Simple Clinical Signs to Identify Severe Neonatal Illness

Globally, 9.7 million children died last year, about 3.6 million of them during the neonatal period (WHO mortality database). Because of its large population and relatively high neonatal mortality rate, India contributes about a quarter of all neonatal deaths in the world. It is particularly important to note that more than two thirds of these neonatal deaths occur in the first week of life[1].

It is well known that majority of neonatal deaths can be prevented with low-technology, low-cost interventions delivered across two continua of care–the first from pregnancy, birth, through neonatal period and childhood, and the second from home, through primary health facilities to hospitals. It has been estimated that optimal treatment of neonatal illness can avert up to half of all preventable neonatal deaths.

In order to improve management of illness in young infants and children, the World Health Organization has been assisting countries in implementing the Integrated Management of Childhood Illness (IMCI) strategy since 1995[2]. There were three concerns with the young infant IMCI algorithm. First, management of conditions in the first week of life was not included because of lack of data on clinical signs during this period. Second, the algorithm was based on limited data from a small number of countries[3]. The algorithm, therefore, relied on the presence of one of a large number of clinical signs to identify severe illness and while this achieved a high level of sensitivity, the specificity was likely to be low. Finally, IMCI training courses had a much greater focus, both in terms of content and time, on management of illness in older infants and children.

The IMCI strategy promotes country level adaptation before implementation. India has made one of the most innovative adaptations of IMCI and renamed it Integrated Management of Neonatal and Childhood Illness (IMNCI) to indicate the increased focus on the neonatal period[4]. The first week of life is included in IMNCI. About 50% of the content and time of IMNCI training is devoted to management of neonatal conditions. Health workers are first trained in the management of 0-2 month old infants, unlike generic IMCI. Additionally, IMCI envisages routine home visits during the first week of life to promote optimal newborn care practices and identification and management or referral for newborn illness and complications. However, the clinical signs on which the algorithms are based were not substantially changed from the original IMCI, given the paucity of new evidence.

The two papers published in October 2007 issue of Indian Pediatrics by Deorari, *et al*.[5] and Narang, *et al*.[6], fill this crucial gap in knowledge. These papers report findings from studies conducted as a part of a multi-country research effort in six countries supported by the World Health Organization and Saving Newborn Lives in collaboration with Boston University. The objective of these studies was to collect systematic information on the performance of a large number of clinical symptoms and signs in identifying serious illness requiring hospital admission in the first week of life, and in the 7-59 day period.

The two Indian studies report very important findings. First, the performance of clinical signs during the first seven days of life was not very different from the 7-59 day period, which indicates that a common algorithm from 0-2 months is appropriate. Second, many of the clinical signs evaluated, some of which are included in the IMNCI young infant algorithm, were rarely seen. This has important implications when we consider that the facilities which would be implementing IMNCI would be smaller than those where the studies were conducted, and therefore these signs are likely to be even rarer. Including rare signs in the algorithm not only make the IMNCI training more difficult, health

worker skills in recognizing them are unlikely to be sustained because of lack of continued practice. Third, mother's history of poor feeding was a reliable sign, and was as good as an observation of feeding ability. If used appropriately for refining the IMNCI algorithm, these findings would help make it simpler and more specific, while at the same time retaining a high sensitivity.

One methodological issue that needs careful consideration while interpreting the results of these studies is that the opinion of an experienced pediatrician, backed up by a limited list of laboratory examinations, was the "gold standard" for evaluating the performance of the clinical signs identified by a health worker. Two backup mechanisms were used to make sure that this gold standard was valid, the follow up of neonates who were not thought to have severe illness and sent home, and a review committee which examined the decisions of the pediatrician. Others have used or suggested alternative gold standards *e.g.*, death after initial assessment or positive blood culture(7,8). Death is not an appropriate gold standard for validating the performance of clinical signs in identifying severely ill neonates. If death occurs after identification of illness and initiation of appropriate treatment, it indicates that the illness had progressed too far for treatment to work. On the other hand, the objective of a clinical algorithm is for detection of severe illness early so that the treated newborns survive. Blood culture, although relatively specific for sepsis, is not very sensitive, and is not applicable to the other serious illnesses.

There is some variability in findings between Chandigarh and Delhi studies. This is not surprising, given that the sample sizes of individual studies were not very large and there were differences in study populations. It is, therefore, important that the findings be interpreted together with those of the other sites in this multi-country study, particularly those of the Bangladesh and Pakistan sites. The generic IMCI algorithm will be revised based on the combined findings of all sites, pooled through a meta-analytic approach.

The publication of the studies in *Indian Pediatrics* provides a great opportunity to accelerate action towards improving neonatal survival.

Refining the IMNCI algorithm and redoubling the efforts for its implementation across the country is a crucial step in that direction.

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