EDITORIAL

RAPID EPIDEMIOLOGIC ASSESSMENT

Rapid Epidemiologic Assessment (REA) is an emerging concept of epidemiologic research during the past decade(1). At the onset, it was not recognized as a standard epidemiologic discipline. The available health statistics system often rely on long, complicated reporting forms. Developing countries do not have much resources for such health programmes and are badly in need of information systems which will facilitate wise utilization of the available limited resources. REA is a method which provides health information most rapidly, simply and at less cost than the standard data collection methods, yet yielding reliable results.

In 1981, the United States National Academy of Sciences Advisory Committee on Health, Biomedical Research and Development (ACHBRD), a Committee established by The Board of Science and Technology for International Development (BOSTID) and Institute of Medicine met to identify areas of research that would contribute to improved health in developing countries which were not adequately investigated earlier(2). One area identified was the need for further work with some of the new epidemiologic sampling techniques and methods used in Expanded Programme on Immunization (EPI)(3). As the concept of REA developed, five subdivisions came into vogue: (*i*) Small area survey and sampling methods, (*ii*) Surveillance methods, (*iii*) Screening and individual risk assessment, (*iv*) Community indicators of risk or health status, (*v*) Case control methods for evaluation. The BOSTID committee on Research Grants funded eighteen projects under REA Programme in 1982, covering the above five areas. The relevance of this rapidly evolving principle in the context of Pediatric research in India is exemplified by the two reports(4,5) appearing in this issue of the Journal. The salient features of each area of rapid epidemiological assessment are outlined in this manuscript. The rapid screening diagnostic test is considered in some detail.

(i) Small Area Survey and Sampling Methods

Since the standard survey and sampling techniques were found to be prohibitively expensive, the need for methods tailored to the resources available in developing countries arose. One such is cluster sampling technique of the WHO Expanded Programme in Immunization (EPI). The other methods under this subdivision include: (*a*) *Lot Quality Assurance Sampling for Monitoring Health Care (LQAS):* It has been used to monitor industrial quality control to assess the lots of manufactured goods. It has been recently used to assess adequacy of immunization coverage based on a series of predetermined criteria; and (*b*) *Rapid Ethnographic Assessment:* To assess factors which influence health seeking behaviors and diseases, *e.g.,* reasons for not utilizing immunizations.

(ii) Surveillance Methods

Systematic collection of data over time can bring out changes in diseases when case ascertainment remains constant. Surveillance is not an alternative to properly conducted surveys, but is tool for continuous monitoring of changes in health status. Smallpox eradication was made possible by an effective surveillance for disease containment and control. The proportion of reported cases either by hospital or laboratory may be taken as a useful warning of an impending outbreak, *e.g.,* cholera, typhoid, *etc.* This knowledge leads to appropriate intervention by health care personnel.

(*a*) *Sentinel Surveillance:* Instead of collecting surveillance data from the entire community, all hospitals or clinics, targeting only to few centres is known as the sentinel surveillance. This serves as an indicator of overall trends in that area. For example, currently this method is advocated for surveillance of immunizable diseases in developing countries.

(*b*) *Mortality Report:* The present system of report on deaths lacks cause specific mortality data which is essential to target interventions to solve the major problems in a community. Assessment of valid cause of death data by "verbal autopsy" based on symptoms or events leading to death is suggested. Sensitivity and specificity of these methods need to be determined, *e.g.,* fever, cough, breathlessness of short duration leading to death, could probably be pneumonia.

(iii) Screening and Individual Risk Assessment

This relates to methods of identifying high risk individuals who could benefit from appropriate intervention.

(iv) Community Indicators of Risk or Health Status

This concerns the identification groups rather than individuals who need specialized care, *e.g.,* prevalence of night blindness, the characteristic symptom of vitamin A deficiency in a particular area can lead to extensive survey and active intervention programme.

These two fields (*iii* and *iv*) come under screening diagnostic tests which are of importance to practicing pediatricians.

(v) Case Control Methods for Evaluation

This is a rapid and effective way of assessing the causation and effectiveness of health intervention. It is particularly useful in studying rare and chronic diseases, besides being useful in investigating association of cause/risk factors with disease. Instead of following a large population over a period of time which is expensive and time consuming, the case control method compares occurrence of risk factors among cases (with diseases) and controls (without disease in study). For example (*i*) To know the effectiveness of providing protected water and proper sanitation in reducing diarrheal incidence, and (*ii*) To know vaccine efficacy.

Screening Diagnostic Tests

Diagnostic tests are not confined only to laboratory. Clinical data like relevant history and physical examination infact, can serve as powerful tools to arrive at a diagnosis. A diagnostic test can be used apart from arriving at a diagnosis, to judge the severity of the disease, its clinical course, prognosis and the actual response to therapy. Based on its qualities, it can be applied

as a (*i*) *screening test* or (*ii*) *confirmatory test*(6).

The screening tests are useful (*i*) in screening the population for the target disorder, and (*ii*) in the early stage of a diagnostic work up.

To decide whether to carry out a given test for the early diagnosis, the following features are to be considered(2): (*i*) The early diagnosis should lead to improved survival, function and quality of life. (*ii*) There must be enough clinical time required to confirm the diagnosis and provide long term care for those positive with the screening test. (*iii*) The patients so diagnosed should comply with subsequent management. (*iv*) The disease searched should be either so common or so dreadful to diagnose it at early stage. (*v*) Cost, accuracy, acceptability and feasibility to administer even by para-clinics of the screening test also must be considered.

Properties of a Screening Test

A good screening test should have high sensitivity, which is expressed as the proportion of correctly classified positives among the total diseased persons, and rarely miss a diseased person. Apart from sensitivity other properties to be considered for any diagnostic test are(6,7): (*i*) Specificity: identifying correctly the proportion of population who do not have the disease. A high specificity is essential for a confirmatory test, *e.g.,* in malignancy; (*ii*) Positive predictive value: proportion of patients who have disease among test positives; (*iii*) Negative predictive value: proportion of patients who do not have the disease among test negatives; and (*iv*) Accuracy: the true positives and true negatives among all tested. Each property of the test is dependent on the other. Prevalence (the proportion of diseased among all tested) will decide the predictive values.

A few examples of application of screening tests, in pediatric practice are: (*i*) Tuberculin test for tuberculosis; (*ii*) Urine screening tests for inborn errors of metabolism; (*iii*) Acute phase reactants for sepsis, rheumatic fever; (*iv*) Dip stick for diabetes; and (*v*) Baroda development screening test for infants for Mental retardation(8).

To assess whether a diagnostic test is useful, based on the available evidence, the following guidelines are advised(9,10):

1. There must be an independent, blind comparison with a 'gold standard' of diagnosis. This is the foremost and important criteria. The 'gold standard' refers to definite diagnosis. Is the test less risky, less uncomfortable, less costly or appreciable earlier in the course of the disease compared to the 'gold standard'. Blinding means the persons who are doing the test and the 'gold standard' are different and independent and are not aware of the clinical details or each others' findings. This is essential to avoid *expectation bias.*

2. The test should have been evaluated in a patient sample that included an appropriate spectrum of mild and severe, treated and untreated disease, plus individuals with different but commonly confused disorders. It is not a problem to diagnose a full blown disease from a normal individual. The key value of a diagnostic test often lies in its ability to distinguish among otherwise commonly confused disorders.

3. Setting of the patients for this evaluation, and filter through which study

patients passed should be adequately described. The prevalence of the disease for the particular diagnostic test vary from place to place especially a tertiary care hospital to that of community.

4. Reproducibility of test result (*precision*): the same test applied to the same unchanged patient must produce the same result and its interpretation (observer variation) should have been determined. This will help objective assessment of the variation that could occur in the test.

5. The term 'normal' should be defined sensibly as it is applied to the test, *e.g.,* diagnostic, therapeutic, causation, percentile, *etc.*

6. If the test is advocated as part of a cluster or sequence tests, its individual contribution to the overall validity of the cluster or sequence should have been determined.

7. The tactics for carrying out the test should have been described in sufficient detail to permit their exact replication. The description should cover patient issues as well as the mechanics of performing and interpreting the test.

8. The utility of the test should have been determined. The ultimate criteria for a diagnostic test is whether the patient is better off for it that means whether the investigator explored the longer term consequence of their use of the diagnostic test.

A reader can apply these guidelines for a critical appraisal of the diagnostic test.

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