

Early Childhood Development: A Paradigm Shift From Developmental Screening and Surveillance to Parent Intervention Programs

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A large proportion of children under the age of five years who do not attain their expected developmental potential belong to low- and middle-income countries (LMICs). The strategies used for identifying children with high risk for developmental delay/disorders include developmental screening, surveillance, and monitoring. Suitability criteria for developmental screening tools in LMICs have been established, but few tools meet all the benchmarks. Based on these, the authors identified two tools that may be considered suitable in the Indian context; the International guide for monitoring child development and the Monitoring child development in the integrated management of childhood illnesses context. However, implementing and sustaining a universal developmental screening program using these is not feasible in the present circumstances. There is emerging evidence that parent intervention programs have significant impact on outcomes related to early childhood development (ECD). The nurturing care framework encompasses five strategies known to enhance ECD in young children even in the presence of adversities; good health, adequate nutrition, responsive caregiving, opportunities for early learning and safety and security. This article discusses the paradigm shift to incorporation of nurturing care-based preventive, supportive and promotive health care services in office practice with active parental involvement. This may prove to be a better option with a more positive, long lasting and quicker impact on ECD.

Keywords: Community health worker, Health promotion, Monitoring, Nurturing care.

Early Childhood Development (ECD) is a dynamic, longitudinal and complicated process. It encompasses multiple dimensions of development; physical, socio-emotional, cognitive and motor. ECD is influenced by protective or risk factors in various, interlinked contexts; genetic, biological, psychosocial and environmental. The expected developmental potential of a child is the best state of development that can be reached given the 'nature' (genetics) and ideal 'nurturing' environment. The first three years of life are considered critical due to rapid velocity of brain growth, wherein there is an intricate interplay of neurogenesis, synaptogenesis, synaptic pruning, and myelination. Thus, the brain is extremely vulnerable to any factor that disrupts these processes, resulting in structural alteration and/or functional brain damage.

The consequences can be dire; ranging from not following one's developmental trajectory, to children with developmental delay and at high risk of future disability. It is estimated that 250 million (43%) children under the age of 5 years do not attain their developmental potential [1], and that most of them are from Low- and Middle-Income Countries (LMICs). A systemic analysis of the 2016 Global Burden of Disease study reports 52.9 million children less than five years having developmental disabilities, again mostly from LMICs [2].

The initial few years of life is also a unique period when the brain is maximally sensitive to stimulation and nurturing. It has the capacity to form new neural connections or activate alternate latent circuits (neuroplasticity), when provided with repeated exposure to various stimuli. This is the scientific basis underlying early intervention (EI) which results in good neuro-developmental outcomes and less disability. Thus, early detection becomes critical.

Early Identification Of Developmental/Behavioral Problems

Evaluation of ECD is challenging. In a young child, development changes rapidly, there is inter-domain overlap, early deviation is often subtle, and infants may show transient dysfunction. Identification requires knowledge, training and expertise in ECD of the health care provider (HCP), and a high level of parental awareness regarding child development (developmental literacy). The following methods detect deviancy from the normal trajectory in situations when parents are yet to develop concerns about development or behavior.

Unstructured elicitation of developmental milestones: This is a non-standardized, operator dependent approach used by HCP from remote memory, according to their discretion. A systematic review on the ability of HCPs to identify children with developmental or behavioral issues reported sensitivity

and specificity ranging from 14-54% and 69-100%, respectively [3].

Developmental screening: This is the administration of a tool specifically designed to identify children for high risk for developmental delay at specific ages. It can be completed by the parent, office staff or HCP. The tool should be brief, simple to use, score and interpret, culturally and linguistically appropriate, standardized on representative populations, and have acceptable reliability and validity (both sensitivity and specificity >70%) [4]. Less sensitivity will result in higher number of false negative results, more children with delay getting missed and not being able to avail EI. In contrast, low specificity will result in more false positive results, cause unwarranted parental anxiety, stigma, expenses, and overburdening the health system. American Academy of Pediatrics (AAP) recommends developmental/ behavioral screening at 9, 18, and 30 months with screening for Autism at 18 and 24 months [4]. The Indian Academy of Pediatrics (IAP) schedule is 9, 18, 24 and 36 months [5].

Developmental surveillance: This is done at every health visit starting from early infancy. It requires an expert in ECD who elicits parental concerns, developmental history, protective/risk factors, makes observations, documents and collaborates with other professionals [4]. Developmental screening is included at specific ages according to the schedule.

Developmental monitoring: Though this term is used interchangeably with surveillance, the underlying context differs. Surveillance is intended for identification of a developmental or behavioral problem. The aim of monitoring is to support ECD, not just detect deviancy or aberration [6]. It encompasses recognizing each child's and family's strengths and vulnerabilities, addressing risk factors, and empowering caregivers with anticipatory guidance, support or specialized services (as the situation demands), and following them up longitudinally. Thus, it benefits all children, those who are developing on track, those who are deviating due to modifiable risk factors, and those with developmental difficulties.

Developmental Screening and Surveillance in LMICs

Universal developmental surveillance and screening form an integral part of the child healthcare systems in most high-income countries (HICs) since at least three decades. That is not the case in many LMICs, where multiple challenges related to implementation exist: which strategy to use (universal, high risk, or disability); which tool to employ; and what schedule to follow; besides finances, training of human resources and other decisions pertaining to logistics. This triggered the search for parameters that would make

operationalization more effective. In 2014, the following feasibility criteria for developmental screening tools for LMICs were proposed [7]: free, easily accessible, training < 3 days, brief (administration time < 30 minutes), acceptable validity i.e., sensitivity (Sn) and specificity (Sp) > 80% and reliability, easily understood by community health workers (CHWs) and parents, and linked with guidance. Three tools satisfied ≥ 4 criteria; Guide for Monitoring Child Development (GMCD), Ten Question Screening Instrument (TQSI), and Malawi Developmental Assessment Tool (MDAT). In 2016, the UNICEF module on developmental monitoring and screening stated that a screening tool should suit the needs and population of a country. It recommended GMCD, and the Ages and Stages Questionnaire, 3rd edition (ASQ-3). In 2017, a systematic review [8] established suitability criteria for tools to be used in LMIC; free/low cost, Sensitivity and Sp >70%, brief, assessment of multiple domains, administered by CHW, and successful use in > one LMIC. The tools shortlisted were: GMCD, MDAT, TQSI, Rapid Neuro-developmental Assessment Tool (RNDA), Caregiver-Reported Early Development Index (CREDI), INTERGROWTH-21st Neurodevelopment Assessment and the 12-month screener.

We feel that other dimensions should also be taken into account during this critical appraisal: screening should be done multiple times at the specified ages; sensitivity and specificity should be acceptable at each age; tools should be culturally appropriate, and if adaptations or translations are used, the context should be maintained; since parents from LMICs are less 'developmentally literate', tools that combine parental interview and direct observation are more accurate [8]; the probability of socially acceptable answers (due to social taboos) will be less; and given the paucity of experts and early intervention centers, tools should be linked with intervention packages that include anticipatory promotion (for typically developing children), ongoing stimulation (in cases of faltering and/or under stimulation) and interim intervention (for children who are awaiting assessment and initiation of EI).

Another tool in the public domain for children less than 6 years is the Monitoring child development in the integrated management of childhood illnesses (IMCI) context (MCDIC), which has been used successfully in 10 South American countries since 2006 [9]. MCDIC fulfills all the characteristics of a tool suitable for LMICs, but was probably not included in any of the resources cited here due to lack of validation study at the time of their publication. However, since then, it has been validated in children under 3 years of age, and found to have acceptable diagnostic accuracy [10].

Table I compares the tools deemed suitable for LMICs.

No single tool meets all the criteria. In-depth critical appraisal reveals that most are not actually suitable for large scale use in LMICs. CREDI has been designed as a population developmental assessment tool i.e., for ECD indicators related to the Sustainable Development Goals. It is not meant for the individual screening of children. ASQ-3 and RNDA are not economically viable options. TQSI identifies disabilities in children above 2 years. The narrow age bands of the 12-month screener and Intergrowth 21 exclude them from developmental surveillance. IGMCD and MCDIC are free, cover a wide range of ages, have acceptable overall and age-specific psychometric properties, and are linked with intervention programs.

Validation Studies of IGMCD and MCDIC in Indian Children

IGMCD: This is the revised version of GMCD, with the prefix 'international' added due to its development and validation in four countries (Turkey, India, Argentina and South Africa) that are economically, culturally and linguistically dissimilar. The underlying premise is that if found acceptable, feasible and scalable, IGMCD can be adopted by any country without the need for investing time, funds and personnel in re-standardization and re-validation. Its uniqueness is that it employs open-ended questions for establishing rapport with parents, and overcoming barriers of low education levels, poor developmental literacy, or the fear of stigma. It has three components: *i*) developmental monitoring in a tabular format across three age bands (6-17, 18-29 and 30-42 months) and seven domains (receptive and expressive language, gross and fine motor, relating to others, playing and self-help); *ii*) supporting ECD (addressing biopsychosocial risk factors and giving anticipatory guidance); and *iii*) EI (based on the WHO/UNICEF Care for Child development module).

The study of diagnostic accuracy of IGMCD was conducted in 1731 children aged between 6-42 months, across all four countries [11]. The reference tool was a comprehensive developmental assessment (CDA) that included combined clinical judgement and evaluation by the Bayley Scales of Infant and Toddler Development (BSID-3). Since standardized BSID-3 norms were not available for each of the countries, three different cut-off scores (≥ 3 , ≥ 4 or ≥ 5) were considered for the BSID-3 subscales. Hence, the values of diagnostic accuracy were dependent on the cut-off used. Overall sensitivity and specificity were acceptable at all cut-offs; 0.87 and 0.72 respectively (≥ 3); 0.79 and 0.73 (≥ 4); and 0.72 and 0.75 (≥ 5). However, this changes when individual age groups are taken into consideration. Sensitivity and specificity remain acceptable at all cut-offs only in the 18-29-month age band. In >30-month age band, sensitivity is acceptable at all cut-offs, but specificity ranges between 0.69 -0.71. Similarly, in the 6-17-month-olds, sensitivity is 0.64 at ≥ 5 , while specificity is 0.68- 0.70, at all cut-offs.

The major drawback is that a single center in India offers training of health personnel in IGMCD. Also, Specificity is $\leq 70\%$ in the 6-17-month age band that covers the 9-month visit.

MCDIC: This is a clinical approach-based strategy for classifying the developmental status of children, using a color coded management scheme similar to the Integrated Management of Childhood Illnesses [9]. It employs a combination of history (risk factors, and developmental concerns), measurement (anthropometry) and observation (phenotypic abnormalities, and age-dependent skills, reflexes and behaviors), clearly outlined in the operational manual. The classification includes: Suspected Develop-

Table I Comparison of Developmental Screening Tools Suitable for Low - and Middle - Income Countries

<i>Tool</i>	<i>Usable at 9, 18, 24 & 36 m</i>	<i>Sn & Sp^a</i>	<i>Admin time < 30 min</i>	<i>Cost/online access</i>	<i>Multi-domain/ training</i>	<i>Used by CHW</i>	<i>Used in >1 LMIC</i>	<i>Link with intervention</i>
GMCD	+	+/-	+	Free/NA ^b	+/minimal	+	+	+
IGMCD	+	+/+	+	Free/NA ^b	+/minimal	+	+	+
TQSI	> 24 m	+/-	+	Free/NA ^b	Disability/-	+	+	-
MDAT	0 – 6 y	+/-	+	Free/ NA ^b	+/ minimal	+	-	-
ASQ-3	+	+/+	+	\$ 295 online	+/manual	-	+	-
RNDA	0-9y	+/-	+	\$ 295 online	+/minimal	+	-	-
CREDI	0-36	NA	+	Free online	+/manual	+	+	+
Intergrowth 21	22-26 m	+/-	+	Free online	+/manual	+	+	-
12-month screener	12 m	+/-	+	NA/ NA ^b	+/minimal	+	+	-
MCDIC	+	+/+	+	Free/online	+/manual	+	+	+

^aSensitivity and specificity >70% at 9, 18, 24 & 36 months. ^bThe tools are described or depicted in the validation studies. ASQ-3 Ages and Stages Questionnaire, 3rd edition, CHW-Community health worker, CREDI- Caregiver-Reported Early Development Index, GMCD-Guide for Monitoring Child Development, Intergrowth 21-INTERGROWTH-21-Neurodevelopment Assessment, MDAT-Malawi Developmental Assessment Tool, MCDIC-Monitoring Child Development in the Integrated Management of Childhood Illnesses Context, NA-not available, RNDA-Rapid Neurodevelopmental Assessment Tool, TQSI-Ten Question screening Instrument.

mental Delay (SDD) in children aged 0-2 year and Probable Developmental Delay (PDD) in 2-6-year olds (red zone); Developmental alert or normal development with risk factors (yellow zone); and normal development (green zone). Each zone is linked with age-appropriate strategies for developmental stimulation.

This tool can be used in India as the concept is familiar to all health personnel including CHW, since Integrated Management of Neonatal and Childhood Illnesses (IMNCI) has been in use in our public health system for almost two decades. MCDIC was validated in 272 Indian children between 0 to 36 months presenting to a hospital for minor illnesses or immunization [10]. The reference tools included Developmental Profile, 3rd edition (DP-3) for assessing developmental status, and Vineland Adaptive Behavior Scale, 2nd edition (VABS-II) for adaptive function. The MCDIC criteria for PDD/SDD was used. The study definition of developmental delay was a General Developmental Score <70 by DP-3 (<-2SD) and Adaptive Behavior Composite <70 by VABS-II (<-2SD). Diagnostic accuracy revealed an overall sensitivity of 88.0% (95% CI 68.8%-97.5%) and specificity of 85.7 (95% CI 81.1%-89.6%). Sensitivity and specificity were acceptable in each individual MCDIC age group, making it suitable for the IAP screening schedule.

The drawback is that there is only a single validation study. A multi-centric validation study by CHW needs to be undertaken to make it generalizable in the community.

Challenges in Introducing Universal Developmental Screening and Surveillance

In a study of the perspectives of pediatricians in Gujrat, on ECD, Desai, et al. [12] reported that though 95.5% of the respondents agreed that EI helped in optimizing ECD and 97.3% said that parents expressing developmental concerns, only 13.6% were using structured tools. Reasons given for not screening were time constraints (72%), non-availability of referral options (45%), and inability to use screening tools (28%). India does not have any national policy/program for developmental screening and surveillance. Though the Indian Academy of Pediatrics (IAP) recommends screening [5], details of which tools to use, or how to operationalize the process is not clearly outlined. Planning, implementing and sustaining universal developmental screening in a setting where it is non-existent, and the concept is alien to health care seekers, HCP and policy makers alike, is going to be extremely challenging. It will require firm belief, wide acceptance and deep commitment from each stakeholder, besides financial and human capital, and of course, time allowed for it to make an impact.

Universal screening will not be a panacea to all the problems related to ECD. Not all children who screen positive will receive a diagnosis, and not all children who screen

negative will be definitely cleared of a diagnosis. There is inequity in the availability of high quality referral and treatment services across India, even with the roll out of Rashtriya Bal Suraksha Karyakram and associated District Early Intervention Centers. If intervention is not available, screening becomes futile.

ECD-Directed Nurturing Care via Parental Intervention Programs

Developmental and behavioral issues are increasing in young children due to multiple reasons. Social isolation (especially in urban areas) results from growing numbers of nuclear families, with decreased opportunities for meaningful interaction with neighbors, friends or family. The increased cost of living have led to both parents working that usually means reduced time for parent-child bonding, children being looked after by elder siblings, nannies or creches, and parental overindulgence to overcompensate for misplaced feelings of guilt. In addition, young children are often exposed to unsupervised digital media at a much earlier age than recommended, due to ignorance and poor parenting skills. There is a very strong need for pediatricians to provide preventive and promotive ECD directed services to children and their families. However, since most parents are unaware of the existence of such services, there is no demand.

In the last decade, experts from diverse fields (public health, developmental pediatrics, child neurology, child psychology, economics, and others) have realized that interventions that strengthen parent-child relationships and enhance early learning have more significant and cost-effective impact on ECD, compared to interventions that focus only on health and nutrition [13]. The Nurturing Care for ECD (NC-ECD) model provides a framework for promoting ECD in children under five years. Its five components (good health, adequate nutrition, responsive caregiving, opportunities for early learning, and safety and security) are scientifically proven to enhance ECD even in the presence of the multiple adversities. Strategic actions for implementation are directed at the level of the government, community and caregiver.

Parenting interventions programs aim at improving caregiver's knowledge, attitudes, practices, and skills for promoting optimal ECD. These address adverse risk factors and behaviors, improve parent-child relationships, enrich the home environment, and teach parents behavior modification and positive discipline. A systematic review and meta-analysis of parenting interventions for children under 3 years of age included 102 randomized controlled trials (RCT) from 33 HIC and LMIC from 1974 to 2020 [14]. Some of the salient findings were: *i*) Parenting interventions significantly influenced child outcomes (better cognitive, language, motor, socioemotional development, and attachment and

KEY MESSAGES

- Developmental screening tools for low- and middle-income countries (LMIC) should be free of cost, easily accessible, brief, broadband, can be used by community health workers, require minimal training, have acceptable reliability and validity (overall and age-wise), easy to use, score and interpret, and be linked with early childhood development (ECD) promotive counselling or referral.
- Planning, implementing and sustaining a universal developmental screening and surveillance program in a setting where it is non-existent, and the concept is alien to health care seekers, health care providers and policy makers alike, is going to be extremely challenging.
- Parenting interventions programs that improve caregiver's knowledge, attitudes, practices, and skills for promoting optimal ECD, significantly influence child outcomes (improved cognitive, language, motor, socioemotional development, and attachment and reduced behavior problems) and parental outcomes (improved parenting knowledge, parenting practices, and parent-child interactions).

reduced behavior problems) and parent outcomes (improved parenting knowledge, practices, and parent-child interactions); *ii*) The impact was more in LMICs than HICs, probably due to more risk factors in the former; *iii*) RCTs with responsive caregiving had significantly more impact than those without; *iv*) Content supporting parent behavior management skills and non-violent discipline were effective in reducing maladaptive behavior; *v*) Few programs actively involved fathers in program delivery; *vi*) Well conducted group sessions were as effective and more economical than home visits; and *vii*) Program duration, personnel, modalities of delivery and setting should be based on resources, community needs, population risk profiles and cultural context.

Pediatricians are the first contacts of parents for healthcare, with whom they have an invisible societal contract of trust. Thus, they are ideal candidates who can help in delivering nurturing care to young children, through their parents. The 2021-2023 IAP Presidential Action Plan for NC-ECD [15] has been conceptualized to sensitize all concerned stakeholders about ECD. One of its many activities is conducting 200 district level workshops to enable pediatricians to incorporate ECD directed supportive, preventive, and promotive health care services in office practice [15]. This will be achieved by popularizing well child visits throughout the first three years of life. The aim is to reach the child by empowering parents with knowledge and skills related to nurturing care. Only time will tell whether the program will attain the desired impact on ECD that has been envisioned.

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