LABORATORY MICROBIOLOGY TO CLINICAL MICROBIOLOGY: ARE WE READY FOR A TRANSITION?

*Sanjay Bhattacharya

Infection is and continues to be, along with environmental pollution, a top public health challenge in India. Traditionally, infectious diseases at the community as well as at the institutional level have been managed by clinical professionals and specialties. The role of microbiologists had been largely confined within the premises of the laboratory, dealing more often with the science than with the application and interpretation of the results emanating from it. Microbiologists within that role played a pre-eminent part in consolidating the foundations of this branch of laboratory medicine and, in the process, striving to produce quality information and personnel dedicated to the service of patients and infectious diseases. However, this model of service provision has not always been very beneficial for the clinicians or the patients. This has resulted in laboratories being somewhat out of touch with clinical realities. A few specific examples include carrying out tests, which are either unnecessary (e.g., speciation or susceptibility testing of Gram negative bacteria colonising chronic ulcers) or outdated (Paul–Bunnell test for Epstein–Barr virus infection) or inadequate (hepatitis B surface antigen “positive” without a neutralisation test). This may also manifest as failure to recognise the urgency of certain results or to recognise the need for development of new tests or testing strategies (viral loads for human immunodeficiency virus/hepatitis B virus/hepatitis C virus). As a result, a lot of resources (capital equipments, consumables, manpower) are either underutilised or inappropriately utilised, leaving a gap between clinical/patient expectation and laboratory performance. Although there are several notable exceptions of individuals/institutions who/which are doing an exemplary job under difficult circumstances, we are likely to achieve more by reorganising our service delivery model.

The laboratory-centred model for microbiologists has been the standard model for a long period of time not only in India but also in many other countries, including those in the industrialised world. However, with the development of India as an emerging economy and the aspiration for high quality and equitable development, there is an increasing need of multidisciplinary work within Infection Management. In this model of multispecialty coordination, the clinical microbiologist is seen as a key interface between clinical and laboratory sciences. A notable and perhaps pioneering example of this model is the United Kingdom,[1] where microbiologists and haematologists had made a successful transition from the laboratory-centred role to a clinical/laboratory interface and clinical leadership role about a generation ago. The objective of this article is to appraise the applicability of this clinical microbiology model to the Indian context.

To begin with, clinical microbiology does not diminish or disempower laboratory microbiology; rather, it enhances it. The key concepts of high quality, consistent standards, business planning, education and training besides health and safety considerations, which are central to an effective laboratory microbiology service, are also at the heart of clinical microbiology. However, what is manifestly different in the two models is the emphasis on clinical liaison (constituting regular and pro-active clinical communication and consultation), which is a logical extension to the doctrine of shared responsibility of patient care. In practical terms, this means that microbiologists go on regular ward rounds (intensive care units and infection-related units) on a routine or reactive basis (for positive blood culture or infection control interventions for example). Clinical microbiologists therefore become an essential part of clinical care with regards to preventative, diagnostic or therapeutic service. Participating and contributing in multidisciplinary meetings, hence, becomes an integral part of the microbiologists’ job description.[2] This approach, besides giving greater visibility and clinical responsibility to the microbiologists both in the hospital and in the community setting, brings out the specialty face to face with “realities and challenges of clinical medicine”. Concepts such as quality, clinical relevance of diagnostic tests and optimal utilisation of sparse resources can then be directly seen to be tested by clinical peers and patients. In addition, this would give clinicians the direct feedback about the strengths, limitations and nuances of test results and, importantly, the degree and the complexity of antibiotic resistance. In a recent study from three Indian centres, 95 of 130 (73%) third-generation cephalosporin-resistant isolates
were found to carry the bla (CTX-M-15) type extended
spectrum β-lactamase.\(^5\) In this context, the transition of a
microbiologist from Petri dish to the patient is becoming
more of a matter of clinical necessity rather than one of
clinical curiosity.\(^4\) Interestingly, a survey of 285 general
practitioners and medical specialists in southern India
revealed that improved knowledge and awareness (16%)
and guidelines along with continuing medical education
(12%) were felt to be factors that might help promote more
prudent use of antibiotics.\(^9\) In another survey of laboratory
users in the UK about perceptions of microbiology service,
a significant proportion of hospital doctors and general
practitioners felt that regular update meetings from
microbiology, including updates on antibiotic sensitivities
and antibiotic guidelines would be helpful. In that same
study, 44% of the hospital doctors wanted greater clinical
involvement from microbiologists.\(^9\)

It would perhaps be unrealistic and naïve to expect in a
transitional economy like India (with resource limitations
in capital equipments, suitably trained human resources
and restricted availability of appropriate training facilities)
to even consider a full-scale transition from a laboratory-
centred model to a clinical leadership model. Clinical
microbiology needs a strong technical support base, with
the requirement of an appropriately skilled and suitably
trained group of biomedical scientists (laboratory technical
staff) who are able to take decisions without direct
supervision with regards to routine diagnostics within the
framework of laboratory safety, standards and quality.
They are also essential for service development, diagnostic
evaluation and validation of techniques. Until we are
able to achieve a reasonable supply of suitably qualified
medical laboratory technologists, regular supervision of
daily bench work by laboratory microbiologists would be
essential. It would perhaps be appropriate to explore this
exciting new way of working in microbiology with hope
as well as caution, where part of the existing workforce of
laboratory microbiologists are enabled and empowered to
undertake clinical responsibilities and clinical interface
roles. However, this can only happen after a period of
appropriate training for the role of clinical microbiologists
and virologists.\(^5\)

In an editorial in IJMM in 2003 on the topic of
Microbiology curriculum for medical students in India,
the current editor of this journal suggested the need for
patient-oriented subject content rather than organism-
targeted reading material.\(^5\) However, considering the
enormous diversity inherent in the post-graduate Medical
Microbiology training courses in India, achieving
any sort of agreement or uniformity in curriculum,
training or examination would be challenging to say the
least.\(^9\) The total annual number of MD Microbiology seats
in India is 311. This is available from 126 medical colleges
located in 22 states or union territories (range 1–10 seats
per institution per year; median 2). Only about 54% of
these institutions are owned/run by the government.\(^10\)
However, compared with the enormity of challenges we
face from infectious diseases in the country, microbiology
seems to be an under-represented specialty. For every 100
medical students in India there seems to be only one MD
Microbiology course available every year (311/31,298
medical students per year).\(^10\)

In conclusion, the key performance indicators for
microbiology doctors need to go beyond academic
achievements into the realm of clinical outcomes and
proper resource utilisation (anti-infective and diagnostics),
number of lives saved or infections reduced. However,
we must not lose sight of the fact that external quality
assurance and accreditation of clinical laboratories remains
one of the biggest challenges faced by the microbiologists
in India. From virtually none when accreditation was
first started in 1999, the number of accredited medical
labs in India rose to 47 by June 2005. By the middle of
February 2009 some 98 laboratories performing
serological testing in microbiology had been accredited
by the National Accreditation Board for Testing and
Calibration Laboratories (NABL). However, this represents
a tiny fraction of the 20,000 odd medical laboratories that
are estimated to be present in the country.\(^11,12\) The external
quality assessment service (EQAS) instituted under the
aegis of the India Association of Medical Microbiology in
1993 reported in 2001 that only 70 laboratories, including
54 from private hospitals and only 18 from medical colleges
(government or private), were participants in the voluntary
EQAS.\(^13\) Laboratory-based microbiologists and virologists
are key to improving the situation and providing leadership
in total quality management.\(^14\) Clinical microbiology as a
philosophy dares to close the unhelpful gap between basic
medical science and clinical care. Notwithstanding the
angst it may generate (within the clinical or microbiological
community), it is a model worth exploring. Using it
effectively without compromising on our existing core
assets of scientific understanding and technical expertise
could be a resource-enhancing and educative experience
for all concerned besides providing the people with the
infection service they deserve. It is not a call for blind
imitation but of rational analysis and adaptation.

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