PRESIDENT'S PAGE

Point-of-Care Diagnosis in Pediatric Practice

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Infectious diseases contribute to high morbidity and mortality of humans since times immemorial. Their potential to spread has resulted in epidemics and even pandemics of cholera, influenza, tuberculosis and plague. Their spread within the hospitals causing hospital-acquired infections in the growing population of susceptible hosts (*e.g.*, those with cancer, autoimmune diseases and organ transplants) is another major concern for medical professionals. Apart from well-recognized bacterial diseases, we also have viral diseases (dengue, chikungunya, viral encephalitis), fungal infections (candidiasis), parasitic infections (malaria, echinococcosis, trypanosomiasis, taeniasis, schistosomiasis), and now emerging and re-emerging diseases. The exact burden of these diseases in the developing countries, including India, is unknown due to under-diagnosis, under-reporting and the lack of appropriate diagnostic facilities. Two major landmarks in the history of communicable diseases have been 'hygiene revolution' in the western world in early 19th century ('Swachh Bharat' in India 200 years later), and the discovery of antibiotics in the 20th century. However, the development of antimicrobial resistance (natural and induced) and lack of development of new molecules (discovery void) have led us to a post-antibiotic era of antimicrobial resistance in microbes – a matter of great public health concern leading to increased morbidity, mortality and increased healthcare costs. This has caught the attention of world community of medical professionals, economists, social scientists and various political bodies, including United Nations.

Antimicrobial resistance (AMR) is linked to excessive and inappropriate use of antimicrobials, self-medication, and excessive use of antibiotics in agriculture and live-stock. This issue needs a multipronged approach, which includes:

- improved specimen collection and transport from bedside to laboratories
- improved diagnostic facilities using rapid point-of-care testing, and development of immunodiagnostics, biomarkers and genomic technology
- surveillance for infectious diseases and AMR
- health education regarding hygiene, antibiotic prescription/consumption, AMR and adverse events associated with antibiotic use among medical professional and public
- restricting agriculture and veterinary use of antimicrobials
- development of new drug molecules
- promote use of vaccines and development of new vaccines
- mandatory implementation of hospital infection control practices, including hand hygiene

Recently, Ministry of Health, Government of India has started an Initiative 'National Program for AMR Containment' [1], and published National Treatment Guidelines for Antimicrobial Use in Infectious Diseases [2]. All professional bodies/organizations in India must discuss these at appropriate forums for early implementation. This coupled with internationally recommended stewardship program is the approach that requires implementation and urgent attention [3]. We should develop our guidelines for common pediatric infections (diarrhea, acute respiratory infections, skin and soft tissue infections, urinary tract infections, enteric fever and meningoencephalitis), and also prepare a document on appropriate dosages and adverse events.

Point-of-care diagnostic methods can make a difference in rationalizing antibiotic therapy. Full blood count is one of the commonly used blood test in practice. White cell count with differential count is used widely by clinicians for risk assessment and to decide the need for immediate treatment or for follow-up. It constitutes an important tool in predicting the risk for bacterial infection and deciding initiation of antibiotics in office-practice. Point-of-care white cell counters (*e.g.*, Hemocue) are

currently available, which can be used in outpatient departments, and white cell counts with differential count can be made available instantly with a simple finger prick method [4]. Thus, a decision to start antibiotics can be made instantly in children presenting with fever and respiratory illnesses. Studies have shown a significant reduction in antibiotic usage with the use of point-of-care devices for white cell count, without any influence on recovery and complications. Definitely, such devices should be utilized in an optimal fashion to making instant treatment decisions like withholding antibiotics in a stable child and the need for urgent management in children with sick child with leukocytosis and neutrophilia, especially if the fever has lasted for more than three to four days.

Point-of-care echocardiography and ultrasonography have greatly improved the management of critically ill children in emergency departments and intensive care units. In a child presenting with hypotension, apart from traditional physical examination, use of point-of-care echocardiography provides valuable information that may not be clinically evident. It discloses valuable information regarding left ventricular function, child's volume status, and evidence of pericardial effusion and tamponade. Measurements of inferior vena caval size and respiratory variation using point-of-care ultrasonography have shown good correlation with central venous pressure and volume responsiveness of the patient. More than a single assessment, serial measurements after every intervention (like administration of fluid boluses or inotropes) provide important feedback regarding the response to these interventions and directs regarding the next appropriate step of management. Point-of-care lung ultrasound is also gaining popularity among intensivists. It allows fast, accurate, bedside evaluation of most acute respiratory disorders. It also enables a pathophysiological approach to circulatory failure. The versatility of ultrasound heralds a kind of visual medicine, a priority in intensive care as well as many other disciplines and settings [5].

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