EXPERIENCES WITH OBJECTIVE STRUCTURED CLINICAL EXAMINATION (OSCE) AS A TOOL FOR FORMATIVE EVALUATION IN PEDIATRICS

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ABSTRACT

Mean scores obtained at objective structured clinical examination (OSCE) and clinical case (CC), by 4 groups of 15 students each were compared. The range of dispersion was more with OSCE as compared to CC. There was no correlation between the scores obtained at OSCE and CC. It is suggested that OSCE can be employed for evaluation of specific clinical skills; however, for comprehensive evaluation, a combination of OSCE and CC should be used.

Key words: *OSCE, Student Evaluation, Psychomotor skills.*

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There has been no uniform agreement on the tools that can be considered perfect to reliably evaluate the clinical competence of medical students. Traditionally, the clinical case presentation has been used for assessing the clinical skills and reasoning process. However, it is time consuming and at times subject to the examiner's bias. Because of this, case presentation alone cannot be considered as a reliable method. Objective structured clinical examination (OSCE) has been proposed as an alternative for assessing the clinical skills(1). It has been reported to be less time consuming, free from subjectivity and relatively reliable.

We have been using OSCE as a tool for formative evaluation for over two years now. For initial one year, it was the only form of practical examination given to the students after they completed 9 weeks of pediatric posting in their third year. When the same students came for their second posting in the fourth year, it was felt that despite scoring very good marks in OSCE, their effective clinical reasoning process (CRP) and structuring of knowledge for use in clinical contexts (SCC) was not good. Since evaluation determines the way in which students will study despite anything teachers may say about the goals of a course(2), for subsequent batches of students, the scheme of evaluation was modified to include OSCE as well as clinical case (CC) presentation.

The present communication describes our experiences with OSCE *vis-a-vis* clinical case presentation (CC) in evaluating medical students.

Material and Methods

Sixty third year medical students, who were evaluated during the period April, 1991 to October, 1992 formed the study material. out of 100 marks assigned, 50 were kept for theory while remaining 50 were assigned to practical and viva. Out of the practical marks, OSCE and CC were assigned 20 marks each.

OSCE: This was planned and conducted using the standard methodology(1). There were 12 stations. Of these, 2 were on assessment of nutritional status, 1 on diet calculation, 2 on history taking (1 procedure + 1 question), 2 on physical examination (1 procedure + 1 question), 2 on history taking/physical examination of a neonate (1 procedure + 1 question), 1 on radiological interpretation, 1 on developmental assessment and 1 on nursing care of sick babies. All procedure stations had a pre-determined checklist, which was scored by pediatric residents except the nursing station, which was done by the ward sister. Examples of stations and the check lists have been shown in *Appendix I.*

CC: Each student was allotted a case and given 30 minutes for working up the same. The presentation was graded by a senior faculty member.

The marks scored in OSCE and CC were compiled and their mean + SD was calculated. Co-efficient of correlation between the 2 sets of scores and its significance was calculated from standard stastical tables. In addition, the reliability of OSCE was calculated by applying tests for internal consistency using split half method and Pearson product moment correlation(3). Significance of the values thus obtained was checked.

Results

The range of marks obtained and mean marks for OSCE and CC for 4 groups of students are shown in *Table I.* It may be noted that range of dispersion is more with OSCE than with CC. There was no significant correlation between the scores of OSCE and CC.

For determining internal consistency, the scores of all the students were pooled. Reliability of half test was 0.23 while reliability of full test was 0.37 which had a significance of 0.01 at 58 df.

Discussion

The assessment of clinical competence is still far from satisfactory. With the present level of our understanding, no single method of assessment gives a reliable estimate of student's knowledge. OSCE has the advantage of being relatively free from subjectivity. Our data indicates that OSCE had a high degree of reliability, which was statistically significant. Thus, for evaluation of clinical skills, it can be considered a good means of practical examination.

However, in actual practice, a physician is required to do more than merely acquire sound psychomotor skills. It requires an intricate mix of cognitive, psychomotor and effective abilities to take history, examine the patient, make a diagnosis by analyzing and synthesising the data and suggest a treatment plan. OSCE in its present form, fails to take care of these aspects. Thus, by relying on OSCE alone as a means of assessment, we might be restricting our evaluation to only one domain of learning.

Conventional case, on the other hand, takes all these factors into consideration but is rather unreliable due to subjective

TABLE I—*Summary of Scores*

Group	No.	Test	Range of marks (Max 20)	Mean + SD	r
A	15	OSCE	9	13.34 + 3.2	0.31
		CC	6	7.29 + 2.19	
B	15	OSCE	11	10.38 + 5.19	0.19
		CC	5	8.34 + 2.29	
C	15	OSCE	9	9.46 + 2.13	0.21
		CC	6	7.37 + 4.21	
D	15	OSCE	7	10.49 + 3.12	0.17
		CC	9	6.12 + 4.12	

None of the regressions were significant.
OSCE: Objective structured clinical examination;
CC: Clinical case presentation.

bias. It may be noted that no significant correlation was found between scores of OSCE and CC. In other words, it means that good scores at OSCE don't mean a good performance at case presentation and vice-versa.

In view of these observations, we feel that OSCE alone cannot be used as a sole means of evaluating clinical competence. In some other reported studies(4), objective structured practical examination (OSPE) has been found adequate to replace the practical examinations. We feel that for pre- and para-clinical subjects, using OSPE may be alright but for clinical subjects like pediatrics, a comprehensive evaluation package containing both OSCE and CC should be employed. Giving relative weightage to each is another issue. At present, we are giving equal weightage to both. However, it is possible that with better understanding we may be able to design OSCE stations, which will not only test psychomotor skills but other domains of learning as well. Work is on in this department and stations for effective learning have already been developed. It may then be necessary to review the relative weightage.

REFERENCES

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Appendix I—*Examples of Procedure Station*

I. Baby Mala was born on 27 February, 90. She has been brought to the well baby clinic today. Her weight is 13.2 kg.

Plot the weight on the well baby card and write a prescription for the immunization due.

Material provided : Well baby card, prescription slips, pencil. Time allowed 4 min.

II. Take history of this neonate up to and including birth history.

Checklist for observer	*Marks*
Birth order	½
Antenatal care taken	1
APH	½
Edema feet	½
Hypertension during pregnancy	½
Urine examination	½
Gestation	1
Place of delivery	1
Attendant - doctor/nurse/dai/othes	½
Duration of labour	1
Instrumentation	½
Cry at birth	½
Breathing effort at birth	½
Color at birth	½
Cord round neck	½
Rupture of membranes	½
Time allowed : 4 min Maximum	10

Example of a Question Station

III. Regarding the history you have just taken. Write True or False (Negative marking).

1.	Mother had spotting PV at 3 months of age	2
2.	Mother had no swelling of feet during pregnancy	2
3.	Forceps was applied during second stage	2
4.	There was premature repture of membrances	2
5.	Baby was blue at the time of birth	2
Time allowed		4 min

RECOMMENDATIONS OF SUB-COMMITTEE CONSTITUTED BY MEDICAL COUNCIL OF INDIA TO PREPARE SYLLABUS IN PEDIATRICS FOR UNDERGRADUATE MEDICAL STUDENTS

The Medical Council of India constituted a Sub-Committee under the Chairpersonship of Dr. Meharban Singh, Professor and Head, Department of Pediatrics, All India Institute of Medical Sciences, New Delhi, to deliberate on the following issues : (*i*) The Committee shall prepare a syllabus within the time frame as suggested in the enclosed documents and to attain the goal related to this subject as indicated in the draft recommendations of the Workshop: (*ii*) The Committee should further recommend books/reading material appropriate to the syllabus recommended: (*iii*) The Committee shall make specific recommendations in respect of teaching methodology and evaluation in the relevant subject keeping in view of the fundamental recommendations of the Workshop: (*iv*) Any other recommendations which the Committee feels relevant.

The Committee (*Annexure 1*) deliberated on the various issues outlined above and made the recommendations under the following headings :

I. Departmental Objectives

* Pediatric Curriculum
* Goal
* Objectives
  - Knowledge
  - Skills

Attitudes/communications skills
* Integration

II Syllabus (Content)
* Didactic teaching
* Skills

III. Learning Opportunities
* Phasing and time allocation
* Conceptual framework
* Integrated teaching
* Teachers' training and resource material
* Clinical clerkship
* Tutorials
* Intership

IV. Assessment

V. Appropriate Books

I. Departmental Objectives

The sub-committee reviewed the objectives listed in the Medical Council of India, (MCI) document and refined them without deviating from the overall spirit. The sub-committee recommends that the objectives written hereunder be incorporated in the future documents of the MCI.

(a) Pediatric Curriculum

The course includes systematic instructions in growth and development, nutritional needs of children, immunization schedules, and management of common diseases of infancy and childhood, community pediatrics and health education.

(b) Goal

The broad goal of the teaching of undergraduate students in Pediatrics is to provide them with adequate knowledge and appropriate skills to handle common health problems of children in order to ensure their optimal growth and development.

(c) Objectives

Knowledge

At the end of the course, the student will be able to:

1. Analyze the health priorities of the country and discuss the key importance of child health for human resource development.
2. Describe the normal growth and development during fetal life, neonatal period, childhood and adolescence, and identify deviations thereof.
3. Describe the common neonatal and pediatric disorders including emergencies in terms of epidemiology, etiopathogenesis, clinical manifestations, diagnosis, rational therapy and rehabilitation.
4. State age-related requirements of calories, nutrients, fluids, drugs, *etc.* in health and disease.
5. Describe preventive strategies for common infectious disorders, malnutrition, genetic and metabolic disorders, poisonings, accidents and child abuse.
6. Outline national programmes relating to child health.

Skills

At the end of the course, the student will be able to:

1. Take a detailed pediatric history, conduct an appropriate physical examination of children including neonates, make clinical diagnosis, interpret common laboratory investigations, and plan and institute therapy.

2. Take anthropometric measurements, resuscitate newborn infants at birth, prepare oral rehydration solution, perform tuberculin test, administer vaccines available under current national programmes, perform venesection, start an intravenous line and provide nasogastric feeding.
3. Conduct relevant simple bed-side investigations like hemogram, urine analysis, examination of stools and biological fluids; and assist in performing diagnostic procedures such as lumbar puncure, liver and kidney biopsy, bone marrow aspiration, pleural and ascitic tap, *etc.*
4. Distinguish between normal newborn babies and those requiring special care, institute early care to all newborn babies including those who are low birth weight, and provide guidance and counselling regarding infant feeding and mothercraft.
5. Provide ambulatory care to all sick children, identify indications for specialized/inpatient care, and ensure timely referral of those who require hospitalization.

Attitudes/Communication skills

1. Demonstrate empathy and humane approach towards the child patients, his parents and attendants.
2. Demonstrate interpersonal and communication skills befitting a physician in order to discuss the child's illness with the parents/family and to hold health education session on care of the child, immunisations, feeding, home care during diarrhea and respiratory infections, *etc.*

(d) Integration

The training in pediatrics should prepare the student to deliver preventive, promotive, curative and rehabilitative services for care of children both in the community and at hospital as part of a team in an integrated form with other disciplines.

II. Syllabus (Content)

The focus of training in pediatrics shall be the disorders seen and managed at primary health centre or in general practice. The sub-committee identified topics which students 'must know' and those they 'should know'. In view of the high contribution of neonatal mortality (over 60%) to infant mortality rate, it is recommended that about 25% of didactic and bed-side clinical teaching in pediatrics should be devoted to neonatology. There should be at least 10 didactic lectures pertaining to normal and high risk newborn babies and their health problems. During their posting in the Department of Obstetrics and Gynecology, the undergraduate students should be asked to attend one clinical teaching session every week with the neonatologist so that there is continuity in their learning process from looking after the fetus during pregnancy, through delivery and neonatal period.

Didactic teaching

The didactic teaching in the form of lectures should be restricted to one-third of the teaching programme. It is desirable to outline the objectives, scope and contents of each lecture so that teacher is provided with detailed guidelines to cover essential aspects of the topic. The national programmes pertaining to maternal and child health should be taught by the faculty of Department of Pediatrics in collaboration with faculty members of the Department of Community Medicine.

The curriculum content will be viewed

as 16 MODULES, as listed in detail hereunder. Intermediate objectives for each Module and specific objectives for each unit within each Module will have to the defined as the next step once the Medical Council of India approves the present syllabus.

After each Module of didactic teaching, there should be formative assessment and a 'feed-back' session with the students to evaluate the teaching programme and incorporate suggestions of the students for future improvements. The Modules of didactic teaching are outlined below :

1. Introduction to Pediatrics

1.1 Importance of child health and its determinants, approach to a child patient and his/her family.

1.2 Age distribution of pediatric patients, anatomical and developmental factors affecting childhood illnesses.

1.3 Common causes of childhood morbidity and mortality and indices of child health.

1.4 First aid procedures: cardiopulmonary resuscitation, shock, anaphylaxis and common poisonings.

1.5 National programmes pertaining to child health.

2. Growth and Development

2.1 Definitions, determinants of growth, assessment of growth and concept of percentiles.

2.2 Growth and sexual development during childhood and adolescence, anthropometry, velocity of growth, growth monitoring and road-to-health card.

2.3 Developmental milestones, determinants of normal development and factors affecting development of children.

2.4 Assessment of development: gross motor, fine motor, language, social and adaptive, concept of DQ.

2.5 Approach to a child with failure to thrive, growth retardation and short stature.

3. Nutrition and its disorders

3.1 Age-related requirements of calories, nutrients, vitamins, minerals and trace elements.

3.2 Infant feeding practices: breast feeding, artificial/bottle feeding and weaning.

3.3 Protein-energy malnutrition: ecology, diagnosis, anthropometry, growth charts and clinical features.

3.4 Associated deficiencies and complications of protein-energy malnutrition and its management.

3.5 Deficiency disorders related to fat soluble vitamins (vitamin 'A', 'D', 'E' and 'K').

3.6 Deficiency disorders related to water soluble vitamins.

3.7 Nutritional anemias in infancy and childhood.

4. Immunizations

4.1 Introduction, active and passive immunisations, national immunisation schedule, contraindications and adverse reactions to vaccines.

4.2 UIP, EPI, cold chain, logistics, techniques of vaccinations, *etc.*

5. Fluid and electrolytes

5.1 Pathophysiology of fluid, electrolytes and acid base balance and principles of management (2 lectures).

6. Neonatology

6.1 Definitions, health indices, classifica-

tion, identification of high risk newborn baby.

6.2 Care of the newborn baby at birth including cardio pulmonary resuscitation.

6.3 Care of the normal newborn baby including breast feeding.

6.4 Common minor developmental neonatal problems.

6.5 Neonatal infections including superficial infections, septicemia and tetanus neonatorum.

6.6 Problems and management of low birth weight babies in the hospital and community.

6.7 Common congenital malformations and identification of life threatening surgical emergencies in the newborn.

6.8 Neonatal jaundice.

6.9 Respiratory distress in a newborn baby.*

6.10 Effects of maternal medications on the fetus and suckling infant.

7. Infectious diseases (I)

7.1 Common childhood exanthematous illnesses: measles, rubella, chickenpox.

7.2 Mumps and whooping cough

7.3 Typhoid fever

7.4 Diphtheria

7.5 Tuberculosis (2 lectures)

8. Infectious diseases (Parasitic disorders) II

8.1 Common infections: roundworms, threadworms, hookworms, etc.

8.2 Malaria including cerebral malaria and its management.

8.3 Amebic dysentery and giardiasis.

9. Gastrointestinal system

9.1 Acute diarrhea and dysentery: epidemiology, etiology, pathophysiology and clinical manifestations.

9.2 Acute diarrhea: assessment of dehydration, management including ORT and nutritional management.

9.3 Persistent diarrhea in infants.*

9.4 Abdominal pain in children.

9.5 Jaundice in a child.

9.6 Some common GI symptoms: vomiting, constipation, rectal bleeding.

10. Respiratory system

10.1 Acute upper respiratory infections including common cold, acute streptococcal pharyngitis, otitis media and croup.

10.2 Acute lower respiratory infections (pneumonias): epidemiology, etiology, clinical features, management including community-based treatment and prevention.

10.3 Bronchial asthma.

11. Cardiovascular system

11.1 Congestive heart failure: causes, diagnosis and management.

11.2 Congenital heart disease.*

11.3 Rheumatic fever and rheumatic heart disease.

12. Genito-urinary system

12.1 Acute glomerulonephritis, hematuria and related problems.

12.2 Nephrotic syndrome.

12.3 Urinary tract infections: acute and recurrent.

13. Hemato-oncology

13.1 Hemolytic anemias in children.*

13.2 Acute leukemias and lymphomas.*

13.3 Solid tumors in children.*

14. Central nervous system and neuromuscular disorders

14.1 Epilepsy including febrile convulsions.

14.2. Pyogenic meningitis.

14.3 Tuberculous meningitis.

14.4 Cerebral palsy: etiology, classification, clinical features, management.

14.5 Mental retardation: etiology, clinical diagnosis and classification, preventable/treatable causes, simple laboratory screening and management.

14.6 Hydrocephalus and microcephaly.*

14.7 Myopathies.*

14.8 Acute poliomyelitis and its sequelae.

15. Endocrine system

15.1 Cretinism: causes, early diagnosis and management.*

15.2 Juvenile diabetes mellitus.*

16. Miscellaneous disorders

16.1 Rational antibiotic therapy in children.

16.2 Common behaviour and psychological disorders in children.

16.3 Common poisoining in children : kerosene, insecticides and dhatura.

16.4 Common childhood symptoms that cause undue parental anxiety but are of no serious importance.

16.5 Common chromosomal disorders and genetic counselling.

16.6 Chronic juvenile arthritis.*

16.7 Perinatal and pediatric HIV infection.

Skills

At the end of the undergraduate training in pediatrics, the student *must be* able to:

1. Take pediatric history (including nutritional, developmental, perinatal, social, family and immunization history).
2. Perform physical examination and assess growth and development of neonates, infants and children.
3. Counsel and advise the parents and the family and give health education.
4. Provide basic cardio-respiratory resuscitation to neonates and children using bag and mask.
5. Assess gestation and perform anthropometry (weight, head circumference, mid arm circumference, length/height) and use road to health card.
6. Prepare and administer oral rehydration solution.
7. Give injections of DPT, BCG, measles and tuberculin, give oral polio drops and maintain cold chain for storing vaccines.
8. Give hydrotherapy to bring down fever in children with hyperpyrexia.
9. Administer oxygen through a catheter and by use of head box.
10. Do venipuncture for collection of blood sample and to set up an intravenous drip using scalp vein set.
11. Give orogastric/nasogastric feeding.

Students MUST KNOW all the above listed topics except those marked with an asterik which they SHOULD KNOW.

12. Give appropriate doses of drugs according to body weight/surface area.
13. Give first aid to a child with poisoning, accident and anaphylactic shock.

He *should be* able to perform a lumbar puncture and intubate infants and children requiring cardiopulmonary resuscitation.

III. Learning Opportunities Phasing and Time Allocation

The Medical Council of India has recommended that there shall be a separate examination in Pediatrics during the final professional examination. In the revised recommendations of the MCI, the discipline of pediatrics has been allocated 8 weeks of clinical clerkship during part I of Phase III. It is anomalous because earlier when pediatrics was clubbed with the discipline of medicine (without any independent examination) the clinical training in pediatrics was allocated 3½ months (14 weeks) for clinical clerkship and while now pediatrics has been made a separate subject, a clinical posting in pediatrics has been reduced to 8 weeks. It is recommended that clinical clerkship in pediatrics should be allocated 8 weeks each during part I and part II of Phase III clinical teaching so that a total of 16 weeks are allocated for the teaching of pediatrics which shall be in accordance with the WHO recommendations that 300 hours should be allocated to the discipline of pediatrics for undergraduate teaching programme.

Conceptual Framework

The didactic teaching should be kept to the bare minimum and emphasis should be given to skill and task-oriented teaching. The students should be encouraged in the process of self-learning with emphasis on problem solving type of approach. Instead of emphasis on memorisation of facts and recall, the student should be trained to acquire professional skills to manage common clinical problems. There should be an appropriate balance between teaching conducted in the hospital and at the community-based primary health centre. The teacher should pay the role of a facilitator and motivator for the students. The major emphasis in teaching should be to provide comprehensive knowledge and skills for management of common health problems of children prevalent in the community.

The batches for bed-side clinical teaching should be restricted to a maximum of 10 students so that all students can individually assess various abnormal physical signs. The Part I Phase III clinical teaching should be imparted in the out patient department so that students are given instructions to acquire skills for history taking, symptom review, evaluation of growth and development, anthropometry, common childhood ambulatory disorders and administration of immunisations, *etc.* During Part II Phase III they should undergo their clinical clerkship in the children medical wards and community based hospitals in the periphery. During clinical phase of training there should be good integration with the disciplines of Obstetrics and Gynecology and Community Medicine for teaching of pediatrics.

Integrated Teaching

The teaching of pediatrics should be integrated with paraclinical disciplines of Pathology, Microbiology and Pharmacology during Phase II and III. The microbiologist should be involved in the teaching of pediatric infectious diseases in which he should explain the attributes of infective agent, collection and transport of samples,

identification of pathogens, immune response and immuno-diagnosis. The pathologist should be actively associated for the teaching of childhood tuberculosis, rheumatic fever, acute pyelo and glomerulo-nephritis, nephrotic syndrome, pneumonias, bleeding disorders and children with malignancies such as acute leukemias and solid tumors. The knowledge regarding pediatric pharmacokinetics, drug doses, drugs during pregnancy and lactation and rational antibiotic therapy should be taught in collaboration with faculty of the Department of pharmacology during Phase II.

The comprehensive concept of developmental biology should be introduced during the preclinical phase by teaching embryology, developmental anatomy, developmental pathology, developmental biochemistry and developmental pharmacology, *etc.* There is a need to consider newer approaches to integrated teaching. An innovative curriculum in infectious diseases incorporating the pediatric aspects developed at AIIMS (and being submitted by the MCI sub-committee on Microbiology) is a model worth trying at selected centres before it can be universally recommended.

Teachers Training and Availability of Resource Material

The teachers must be imparted formal training in the art of teaching methodology. They should harness latest audio-visual aids to impart effective teaching and training to the students. The Medical Council of India should ensure that all the Pediatric Departments of teaching hospitals are equipped with *Level II special care neonatal units and diarrhea treatment and training units* so that optimal teaching in neonatology and diarrheal disorders is imparted. The neonatal unit should have manikins for teaching and demonstration of resuscitation of asphyxiated newborn babies. The teaching can also be augmented by availability of video films covering common childhood disorders especially diarrheal disorders, acute respiratory infections and cardio pulmonary resuscitation.

Clinical Clerkship

Since the present system involves students spending full day in the department, they should attend OPDs, work up cases, learn procedures and record clinical course of patients. The following clinical demonstrations should be attended by the undergraduate students during their clinical posting in pediatrics:

(*a*) *First Posting (8 weeks)*

1. History taking in children.
2. Approach to general physical examination and systemic examination of children.
3. Anthropometry for assessment of physical growth.
4. Developmental examination for assessment of developmental status.
5. Protein-energy malnutrition: marasmus, marasmic kwashiorkor, kwashiorkor.
6. Anemia in a child.
7. Common deficiency disorders including nutritional anemia, rickets and vitamin 'A' deficiency.
8. Acute gastroenteritis and assessment of dehydration.
9. Acute upper and lower respiratory infections.
10. Acute febrile illnesses and exanthemata.

(*b*) *Obstetric Posting (8 days)*

1. Resuscitation of neonates.
2. Examination of a newborn baby.
3. Normal newborn: Common problems.
4. Low birth weight neonate.
5. Common peculiarities/problems of neonates.
6. Neonatal jaundice.
7. Neonatal infections.

(*c*) *Second Posting (8 Weeks)*

1. Child with jaundice.
2. Bleeding disorder.
3. Generalised edema or anasarca.
4. Isolated ascites.
5. Hepatomegaly/Splenomegaly.
6. Persistent diarrhea.
7. Seizure disorder.
8. Acute bacterial meningitis.
9. Tuberculous meningitis.
10. Primary pulmonary complex and disseminated tuberculosis.
11. Acute paralytic poliomyelitis.
12. Growth retardation and short stature.
13. Congenital heart disease.
14. Rheumatic heart disease.
15. Cerebral palsy.
16. Mental retardation including Down syndrome and cretinism.
17. Hydrocephalus and microcephaly.

Students must work up and record clinical course of at least 10 cases during their second posting.

Tutorials

During the period of clinical clerkship, the students should be asked to prepare tutorials which should be discussed under the preceptorship of a senior resident/faculty member on the following topics:

1. Anthropometry to assess the growth.
2. Assessment of degree of dehydration and preparation of oral rehydration solution.
3. Calculation of caloric and protein intake of children on the basis of their dietary intake, assessment of nutritional status, interpretation of a growth monitoring chart, classification of protein-energy malnutrition and management thereof.
4. Assessment of developmental status of children and evaluation of sexual maturity staging during adolescence.
5. Resuscitation of newborn (Using manikins, *etc.*)
6. Administration of immunizations, indications, contraindications, side effects, practical aspects for maintenance of cold chain.
7. Common instruments used in pediatric practice and common pediatric procedures.

Internship

Internship provides the most important opportunity to learn skills. One month of mandatory intership in Pediatrics should be utilized to involve the students in a supervised clinical work in the outpatient and impatient setting. Following tasks will be performed by the intern and recorded in the *log book:*.

1. Attend
   * General OPDs (8-10)
   * Under-five clinics (4-5)
2. Work-up indoor cases, maintain records, follow clinical course
   * Inpatient cases (8-10)
   * Newborn (4-5)

3. Attend 10 deliveries to resuscitate neonates and provide them care at birth.
4. Perform the following procedures under supervision:
   * Venesection for collection of blood sample (5)
   * Inserting scalp vein needle/ intravenous catheter (5)
   * Urine examination (Protein/sugar/ME) (5)
   * Hb,TLC, DLC, peripheral smear examination (10)
   * Oral rehydration therapy (10 cases)
   * Lumbar puncture (2)
   * Insert naso/orogastric tube (10)
   * Mantoux test (5)
   * Oxygen therapy (5)
5. Observe and assist the following procedures :
   * Umbilical vessel catheterisation (2)
   * Intubation (2)
   * Liver biopsy (2)
   * Kidney biopsy (1)
6. Give following vaccines :

BCG ID	(10)
DPT IM	(10)
OPV oral	(10)
Measles SC	(10)

7. Give health education talks to small groups.

Neonatal care and mothercraft	(1)
Breast feeding, nutrition	(1)
Home care during diarrhea/ARI	(1)

Interns should also be put on night duties (under supervision) to orient them to handle pediatric emergencies.

IV. Assessment

There should be regular formative internal assessment after each clinical posting. The weightage of internal assessment should be at least 20 per cent of the total marks allocated to the subject of pediatrics. The separate final examination in pediatrics should be allocated 200 marks with distribution as shown below:

Theory	60
Viva voce	20
Practicals	80
Internal assessment	40
Total	200

The internal assessment of 40 marks should be further sub-divided into 10 marks each after the conclusion of block posting of 8 weeks each, and 20 marks (10 marks for theory and 10 marks for practicals) should be allocated to pre-professional examination.

The assessment should evaluate those aspects of knowledge and skills which have been taught to the students and which are relevant to serve their needs as first contact physicians working in the community disorders rather than rare esoteric complex metabolic disorders. Roughly 80 per cent of the assessment should be devoted to 'must know' areas. The plan of final examination shall be as follows:

Theory Paper

* Structured Essay Questions (70%)
* Multiple Choice Questions (30%)

The theory paper must cover a wide cross section of the syllabus by including items from maximum possible modules.

Practicals

* Two short cases
  or
* One short case
  plus

Objective Structured Clinical Exami-

nation (OSCE) (of at least 10 stations)

Viva-Voce

* Structured viva-voce.

For conduction of separate practical and viva voce examination in pediatrics, it is recommended that there should be two external examiners and two internal examiners to evaluate 100 undergraduate medical students in pediatrics and part thereof.

V. Appropriate Books

1. Essential Pediatrics, Ed. O.P. Ghai, Interprint, New Delhi, 1991.
2. Textbook of Pediatrics, Ed. S. Gupte, Jaypee Brothers, New Delhi, 1990.
3. Practical Pediatric Problems by Sir Robert Hutchison.
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Annexure
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