TOP Times of Pediatrics ™

2018 | Issue 1

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CONTENTS

Chief Editor's Message

Welcome to Times of Pediatrics

Any publication is a process as laborious as the process of delivering a baby. Maturity (contents and the quality), weight gain (number of pages) and intact survival (final copy) all have to be carefully looked after.

'Times of Pediatrics' has gone through all these laborious processes and has come out as an exclusive journal for health-care providers giving guidelines for treatment, bringing uniformity in management and training minds for protocolized thinking. With each issue, the journal will provide concise, precise, and up-to-date information that will help standardize care in practice.

Journals published from the medically advanced countries do not focus enough attention on the prevailing problems and circumstances in the developing countries such as India. When a practitioner is confronted with a clinical problem, he can rarely turn to a text-book for help. What he needs at that time is not a recounting of a long list of differential diagnosis, but practical guidelines as to how to arrive at a particular diagnosis and how to proceed further.

With the help of history, focused examination and minimum investigations, one can reach a working diagnosis and lay down immediate priorities in the management.

"During post-graduation, we learn from standard textbooks.
As we enter into practice, we learn from patients and medical representatives.
Many a times we need to unlearn some of these things and relearn.
TOP will help you learn, unlearn, and re-learn right things".

The goal behind the publication of this journal is to facilitate a logical and efficient stepwise approach to reasonable differential diagnoses for the common pediatric problems. Moreover, it would train the brain to approach a problem.

To put it in the words of Henry David Thoreau...our lives are frittered away by detail; simplify, simplify.

I am sure that the journal will enhance the capabilities of students, house officers, and clinicians guiding them towards optimal utilization of the available investigative and therapeutic resources.

The explosion of knowledge in Pediatrics is phenomenal and fast. If the medical advances and good clinical practice get coupled with effective advocacy, our increasing knowledge will benefit child care in our country.

Dr. Pramod Jog

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National President, Indian Academy of Pediatrics (IAP), 2016
Standing Committee Member, IPA (International Pediatric Association)
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Editorial Message

Dear Doctors,

It gives us immense pride to pen these few lines as the editors for this issue of the "Times of Pediatrics".

The aim of this series is to have a mix of academic, scientific, and lifestyle-related articles to bring you up-to-date with developments in our field. With a view of offering a diverse range of reading material, we have scientific articles in this particular issue on Antimicrobial and Immunomodulatory Activities of Bacillus clausii Probiotic Strains. We also have some insider travel information on Kuala Lumpur the vibrant capital of Malaysia.

Times of Pediatrics is a little different from the standard scientific journals which we are all used to. This series has magazine style layouts and easygoing approach, which is its characteristic.

Do feel free to get in touch with us with your comments, remarks, recommendations for topics to be covered, and feedback you may wish to provide.

"Have the courage to follow your heart and intuition. They somehow know what you truly want to become." -Steve Jobs

Dr. Pramod Jog

Dr. B.R.Thapa

Dr. Sanjay Natu

Dr. S.G. Kasi

Dr. Bhaskar Shenoy

(Editors)

Antimicrobial and Immunomodulatory Activities of *Bacillus clausii* Probiotic Strains

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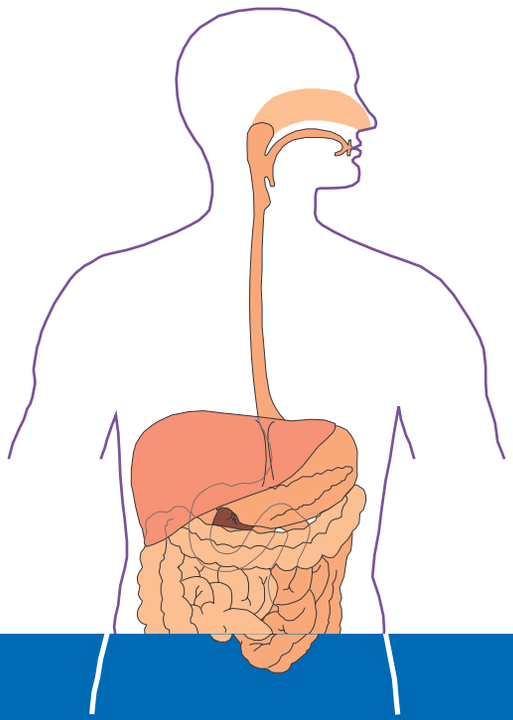


DRUG IN FOCUS

Introduction to probiotics

The concept of using probiotics in the management of various disease conditions dates back to more than 100 years. It has regained much popularity in recent years owing to the rising number of multidrug-resistant pathogens and its potential ability to remodel or shift microbial communities to a healthy state in the management of diarrheal diseases.

Mounting evidence suggests gastrointestinal (GI) infections to be one of the major causes of morbidity and mortality, accounting for approximately 1,575,000 deaths in children <5 years of age every year, globally. The most common causative microorganism includes viruses and pathogenic bacterial strains of *Escherichia coli*, toxigenic *Clostridium difficile* (*C. difficile*), *Campylobacter jejuni*, *and Vibrio cholerae*. Toxins produced by these pathogens can lead to life-threatening dehydration and diarrhea. With the introduction of new molecular assay techniques, *C. difficile* have been identified as a major cause of antimicrobial-associated diarrhea and colitis, accounting for 15%–25% of the cases. This highlights the importance of alternatives to antibiotics for gastroenteritis management such as probiotics. This review aims at exploring the possible mechanism of actions of probiotics, with the key focus on *Bacillus clausii* strains.[1]

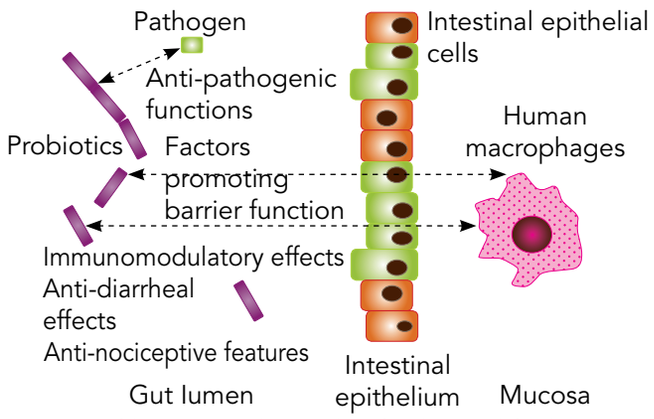
Antipathogenic mechanism of probiotics

Several mechanisms of action of probiotics have been proposed for the management of diarrheal diseases as shown in Figure 1. These include as follows:

Stimulation of host antimicrobial defences

Evidence suggests that the probiotics produce antimicrobial compounds effective against pathogens directly. Corr et al. demonstrated that bacteriocin Abp118 produced by *Lactobacillus salivarius* protected

Figure 1. Probiotics and beneficial effects in the intestine



Depiction of the interactions between beneficial bacteria (left side), their secreted factors, pathogens, and the intestinal mucosa (right side). The arrows indicate the release and possible distribution of secreted factors derived from probiotics.

mice from *Listeria monocytogenes* infection versus strains that failed to produce the bacteriocin.[1]

Pathogen exclusion via indirect mechanisms

The intestinal tract resists the effects of pathogens through the production of a chemical known as defensin. Probiotics help to stimulate defensin activity either by increasing their synthesis or by converting them into their active forms. Evidence suggests probiotics to create unfavorable conditions for the survival of pathogen in the intestinal tract via several mechanisms. Firstly, they alter the ability of the pathogens to adhere to or invade colonic epithelial cells. Second, they compete for essential nutrients thereby impairing pathogen colonization. Third, they alter the gene expression program of pathogens to inhibit the expression of virulence functions. Lastly, probiotics alter the pH of the mucus layer, creating an unfavorable environment for pathogen colonization.[1]

> Probiotics play a protective role against intestinal pathogens by secreting antimicrobial substances, enhancing intestinal barrier function, interfering with pathogens by competitive exclusion, modulating the host immune system and stabilizing microbiota.[1]

Immunomodulation

Probiotics are thought to have strain-dependent effects on the immune system. Different strains of *Lactobacillus* species have been shown to have contrasting effects on the production of proinflammatory cytokines. Stimulation of cytokine production may be important for defence against gastroenteritis, whereas the suppression of immune signalling may be important for restoring homeostasis and promoting healing or resolution of infections.[1]

Enhancing intestinal barrier function

Diarrhea is associated with disruption of epithelial barrier function and loss of tight junction between the epithelial cells. Endotoxins secreted by pathogens promote necrosis of epithelial cells leading to a leaky intestinal barrier. Probiotics have been shown to promote tight junction formation and intestinal barrier functions. It may also suppress toxin production or prevent specific pathogens to adhere to the intestinal surface.[1]

Antimicrobial spectrum of *B. clausii*

Evidence suggests that Bacillus probiotics have beneficial clinical effects, especially in the treatment of diarrhea and in the prevention of infectious diseases. The antagonistic activity of *B. clausii* namely O/C, N/R, SIN, and T of *B. clausii* strains was analysed using colony overlay assay using *S. aureus* and *Salmonella* strains as test culture.[2]

> *B. clausii* O/C strain has been demonstrated to produce an anti-*C. difficile* substance known as bacteriocin clausin.[3]

- All the *B. clausii* strains exhibited anti-staphylococcal activity, but not anti-salmonella activity in vitro.
- The *B. clausii* O/C strain demonstrated to be effective against only gram-positive species including *C. difficile* but not against gram-negative bacteria and fungi (Table 1).
- The time-course study of antimicrobial production was carried out by culturing O/C strain in MH broth media. Significant production of antimicrobial compounds against Staphylococcus was observed in the middle of the stationary growth phase after 35-43 hours of culture growth, which coincided with sporulation as shown in Figure 2. The maximum level of antimicrobial production (74 UA/mL) was observed when the sporulation

Table 1. Inhibitory activity produced by *B. clausii* OC supernatant for different pathogenic and non-pathogenic intestinal bacteria and other microorganisms

Strain tested	Activity
S. aureus CIP† 350 53 156	++
Enterococcus faecium LMBA‡ 27323	+
E. faecium LMBA 27323	+
Micrococcus sp LMBA 26	++
Lactococcus lactis ATCC§ 11454	+
L. lactis LMBA 374	+
Clostridium difficile 514	++
Escherichia coli LMBA 20684	–
Salmonella enterica serovar; *S. typhimurium* ATCC 29629	–
S. flexneri LMBA 12225	–
Vibrio cholera NCTC** 8021	–
V. parahaemolyticus ATCC 17802	–
Pseudomonas fluorescens LMBA BE¶	–
Fusarium oxysporum ox52††	–

*Antimicrobial activity determined by agar diffusion test; †Collection de l' Institut pasteur; ‡LMBA: Laboratoire de Microbiologie et Biochime Applique´e, ENTIA de bordeaux, France; §ATCC: American type culture collection; ¶Hopital pellegrin, bordeaux, France; **National collection of type cultures, England; ††INRA de bordeaux.

rate was 60%. The antimicrobial compounds were relatively thermostable and retained activity after half an hour of incubation at 85°C. Moreover, 60% of anti-staphylococcal activity was demonstrated to be retained in the cell-free supernatant after half an hour of heating at 95°C.[2]

- With the exception of pronase, treatment of the cell-free supernatant with subtilisin, proteinase K, chymotrypsin, lipase, α-amylase, or lysozyme did not affect its antimicrobial activity.[2]

Figure 2. Growth and production of an antimicrobial substance by probiotic strain *B. clausii*

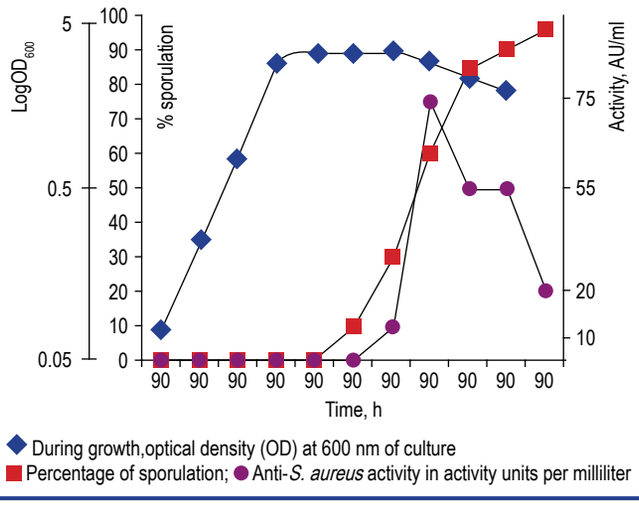
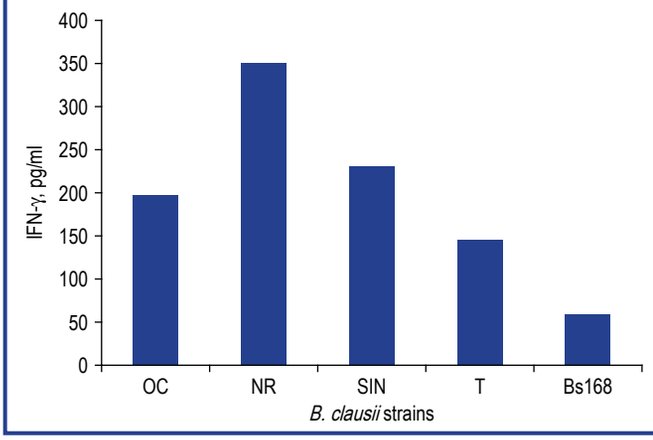


Figure 3. Stimulation of IFN-γ production by murine spleen cells induced with B. clausii probiotic strain



Immunomodulatory activity of *B. clausii*

The immunomodulatory activity of *B. clausii* probiotic strain was demonstrated through their ability to stimulate nitrite production in Swiss murine peritoneal cells after 72 hours of cell culture.[2]

- The vegetative cells of the *B. clausii* strains was shown to induce significant amount of nitrite generation amounting to approximately 100 µM.
- All the 4 strains of *B. clausii* were strongly associated with the stimulation of IFN-γ production, which was significantly higher as compared to that of *B. subtilis* 168 reference strain (Figure 3).

Spleen cells were isolated from C%&BL/6j mice and co-cultured with probiotic strain *B. clausii*T (T), or reference strain *B. subtilis* 168 (Bs168). Analysis of IFN-γ production by murine spleen cells was realized 72 hours later using ELISA.

- All *B. clausii* strains also demonstrated a significant T-cell proliferative response (Table 2).

Table 2. *B. clausii* probiotic strains stimulate proliferation of murine CD4⁺ T cells

Strain/ Immunostimulater	Stimulation of murine CD4+ T cell* proliferation, index of stimulation
B. clausii OC	2.5
B. clausii NR	3.8
B. clausii SIN	2.7
B. clausii T	2.9
B. subtilis 168	1.9
Con A, 2 µg/mL†	3.4

*A total of 5 × 10⁵ CFU bacteria was used for stimulation of 2 × 10⁵ CD4⁺ T cells in the presence of irradiated (3300 rad) naive murine spleen cells (5 × 10⁵ cells), Spleen and CD4⁺ T cells were isolated from C57Bl/6j mice †Concanavalin A was used as a positive control for CD4⁺ T-cell stimulation

Summary points

- Bacteria of Bacillus genus have been well established to produce of a large number of bacteriocins and antibiotics.
- The beneficial clinical effects of the *B. clausii* probiotic strain can be attributed to their antimicrobial and immunomodulatory activities.
- *B. clausii* strains of O/C, N/R, SIN and T have shown to exhibit antimicrobial activity in vitro.
- In vitro studies suggest the antimicrobial substance produced by *B. clausii* O/C strain to be active against the *C. difficile* strains. This finding opens perspectives for the therapeutic benefits of the *B. clausii* probiotic strain in the management of *C. difficile*-associated diarrhoea.

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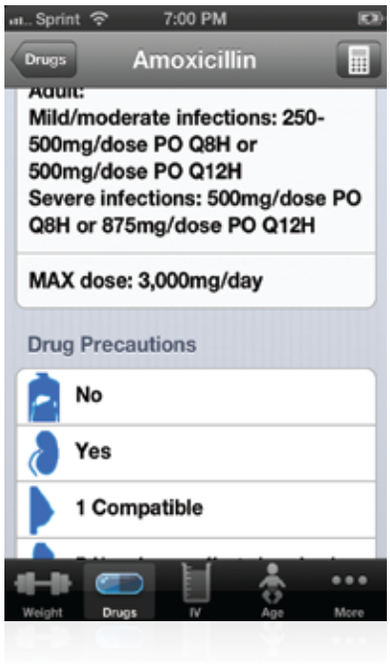
App Review

Pedi QuikCalc

Pedi QuikCalc was created by pediatrician Dr. W. Kent Bonney. Pedia QuikCalc is a useful app for pediatricians, family practitioners, or any physician taking care of children in their practice.

The newborns are unique and challenging to treat and pediatricians track their patients' weights and heights closely to detect any major increases or decreases in growth. Also, a patient's precise age is important, especially early in life when months, days, or even hours of age can make a difference in assessment and management.

Pedi QuikCalc is a simple app to make all of the calculations and recording easier. The app has features such as an IV fluid calculator, weight-based dosage calculator, BMI-for-age calculator, and the ability to plot on CDC or WHO growth charts, and links to helpful resources such as the BiliTool, AAP, and the CDC website.



Compatibility: iPhone, iPad, iPod Touch. Optimized for iPad. Available on the Apple App Store.
Requires: iOS 5.0 or later

PITFALLS

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Pitfalls in respiratory diseases

Respiratory diseases are the commonest cause of morbidity and mortality in children. The disease pattern presenting to the pediatricians ranges from trivial yet troubling benign self-limiting upper respiratory tract infection to severely complicated pneumonia while the diseases can have acute, sub-acute, recurring, relapsing and chronic presentations. Pediatricians face problems and difficulties in diagnosing, investigating and treating a wide range of respiratory illnesses.

There are many pitfalls in recognition and management of respiratory illnesses since the clinical spectrum and presentations can be overlapping. Many symptoms in the office practice will revolve around colds, cough, wheeze, breathing difficulties. Various permutations and combinations of variable intensity, severity, and duration of the symptoms will be the presentations of many diseases. History, clinical examination, and skills of pediatricians come to the rescue in making an appropriate decision. The outcome of good clinical judgment will be not only lifesaving in diseases like pneumonia but also in ensuring good control of diseases like asthma. It need not be emphasized that either simple or expensive investigations are not good substitutes for a thorough clinical evaluation.

Parental counseling for respiratory diseases

Parental counseling forms the mainstay of approach in the management of a majority of URTIs since the episodes tend to recur in the first 5 years of life. Generally, recurring URTI may be common and benign in nature while the recurring LRTI may have underlying significant diseases that cannot be ignored. There is a need for upgrading of clinical

skills since evaluation of URTI calls for a detailed history encompassing the source of infection e.g. another child in the family, onset of the disease for example: sudden onset of high grade fever in the viral URTI, disappearance of fever followed by troublesome cough as in acute viral URTI, detailed information on host factors including nutrition, growth, and immunization status of the child or valuable information about the environmental factors such as parental smoking, daycare admission, bottle feeding, and hand-hygiene practices.

Pediatric allergies

Allergic diseases in childhood pose challenge in the diagnosis since the clinical features are often overlapping with recurring respiratory infections common in the age group. It is needless to say that a good number of exacerbations of asthma or allergic rhinitis are triggered by viral respiratory infections making the clinical diagnosis confusing & challenging. A careful clinical evaluation of risk factors such as personal atopy or family history of parental asthma will be very useful in demystifying in the diagnosis of asthma in preschool age group. The typical nature of the illness such as nocturnal, episodic, trigger- induced, relief with bronchodilator or steroids helps .

Pediatric emergency

A busy pediatrician can some time encounter life-threatening respiratory emergencies and often the failure to recognize them can cause death in the unrecognized. Emergencies can be sole presentation such as foreign bodies in the airway. While the absence of history does not preclude the possibility of a foreign body but a shrewd pediatrician can carefully elicit the history of choking or aspiration of "forgotten foreign body"

It can also be noted that many a times pediatrician has to anticipate forth coming serious emergencies as an apparently benign laryngitis worsening into life threatening severe croup. The knowledge of inhalation therapy and oxygen administration still needs to be upgraded for many of us since errors, a wrong administration can result in the failure of therapy which can prove very costly later.

Prescribing antibiotics

Rational prescription of antibiotics is the need of the hour. The situation can be very tricky since a majority of clinicians get into a false sense of security with the prescription of antibiotics. There is over-reliance in prescribing antibiotics for majority of URTIs and paradoxically, in one of the WHO estimates, at least one fifth of the children dying from pneumonia do not even receive the first dose of antibiotics! Not only the indication of rational prescription of antibiotics needs to be emphasized for pediatricians but also dose, duration and escalation/de-escalation of antibiotics needs to be done appropriately and at times there is an erroneous feeling that parenteral antibiotics work better than the oral counterpart.

Unwanted hospitalization, inadvertent use of IV fluids, nebulizations, and parental drugs can add to the cost of therapy and should be discouraged when not required for all children in a developing country like ours.

Summary

To summarize, diagnosis of airway illness is challenging and interesting owing to the dynamic nature of the illness and a true diagnosis may slip off clinician's mind if he doesn't give valuable time for thorough clinical evaluation. Paradoxically a large number of clinicians indulge in the investigation such as blood count, and X- ray that hardly add or change the course of management in the majority of cases. An indiscriminate ordering of investigation and false interpretation of reports can lead to irrational management of many illnesses.

Late Preterm: An important but often neglected problem

Dr. Sanjay Natu
MBBS, MD Pediatrics

Introduction

Every year, an estimated 15 million babies are born preterm (before 37 completed weeks of gestation), and this number is rising. Preterm birth complications are the leading cause of death among children under 5 years of age, responsible for approximately 1 million deaths in 2015. Across 184 countries, the rate of preterm birth ranges from 5% to 18% of babies born. India is the country with the greatest preterm births. Out of 15 million preterm births globally, 3.5 million take place in India.[1]

Late preterm infants are defined as those born between 34 weeks [239days] to 37 weeks [259days] of gestation.[2] Late preterm infants are the largest subgroup of preterm infants, accounting for more than 70% all preterm birth.[3] They are physiologically less mature and have limited compensatory responses to the extra-uterine environment as compared with term infants.[3] The reason for the increase in late preterm births during the last decade may be the increased use of assisted reproductive technologies.

Compared with term infants, late preterm infants have been shown to have higher frequencies of respiratory distress, temperature instability,

hypoglycemia, kernicterus, apnea, feeding problems, seizures as well as higher rates of rehospitalization.[4] Late preterm infants were considered near term owing to their good weight and appearance of apparent maturity. National Institute of Child Health and Human Development (NICHD) recommended discontinuing the use of the phrase "near term." because it can be misleading, conveying an impression that these infants are "almost term," resulting in an underestimation of risk and less-diligent evaluation, monitoring, and follow-up. Since there is no such thing as a normal preterm infant, "late preterm" conveyed the sense of vulnerability of these infants better than did the phrase "near term".[2]

There are a number of maternal, fetal, and placental complications in which either a late-preterm or early-term delivery is warranted. The timing of delivery in such cases must balance the maternal and newborn risks of late-preterm. Decisions regarding the timing of delivery must be individualized. The American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine have long discouraged non-indicated delivery before 39 weeks of gestation. The reason for this long-standing principle is that the neonatal risks of late-preterm (34 0/7–36 6/7 weeks of gestation). Recommendations for the timing of delivery when conditions complicate pregnancy at or after 34 weeks of gestation are placenta praevia, placenta praevia with suspected accreta, increta, or percreta , prior classical cesarean, and prior myomectomy.[5]

Late preterm infants pose unique challenges to physicians and nurses involved in their care after birth. They may be cared for in different units within hospitals after birth, including Neonatal Intensive Care Units, Newborn Nurseries, or rooming in with the mother. As a result of their gestational age and birth weight, the late preterm infant is often assessed quickly and triaged identical to term infants. Such practice can potentially result in a lack of attention to important components for the successful transition after birth. Overall morbidities in late preterm have been noted to increase 20-fold with each week lost before 38 weeks gestation.[6] Late preterm neonates have significantly higher rates of morbidity and mortality relative to those born at term (37–42 weeks). In addition to higher risks for serious health complications, the mortality rate for late preterm infants is 4-fold higher than that for term infants.[7]

Management

The National Perinatal Association developed Multidisciplinary Guidelines for the Care of Late Preterm Infants,[8] in collaboration with many expert individuals and organizations, which provide valuable information to physicians, midwives, nurses, ancillary members of the healthcare team and most importantly, the parents of late preterm infants.

For practical purposes, the guidelines are divided into four sections:

1. In-hospital assessment and care
2. Transition to out-patient care
3. Short-term follow-up care
4. Long-term follow-up care

Within each section, the guidelines are further divided into four Subsections:

1. Stability
2. Screening
3. Safety
4. Support

Each guideline includes recommendations for the Healthcare Team and for Family Education.

Short-term follow-up care late preterm infants should be seen by their community primary care provider within 1–2 days after transition/discharge from the hospital; the provider should assess the infant's continued stability, review screening results, ensure ongoing safety, and evaluate the adequacy of support systems. Because of feeding difficulty in late preterm infants, it is especially important that breastfeeding late preterm infants be seen within a day after transition/discharge. Short-term follow-up care should include weekly assessments until the infant reaches 40 weeks of corrected gestational age

(GA). More frequent visits may be necessary if weight or bilirubin checks are indicated.

Long-term follow-up care there is no frame time to end long-term follow-up care of late preterm infants. Because research has documented increased morbidities for late preterm infants during infancy, childhood, adolescence, and through adulthood, follow-up care must begin at birth and continue, with varying degrees of surveillance and reflecting individual needs, throughout the lifespan. During the long-term follow-up care active parent's participation must be ensured. Long-term follow up care includes monitoring of growth, screening for sensory organs, developmental and behavioral screening.[8]

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CONFERENCE CALENDAR

January 23–24, 2019
International Conference on Pediatrics, Nursing and Healthcare
London, UAE

January 28–29, 2019
Annual Congress on Pediatric Toxicology
Osaka, Japan

January 28–29, 2019
31st World Congress on Pediatrics
Osaka, Japan

January 30–31, 2019
International Conference on Maternal Fetal and Neonatal Medicine
Dubai, UAE

Feb 7–10, 2019
PEDICON
Mumbai, India

February 18–19, 2019
16th International Conference on Pediatrics and Pediatric Cardiology
Amsterdam, Netherlands

February 18–19, 2019
12th Annual Meet on Pediatric Surgery and Pediatrics
Paris, France

February 21–22, 2019
Annual Congress on Pediatric Radiology
Osaka, Japan

February 25–26, 2019
5th World Congress on Pediatric Surgery and Pediatric Surgeons
Seoul, South Korea

February 28–March 01, 2019
22nd World Congress on Pediatric Cardiology & Heart Failure
Osaka, Japan

The role of Vitamin D in allergic diseases in children

Miraglia Del Giudice M, Allegorico A.

Vitamin D modulates a variety of processes, and has an important role in different allergic diseases such as asthma, atopic dermatitis, and food allergy.

Growing evidence connecting vitamin D to allergic diseases like asthma, atopic dermatitis (AD), and food allergy

- Vitamin D and its receptor (VDR) are both essential for the development of natural killer cells and for interleukin (IL)-4 and interferon (IFN)-g production.
- Natural killer cells produce several proinflammatory cytokines.
- Vitamin D can suppress the proinflammatory cytokine IL-17, which has a key role in non-atopic asthma.

Vitamin D and asthma

- Higher serum levels of 25(OH)D are associated with a reduced risk for asthma exacerbations and hospitalization.
- Vitamin D can potentially increase the therapeutic response to glucocorticoid and potentially be used as an add-on treatment in steroid-resistant asthmatic patient.

Vitamin D and atopic dermatitis

- Vitamin D deficiency is related to the severity of atopic dermatitis.

Vitamin D and food allergy

- Low blood vitamin D level is a risk factor for food allergy.
- Vitamin D supplementation may have a role in allergic illness.

Reference: Miraglia Del Giudice M, Allegorico A. The Role of Vitamin D in Allergic Diseases in Children. J Clin Gastroenterol. 2016 Nov/Dec;50 Suppl 2, Proceedings from the 8th Probiotics, Prebiotics & New Foods for Microbiota and Human Health meeting held in Rome, Italy on September 13-15, 2015:S133-S135.

Breastfeeding

The natural choice for a healthy start

Nursing is a wonderful experience, both for the mother and the baby. Breastfeeding helps the mother in bonding closely with their babies. Mother's milk is a natural and a 'perfect food' which is easily digested and absorbed by the newborn.

Advantages of breastfeeding

For the mother	For the baby
• A natural method of birth control • Space pregnancies • The uterus returns quickly to its normal size • Emotional satisfaction	• Essential nutrients such as good quality proteins, fat, vitamins, calcium, and iron • Good growth up to 6 months of age • Better brain development • Source of energy during baby's illness • Protection against infections, diseases • Decreases the chances of obesity in later life

Preparation for breastfeeding

A good latch is important to successful breastfeeding.

- Sit comfortably with good back support.
- The baby should be tummy-to-tummy in position. Keep the ear, shoulder, and hip aligned.
- Hold the breast and guide the nipple to the baby's mouth.
- Get maximum area around the nipple in the baby's mouth
- Latching on.

Positioning your baby to feed

Cradle hold

Cross-cradle hold

Side-lying cradle

Recommendations for breastfeeding

- Start feeding within an hour after delivery and feed the colostrum.
- Should be exclusively for minimum 6 months and if possible for ≥2 years along with nutrient-rich complementary foods.

KUALA LUMPUR

THE VIBRANT CAPITAL OF MALAYSIA

Kuala Lumpur is the sultry capital of Malaysia packed with historic monuments, steel-clad skyscrapers, lush parks, mega-sized shopping malls, bustling street markets, and lively nightspots.

Kuala Lumpur is a vibrant mix of the incense-wreathed, colourfully adorned mosques and temples of the country's Malay, Chinese, and Indian communities.

For such a frenetic city, Kuala Lumpur has an uncanny way of charming its visitors. When it comes to food, the sheer variety of delicious dining options reflects the very best of Malaysian cuisine. The way Kuala Lumpur has embraced modernity with its towering skyscrapers and technological connectivity, all while being deeply entrenched to the traditional customs and religions of its residents, is amazing. Beyond the traffic and malls there is a complex cultural patchwork formed of distinct, coexisting communities, united by the warm welcome extended to guests.

Kuala Lumpur has a year-round tropical climate that is warm and sunny, along with abundant rainfall. It can even rain daily during October to March and is dry in June and July. A true metropolis with a big central business district with many tall skyscrapers and internationally renowned hotels, and numerous luxurious shopping malls, Kuala Lumpur is where you can experience one of the oldest jungles in the world, Taman Negara National Park, which is closely located to it.

For the use of a registered medical practitioner or a hospital or a laboratory only.

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