

Medical microbiology and the infectious diseases burden: Is India prepared?

The need for having infectious diseases (ID) as a specialty in India is overwhelming. This can be appreciated by the data quoted below in this overview.

It may not be wrong to say that in India, the specialty of ID does not exist. It is an irony of fate that the country which requires it the most, does not have it. The internist or medical graduate, including specialists in any field with whatever primitive knowledge, tackle most of the burden of ID in India. An attempt was made to address this problem, when the specialty of Medical Microbiology was started as a part of the MD course in the late 1960s. The intention good but the means for its implementation for the benefit of the community appears to be lacking. The enormous talent of medical graduates especially post graduates in medical microbiology is wasted because of its non-application in the field of ID.

No microbe causes disease in cent percent of its hosts, making it difficult to justify a definition of infection synonymous with disease.¹ A distinction between colonization and disease has to be made. For example, the recovery of *Neisseria meningitidis* from the blood or cerebrospinal fluid of an individual could appropriately be a case of meningococcal meningitis. On the other hand, the recovery of *N. meningitidis* from a non-sterile site, e.g. the nasal passage in a symptom-free person, should be considered colonization rather than infection, despite the fact that the organism was isolated in the host. In each situation, the patient has infection since he/she harbours *N. meningitidis*, but in the former, the outcome of the infection is disease, whereas in the latter, it is colonization or carriage. Hence, isolation alone does not reflect the clinical status of patient nor does it suggest a need for any type of intervention and/or therapy. Presently, we lack adequate quantitative and qualitative measures of damage to establish objectively whether the states of commensalism and colonization are harmless to the host, protect the host, or will eventually produce damage resulting in disease. Fortunately, the clinical signs, symptoms and syndromes that characterize the diseases caused by most microbes are relatively well defined and agreed upon. The recognition of these clinical entities has an important bearing in the therapy of infections and thereby call for the need for ID as a specialty.

Poverty is a medium for diseases to grow exponentially. The economic system that we live in today is focused on high profits. Investment in public health, more so in ID, has a low priority. It has to be realized by the world that prevention of illnesses has always resulted in the economic growth of a country.

The statistics of the global burden of water-related infectious diseases alone are startling: each year, approximately 4 billion cases of diarrhoeal diseases (including cholera) lead to 2.2 million deaths, mostly among children under the age of 5 years.

This is equivalent to 20 jumbo jets crashing every day. These deaths represent approximately 15% of all child deaths under the age of 5 in developing countries.² Research has shown that improving the quality of water reduces diarrhoeal diseases by 16%, whereas improving sanitation brings about a reduction of 32%, and handwashing with soap results in a further reduction of up to 45%.²

Opportunistic fungal infections have emerged as an important cause of morbidity and mortality in immunocompromised patients and remain a major challenge for clinicians. Invasive fungal infections, besides their increased frequency, are still associated with unacceptably high mortality-up to 40% in bloodstream infections caused by *Candida albicans* and more than 50% in invasive aspergillosis.³

The epidemic of human immunodeficiency virus (HIV) infection claiming young lives in Africa is a disaster for that country where infants, even before achieving their productive years of life, are consumed by this disease. As it appears, India is sitting on a volcano, if WHO figures are to be believed. The prevalence of hepatitis B virus (HBV) is already between 4% and 7% and that of hepatitis C virus (HCV) is fast growing (0.8%-1%).

Malaria is the world's most important parasitic infection and ranks foremost among the major health and developmental challenges in the developing countries of the world.⁴ Despite global economic development, more people die from malaria nowadays than 40 years ago.⁵ The estimate for annual mortality due to malaria ranges from 0.5 to 3.0 million people.⁶ In a well-documented study, it was concluded that chloroquine resistance has resulted in a 4-8 fold increase in mortality.⁷ Every year we are visited by the dengue virus, another mosquito-borne scourge of mankind directly related to public hygiene.

The incidence of sepsis has increased by 329% over a period of 20 years, between 1979 and 1999, according to new research presented at the American Thoracic Society's 98th International Conference (May 17-22, 2002, Atlanta, USA).⁶ Although better supportive care for patients with sepsis has lowered the mortality rate, many more patients are now actually dying from sepsis' as commented by Dr Greg Martin, Emory University School of Medicine, Atlanta, GA, USA.⁸ There are now more people with altered immunity because of organ and bone marrow transplantation, chemotherapy and HIV infection, which lowers the immunity in patients. Add to this the geriatric population pool. Apart from the loss of life and morbidity caused by sepsis, it is also a drain on resources.

Despite significant advances in the fight against tuberculosis over the past 10 years, formidable challenges still remain as the incidence of tuberculosis is rising. Developments in tuberculosis research include progress in the understanding of multidrug resistance, development of rapid DNA-typing

techniques and the genetic sequencing of *Mycobacterium tuberculosis*. Experts addressing tuberculosis control noted that 23 'high-burden countries' account for 80% of the world's tuberculosis cases and India is one among them. It is estimated that worldwide, one in three people is infected with tuberculosis and that there are 8 million active cases each year, resulting in 2 million deaths.⁹

Hepatitis B virus infection is prevalent in Asia, Southern Europe and Latin America, where the rate of hepatitis B surface antigen (HBsAg) carriage in the general population ranges from 2% to 20%.¹⁰ About 2 billion people, one-third of the world's population, have serological evidence of infection and develop liver disease. Worldwide, 350 million people with chronic HBV infection have a 15%-25% risk of dying from HBV-related liver disease, including end-stage cirrhosis and hepatocellular carcinoma.¹¹ Each year, acute and chronic HBV infection causes roughly 1 million deaths.¹²

Unfortunately vaccines for many pathogens, including HIV, hepatitis (HCV, HEV), malaria (*Plasmodium falciparum*) and *M. tuberculosis* are either ineffective or unavailable. The traditional immunization arsenal includes vaccines that use live-attenuated or inactivated organisms. From an immunological standpoint, live-attenuated vaccines are the vaccines of choice.

In this era of concern about the number of babies who are born infected with HIV, the increasing number of babies with congenital syphilis unfortunately receives little attention. This discrepancy is surprising, more so when congenital syphilis can be prevented by well-established screening and treatment approaches, whereas the prevention of mother-to-child transmission of HIV is less effective and more expensive. Congenital syphilis is now a rare disease in affluent countries, but it remains a severe, adverse pregnancy outcome in many less-developed countries. The infection is transmitted vertically, and in women with infectious syphilis, at least two-thirds of foetuses are affected.¹³ In the early part of the twentieth century, tertiary syphilis was the cause of illness in about a fifth of patients in institutions for the mentally ill in the USA. In many developing countries, this situation applies at present. WHO estimates that each year, a million pregnancies are adversely affected by syphilis due to maternal infection (about 270 000 babies are born with congenital syphilis, 460 000 pregnancies end in abortion or perinatal death, and 270 000 babies are born prematurely or with low birth weight.¹⁴ There is limited information on the prevalence of syphilis among pregnant women in Asian countries, although studies from China and India in the 1990s found rates of between less than 1% and 5%.¹⁵⁻¹⁶

Keeping in view the above data, India needs a robust ID set-up which can be achieved by the rejuvenation or transformation of Medical Microbiology into Clinical Microbiology. Here, the specialty of Clinical Microbiology or ID needs to be introduced immediately and nurtured with conviction. It should not be difficult with the infrastructure of medical colleges that exists in this country, where well-drafted

programmes can be initiated.

The teaching of ID at the undergraduate or postgraduate level in almost all specialties is dismally poor. It is the need of the hour that *pundits* who frame or have a say in drafting the medical curriculum keep in mind the needs of the society, so that the tremendous efforts and the most fruitful years of the life of medical graduates and Medical Microbiology postgraduates are not wasted. Sensitization to this crucial, non-existent specialty has to begin during undergraduate training itself, which can be further groomed at the postgraduate level. Clinical teaching should be ensured in the Medical Microbiology curriculum if we want to reap the fruits of training a medical graduate in ID. No conscientious medical practitioner in India can survive without acquiring a reasonable knowledge of ID, which is abundantly, clear from the statistics quoted above. There have been some exceptions such as the Sanjay Gandhi Post-Graduate Institute, Lucknow, which has started a postdoctoral course in ID but this may not be enough.

An attempt has been made in this issue to highlight some of the important ID related issues most relevant to our country. The readers will appreciate the endeavour of every author by the quality of their articles, which are thought-provoking. I am hopeful that topics such as typhoid reviewed by Dr A. Aayagiri, endocarditis by Dr A. Arora, emerging infections by Dr A. Sharma, significance of *Candida* (non-*albicans*) by Dr A. Chakrabarti and application of molecular assays by Dr K. J. Prasad should make interesting reading. The TORCH panel investigation is a prominent grey zone in the serodiagnosis of this group of infections. This investigation, reviewed by Dr J. K. Oberoi, appears to be very simple, but in fact, is far from being so. While the gap is narrowing between infections above and below the navel, the antenatal and perinatal evaluation of TORCH assays continue to be challenging and baffling to medical practitioners and gynaecologists alike.

The concept of HIV-1 and its strains in India has been of interest to researchers in India and no less than the authority in the field of Virology, Professor P. Seth, has made an earnest attempt to explain and review the article for us.

As organ transplant has gained momentum in our country, it is important for us to understand its outfalls (collateral damage) by way of immunosuppressive therapy. Opportunistic pathogens play a dominant role in immediate as well as delayed infections affecting the morbidity and mortality of patients who have undergone a transplant. Distinguished authors with a long-standing reputation in this field Dr V. Kher and Dr R. Sardana have done full justice to the topic.

We always are on the lookout for new antibiotics, which unfortunately are not forthcoming and Dr A. Rattan, who is passionately pursuing newer molecules, has aptly brought home the fact. The significance of coccidian intestinal parasites cannot be overemphasized and the same has been reviewed by the eminent Medical Parasitologist Dr N. Malla.

Genitourinary tuberculosis has been a difficult area in clinical

practice. Dr S. Khanna and Dr S. Joshi have done full justice to the article by highlighting and sharing their concerns regarding the pitfalls in its diagnosis. Rare presentations can be appreciated in the images section provided by Dr Kamlander Singh.

It has been a pleasure as well as a learning experience to be associated with this special issue of JIMSA as its Guest Editor. I wish to thank Dr P. D. Gulati for giving me this chance. My sincere thanks are due to all the contributors who very readily agreed to my request and have put in a lot of efforts in helping me produce this issue in time. I wish to dedicate this issue to the policy-makers of this country who frame the medical curriculum, besides all those patients who battle infections, especially in the intensive care units of our hospitals day in and day out.

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