The Department of Pediatrics, Safdarjang Hospital, New Delhi, 1950-2020

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The paper attempts to capture the development of the Department of Pediatrics, Safdarjang Hospital, New Delhi, from a historical perspective in its founding years in late 1950s, showing the progress from its nascent state as a part of adult medicine to a full-fledged independent department with state-of-the-art advances in the 2020s. From an ordinary Pediatrics Department, it was reorganized radically to expand clinical facilities as well as education and research by innovative methods, developing subspecialties including an upgradation of the neonatology division, simultaneously establishing linkages with community level centres. The pioneering workshops for training obstetricians and pediatricians paved the way for initiation of multiple such national workshops across the country, by the Government of India, for establishment of neonatal care units countrywide. It was instrumental in the formulation of 'Essential Newborn Care' as the first national newborn care program and later a new concept of 'Mother and Neonatal Care Unit (M-NICU)' for perinatal care, apart from many other contributions for shaping national policies.

Keywords: *Child health programs, Iconic institution, M-NICU, Pioneering, Workshops.*

The time period between 1940 and 1960, of the last century, was one of the most challenging periods for child health in the country. The infant mortality rate was over 150 and the neonatal mortality rate over 100 [1]. A few cities in the country like Mumbai, Chennai, and Delhi had pediatric care facilities, with only a handful of pediatricians. The country had no specific child health program, and the child was considered and treated as a mini adult. Pediatrics was not even recognized as a specialty and was part of general medicine. The transition of pediatrics began in the sixties and the seventies. It formally separated from medicine and became an independent subject, and newborns became the domain of pediatricians. Subsequently, pediatric sub-specialties developed, and child health found its place in the national five-year plans, with dedicated health policies and programs.

The Department of Pediatrics, Safdarjung Hospital, was an integral part of this historic journey. The distinctive innovative clinical services and the path-breaking pioneering research carried out at this institution has influenced national policies, thereby creating an indelible footprint in the history of pediatrics in India.

The Initial Years: 1950-1960

The hospital was established in southern Delhi in 1942, and was rebuilt in the fifties as a multi-specialty hospital. The pediatrics department had three pediatric and one pediatric surgery unit, each with 50 beds, and was headed by a pediatrician and a pediatric surgeon, respectively. The outpatient department functioned from a barrack, while emergencies were attended to in the hospital's emergency department.

The Department of Obstetrics and Gynecology included an outpatient department (OPD) and casualty, and two separate labor rooms, one for aseptic cases and the other for infected cases. In the instance where a newborn had delayed cry at birth, the traditional custom of slapping the buttocks was performed by the obstetrician. Pediatricians attended deliveries done by caesarean section, but not normal deliveries, unless called for.

The newborns were transferred to their mothers/special care nursery, after initial observation. Two separate large rooms without ancillary facilities functioned as Special Care Nursery. The status of newborn care during this decade is summarized in **Box I**.

1960-1978

The author (SKB) joined the Department in 1965. Dr. Shanti Ghosh, who joined as Head, Department of Pediatrics in 1966, radically reorganized the Department along with Dr. S Vaishnava, Dr. GP Verma, and SKB.

Clinical Services

General Pediatrics: While the three-unit system continued as before, a unique OPD service was established with the concept of 'under-five clinics.' Separate sections designated for anthropometry, immunization, nutrition, and consultation were introduced for the benefit of each patient. The nutrition section visually explained the needs of a young child utilizing a typical Indian *thali*, common in

Table I Status of Newborn Care (1956-66)

No of Births	: 7064
Neonatal mortality rate	: 43
Pediatrician	: Visiting
Residents	: Shared with General Pediatrics
Nurses	: Shared with Obstetric wards
Newborn-hospital status	: None
Newborn Care	
• At Birth	• LSCS and emergencies when called • Ambu bag, but no warmer or O2 hood
• Primary level	• Initially in one room for observation • Later rooming in with mother • First clinical examination 24-48 hrs • One round and examination per day • No pre-written protocols, case records

every Indian household. Every child received a 'Road to Health Card', adapted from David Morley's 1974 Health Record, detailing his/her visit.

Sub-specialties: The Department established sub-specialties of pediatric nephrology and juvenile diabetes headed by Dr Sarla Vaishnava, and pediatric cardiology led by Dr SK Sanyal, trained at prestigious institutions abroad.

Neonatology services, which till then were in a primitive state and relatively neglected, were organized as an independent neonatal unit by Dr. Ghosh, with SKB as head. The task to reorganize it was extremely challenging.

Meeting the Challenge

The challenges were met head-on with innovation and collaboration with allied specialties, chiefly obstetrics. The first innovation was creating and implementing a mandatory orientation and training in basic newborn care, imparting skills like resuscitation at birth, to all the staff at the beginning of their postings. Alongside, we proactively communicated with our obstetric colleagues to discuss common clinical problems and devise solutions. This led to increasing mutual trust and resulted in the unexpected gesture of transferring two unused labor rooms to the neonatal unit by Dr. Pinto, Head of obstetrics and gynecology department. This helped reorganize and establish the newborn unit by creating two 25-bedded special care nurseries **(Fig. 1)**.

Lack of equipment in our nurseries was overcome by improvising techniques like using electric light bulb lamps as infant warmers, ordinary needles modified to be used as scalp vein needles, and large bore needles (liver biopsy needle) with standard catheters for exchange blood transfusion, and infant carrying baskets for transporting newborns (**Fig. 2)**.

Regular interdepartmental meetings were started, which included monthly obstetric-neonatology meeting to discuss monthly audit, perinatal mortality conferences with pathology department, interaction with microbiology department for infection surveillance, with radiology, clinical pathology departments and blood bank. In addition, there were daily morning review meetings within the unit to discuss the past 24 hour events, which provided the faculty and trainees a multi-dimensional learning environment well beyond just case management.

All these changes enabled us to introduce the innovation of protocol-based pediatric and neonatal care. Our neonatal unit protocols became representative of the institution and formed the basis of national guidelines.

Problem Focused Approach

The reorganization described above brought striking improvement in the quality of newborn care. But to deal with continuing high mortality in very low birth weight (preterm, IUGR), infections, birth asphyxia, and extreme weather, we adopted a problem-focused approach grounded in research.

Fig. 1 Safdarjang Hospital (a) Obstetric and Newborn wing, and (b) the rooming in practice.

Some such strategies included classification of newborns at birth as appropriate for gestation (AGA), small for gestation (SGA), and large for gestation (LGA) so as to identify high-risk infants [2,3]. A critical review of admissions in extreme weather lead to the diagnosis of Primary Cold and Heat Injury of the newborns [4,5]. These conditions were described for the first time in the country and led to the use of low temperature reading thermo-meters in nurseries, and eventually to air conditioning of labour rooms, nurseries, and postnatal wards. Studies on gastric aspirate cytology helped in the early diagnosis and treatment of intrauterine infections and pneumonias [6]. The study regarding early discharge versus standard discharge of low birth weight newborns from special care nursery, established early discharge of low birth weight infants at 1.3-1.4 kg weight, to be as safe as standard practice and prevented deaths by overcrowding and nursery acquired late infections [7].

These and other studies carried out by the Safdarjang Hospital team changed established practices, improved the outcome of newborn babies, and were adopted nationally.

1979 -1985

Newborn Care Comes of Age

Dr Shanti Ghosh and Dr Vaishnava retired by 1979 and SKB took over the department as Head with a young team. In 1980, in response to a concern raised by the then medical superintendent, Dr NL Pramanik, regarding static neonatal mortality rate and the need for upgrading the neonatal unit to a tertiary level intensive care facility, a detailed proposal was formulated after diligent review and deliberations amongst the clinicians and experienced nurses. The proposal included servo-controlled warmers (open-infant-care systems against standard Isollet incubators for visibility, ease of nursing care, maintenance, lower infection rates, and being user friendly), pulse oximeters, portable transcutaneous vital sign monitors (as opposed to fixed monitors), blood-gas analyzers, oxygen analyzers, and flux meters for measuring phototherapy light intensity. This resulted in the establishment of a state of the art neonatal intensive care unit in 1980 (**Fig. 3**). These measures changed the administrators' viewpoint about newborn care in India.

Intensive Care to Primary Care

The hospital-based newborn care at Safdarjang Hospital highlighted the country's primary need for all three levels of care from primary to tertiary level, to provide affordable, quality newborn care for every infant, irrespective of his/her birth weight, gestational age, place of birth, and the person conducting the delivery.

We, therefore, devised an Indian Council of Medical Research (ICMR) pilot study, "A concept of regionalization of perinatal care." which required establishing primary care at a Primary Health Care Centre at Bhorakala and Secondary Care Centre at Government Civil Hospital, Gurugram, Haryana and Tertiary Care Centre at Safdarjang Hospital, New Delhi in a radius of 70 km. This community-based study involved a primary health centre, a district hospital, and an apex hospital with linkages and referral systems without dedicated, supportive transport and tele-communications services but with a referral available to a higher centre.

Fig. 2 Indigenous improvised equipment.

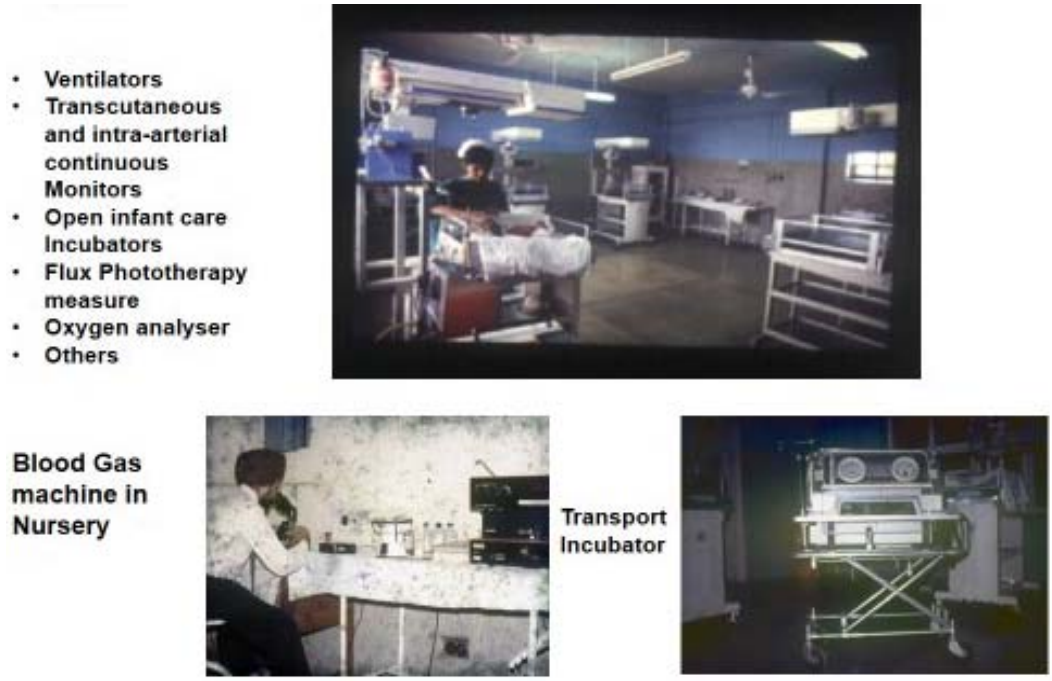

Fig. 3 Neonatal intensive care unit, Safdarjang hospital, 1980.

It was a successful project, demonstrating the feasibility and cost-effectiveness of establishing the three levels of newborn care, equipping them appropriately and training the staff from the dais and traditional birth attendants to auxiliary nurse midwives (ANM), medical officers, nurses and pediatricians, obstetricians to create a functional and practical two-way referral system between community level and apex centers **(Fig. 4)** [8].

Education, Training and Continuing Medical Education

The department firmly believed that in addition to ongoing academic programs, training workshops and continuing medical education was needed across the country. One of the first such training courses was the Government of India – WHO 'Neonatology Orientation Course' by Prof Beryl Corner from Bristol, UK and Prof. Ghosh in 1969.

The success of this initial workshop paved the way for initiation of multiple National Neonatology Training Workshops across the country, in 1979, by the Government of India, in collaboration with WHO. SKB became the first Indian WHO Consultant for the workshops, organized at SAT Hospital and Medical College, Trivandrum, Kerala (1979), SCB Medical College, Cuttack, Odisha, (1980) and the Safdarjang Hospital, New Delhi (1980) for the purpose of training pediatricians and obstetricians to establish such units in their respective states. The department also organized the first pediatric intensive care workshop in 1983, by Government of India, for 22 Heads of the departments of pediatrics across the country.

The department participated in national and international conferences. It progressed from an occasional paper initially to wider publicity with each passing year. Our presentations graduated from an era of epidiascope transparencies to black and white slide projection to innovatively designed colored graphic data presentations.

Research and Publications

Some of the notable research contributions from the department include the development of the Indian Cognitive Development assessment scales; new understanding of common childhood infections and their treatment modalities in the Indian environment, feasibility of mass immunization campaigns [9] and modifying immunization schedules like the efficacy of three doses of the oral polio vaccine [10], need for a BCG booster dose [11], and early measles vaccination.

In neonatology, research accomplishments began with Dr Ghosh's classic paper on questioning the rationale for the international definition of low birth weight [12], describing undetected severe hypothermia causing cold injury and death [4], longitudinal studies from birth to adulthood to assess long-term effect of low birth weight [13], a landmark perinatal mortality study in over 27 000 births with autopsies in 50% of the perinatal deaths, feasibility of regionalization of perinatal care at national

Fig. 4 The triage system of newborn care.

level [14], demonstrating efficacy and safety of Low solute ORS solution in 0-3 months infants and risk of significant hypernatremia with standard WHO ORS solution [15], mid-arm-circumference (MAC) as a marker of low birth weights in community where infant weighing scales are not available [16], identification of high risk families and mothers and outcome of their off springs in rural and urban slum communities [17] and many others.

But, the landmark research milestone was the founding of 'The New Delhi Birth Cohort' (NDBC) in 1968 by Dr S. Ghosh, Dr IM Moriyama, and SKB in a 12 sq. km South Delhi community with 8181 cohort born to ever-married women followed from pre-pregnant state to pregnancy and childbirth. Our book [13] describes the five-decade incredible journey of this birth cohort, which is now a four-generation family cohort, and its enormous contributions to national and international research with respect to fertility, impact of child mortality on family planning, child survival, growth and cognitive development, the long-term effects of birth weight, gestation, fetal growth and childhood growth on adult health, cardio-metabolic disorders and human capital.

THE 21ST CENTURY: THE YEARS 2001- 2020

The current century saw rapid state-of-the-art advances in the department and its subspecialties, with physical restructuring, diagnostics, and adoption of standard evidence-based operating procedures aimed to reduce duration of hospitalisation and hospital acquired infections. A multidisciplinary comprehensive Early Intervention Child Development Assessment Centre (CDAC) was also established.

Emergency Triage and Pediatric Intensive care Unit (PICU): In 2017, the Department established the Emergency and Triage services in the New Emergency Block of the hospital, with the latest facilities, including continuous electronic monitoring, point of care diagnostic microbiology and biochemistry laboratories, blood bank, and supportive super-specialties like Paediatric Surgery, Neurosurgery, and Intervention Radiology. The paediatric emergency services are located on a separate floor with facilities to stabilize and monitor the critically ill. A unique feature is the provision of optimum care facilities for extramural neonates, which comprise almost 30% of pediatric admissions. Besides these, the Department has well equipped 20-bedded Paediatric Intensive Care Unit (PICU) for critically ill patients. Introduction of the concept of emergency assessment, triage and PICU services has significantly decreased the mortality within the first 24 hours of admission.

The department now has a dedicated hemato-oncology unit providing day-care based chemotherapy as well as a leukemia ward. In addition a separate thalassemia day-care unit is present, supported by a point of care lab.

Neonatology: A sharp (75%) increase in annual deliveries including a substantial proportion of high-risk pregnancies, led to the development of the novel concept of 'Mother in Neonatal Care Unit' (MNICU) (**Fig. 5**), a first of its kind model in Asia, in 2017. It created the concept of 'zero separation' involving couplet care, with the mother staying 24×7 in MNICU with the baby, actively partici-pating in the care from birthing till discharge.

The M-NICU concept brings a paradigm shift in the institutional management of small and sick neonates, especially relevant for the developing world. It opens out the possibility of introducing a four tier newborn care system with primary, secondary and MNICU and tertiary intensive care nursery. M-NICU is likely to be most practical, affordable, cost effective, humanised, mother incentive-based care resulting in significant reduction in nursery overcrowding and infections, successful establishment of breast feeding (Kangaroo care) and improvement of survival. The Government of India is also contemplating creation of such units across the country [18-20].

National and International Child Health Programs

With an active participation in the public health initiatives of Government and Non-Government programs, the department became a primary centre for scaling up child health interventions across the country, and the nodal centre for the Delhi Newborn Birth Defect Surveillance. The Ministry of Health and Family Welfare and the Ministry of External Affairs has also given the department the responsibility to prepare a module of Facility Based Newborn care (FBNC) and expand the mother, newborn, and child health programs, including immunization through the SAARC platform in SAARC countries.

It became a centre for WHO fellowship in Basic and Advanced Neonatology and Adolescent Medicine and established the country's first adolescent training centre at Safdarjung Hospital Adolescent Health Network (SHAHN). Multi-centre collaborative studies with the support of national and international organizations including DeNIS study, randomized controlled trials on probiotics, vitamin D and immediate Kangaroo Mother Care are some of the research activities of this century [21-24].

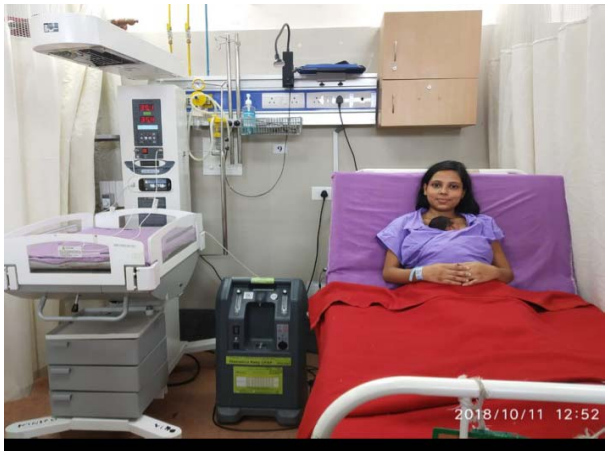

Fig. 5 Mother with her newborn in a maternal-neonatal intensive care unit (MNICU)

IMPACT ON CHILD HEALTH POLICIES

The department of pediatrics at Safdurjung hospital has had a huge impact nationally and internationally from its early days by its ever-evolving multifaceted clinical and research contributions. Nationally relevant researches led to revised national schedule of five doses of Oral Polio vaccination in UIP in 1985, inclusion of Low birth weight in Child Survival and Safe Motherhood program (1992), the formation of the national "Essential Newborn Care" program at the district level for the Government of India and its inclusion in the National Child Survival and Safe Motherhood program 1994. The Essential Newborn Care Program remains the pivot for all subsequent national newborn care programs from RCH I in 1997 to Newborn Action Plan 2014. The introduction of Dakshita 2015 and LaQshya 2017 is the fallout of the perinatal autopsy study's findings. The low solute ORS for oral rehydration is now universally accepted. The most recent 'Zero Separation' policy in creating MNICU, has given the developing world a much needed wholesome concept in perinatal and neonatal care.

The finding of 'the first 1000 days' in a child's life as the golden period for nutrition intervention in 'The New Delhi Birth Cohort' studies, has resulted in 'POSHAN,' the national nutrition program. The NDBC iconic magnetic data storage tapes in ASCII coded format 2400 Ft. spooler are a part of Indian Council of Medical Research (ICMR) Museum and are displayed as national treasure.

Awards and Honors

The distinctive contributions by the members of the Department earned them numerous accolades from national and international organizations. Prof Shanti Ghosh and SKB became President of Indian Academy of Pediatrics (IAP) and were honored by Medical Council Of India, ICMR, National Academy of Medical Sciences (NAMS), Indian Academy of Paediatrics (IAP), National Neonatology Forum, India (NNF), and the APPSEAR. SKB also became the Editor-In-Chief, *Indian Pediatrics* and Founder President NNF, India.

Several pediatricians of the country including Late Prof MK Bhan, Dr Soumya Swaminathan, Prof Vinod Bhutani, Prof Vinod Paul, Prof HPS Sachdev, Dr Panna Choudhary, Prof S Ramji and many others worked in their early formative years in the Department, imbibing the spirit, work ethics, philosophy and commitment to public health, and became well known nationally and internationally for their outstanding contributions [25].

WHAT EMBODIED THE DEPARTMENT?

The department became known for its invigorating academic and progressive environment. It had a cordial and

lively atmosphere, not only by providing freedom to learn and explore in academics and research, but also by the 'coffee club' culture where staff could interact informally with each other. The annual Diwali and Christmas celebrations, the movies, puppet, and magic shows for in-patients added to boost the team spirit and staff morale.

The presence of the offices of Indian Pediatrics and NNF housed in the department, and multiple on-going collaborative research work motivated the young physicians for research. The department believed in identifying young talent and providing opportunities to them. A crucial factor promoting progress was the congeniality between doctors and the nursing staff and para-clinical departments which enabled the department to accomplish its intended goals and objectives and attain enviable heights.

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