



Perspective

Infectious disease blocks in district hospitals to augment India's resolve to contain antimicrobial resistance

India has witnessed increasing trends of resistance to known antimicrobials in the recent past and development of resistance to the available antimicrobials is compromising the gains that the country made towards control of communicable diseases such as malaria, tuberculosis and sexually transmitted infections¹. Lack of availability of quality diagnostics and over-the-counter availability of antimicrobials result in their overuse leading to the development of drug-resistant pathogens. India's antibiotic consumption in retail sector went up by 22 per cent from 2008 to 2012 with an increase in the use of newer classes of antibiotics such as carbapenems, lincosamides, glycopeptides, third-generation cephalosporins and penicillins with beta-lactamase inhibitors². The Indian Council of Medical Research (ICMR) data³ suggest that the resistance to carbapenems is increasing by 5-10 per cent every year. Increasing resistance in community pathogens causing typhoid and diarrhoea and in pathogens causing hospital-acquired infections to higher generation antimicrobials has been documented from India. Resistance to antifungals such as fluconazole is also being increasingly reported³. Reports from Indian district hospitals (DHs) have documented high rates of antibiotic prescriptions in secondary-level hospitals highlighting an urgent need to improve the prescription of antibiotics⁴. Besides increasing the cost of treatment for individual patients, the increased cost of treatment of drug-resistant infections is a preventable financial barrier in achieving universal health coverage. Therefore, there is a sense of urgency to interrupt transmission of drug-resistant pathogens, failing which we may land in pre-antibiotic era with no new antimicrobials available to treat even some of the common infections. The combination of infection control and antimicrobial stewardship (AMS) programmes has been demonstrated to limit the emergence and transmission of resistant bacteria,

thus reducing the direct and indirect healthcare costs associated with the misuse of antimicrobials⁵. The Government of India announcement on establishing infectious disease (ID) blocks in district hospitals (DHs) will augur well with the overall intent to step up the fight against IDs, especially antimicrobial resistance (AMR).

India's commitment to containment of antimicrobial resistance

The Government of India has conveyed its commitment to address AMR through a series of steps taken in the recent past, including releasing the National Action Plan (NAP) to tackle AMR in 2017⁶. The NAP mentions strengthening surveillance, reducing incidence of infections through effective infection prevention and control (IPC) and optimizing the use of antimicrobials through AMS programmes as the priority areas. Surveillance, to capture the trends and pattern of AMR across the country, has been strengthened through the establishment of two surveillance networks, *i.e.*, the ICMR AMR surveillance network, operational in 30 hospitals, and the one supported by the National Centre for Disease Control (NCDC) in 20 hospitals⁷. Since both the networks collect data from the tertiary care hospitals, there are concerns around the generalizability of data. Paucity of good microbiology laboratories in secondary level hospitals makes it challenging to collect AMR data from lower levels of healthcare. The ICMR and All India Institute of Medical Sciences (AIIMS), New Delhi, have also initiated surveillance systems for capturing hospital-acquired infections and strengthen capacities for IPC in intensive care units of tertiary care hospitals, with technical and financial support from the Centers for Disease Control and Prevention (CDC), USA⁸. All the hospitals which are part of the ICMR network are being supported to introduce the AMS programmes⁹.

All these initiatives promise a broad intent to launch a consolidated response on containment of AMR in the country. However, due to the lack of human resources and infrastructure available to implement these interventions in secondary-level hospitals, all these initiatives remain limited to the tertiary care hospitals only.

Spotlight on district hospitals (DHs)

The DH is an essential component of the district health system and provides a link between the sub-DHs, community health centres, primary health centres below, and the tertiary care hospitals above. India has more than 700 DHs, out of which almost 200 hospitals also have more than 300 beds¹⁰. At a secondary level of healthcare, DHs are expected to provide curative, preventive and promotive healthcare services to the people in the district. Although the DHs are expected to provide specialized care, but this often fails due to understaffing at various levels and lack of availability of specialists. Cognizant of this gap, the NITI Aayog has proposed a mechanism to connect DHs to private medical college district facilities to bring specialized care facilities to the grassroots levels¹¹. The absence of ID infrastructure in DHs has made it difficult to translate the AMR-related activities initiated at the tertiary care level, by ICMR and NCDC, to the secondary level.

The Government of India has launched a series of initiatives in the past few years to strengthen the infrastructure and resources available at secondary level hospitals. *Swachata* (cleanliness) programme was launched in 2015, to strengthen infection control practices in all public health facilities¹². Under the National Health Mission, all DHs are being encouraged to go for accreditation by the prevalent accredited bodies and having an antibiotic policy is a requirement for the National Accreditation Board for Hospitals¹⁰. In yet another positive development for DHs, the Government of India has committed to introducing ID hospital blocks in all DHs and setting up public health laboratories in every block (not just in district), to address the paucity of laboratory network in rural areas. This was announced by the Finance Minister on May 17, 2020 as part of Emergency COVID-19 Response to enhance investment in public health¹³. India has signed a four-year agreement with World Bank for \$1 billion loan with a commitment to use the funds for strengthening health systems to support prevention and preparedness, strengthening the One Health platform, community engagement, monitoring

and evaluation and contingent emergency response¹³. All these initiatives convey the Government of India's recognition of DHs and the pivotal role that these hospitals can play in prevention and control of IDs. The country has paid heavy price for not investing in secondary healthcare systems during COVID-19 pandemic and bringing the spotlight to DHs will trigger the much-awaited transformation of healthcare system at the secondary level. By virtue of its positioning in the healthcare system, DHs equipped with a dedicated and functional ID block can not only share the burden of tertiary care centres in the management of IDs but also can become the focal point for providing support to CHC and PHC for the management of IDs which are the first point of contact for the majority of patients.

To be effective, the ID blocks would need to be supported by trained manpower such as ID physicians, microbiologists, infection control nurses, clinical pharmacists and well-equipped diagnostic laboratories. ID physicians would be central to creation of the ID blocks. An earlier study has documented direct correlation between quantities of antimicrobials consumed and levels of drug resistance¹⁴. An ID specialist can rationalize antimicrobial prescriptions and lead to significant improvement in appropriateness of antibiotic prescriptions¹⁵ by implementing series of interventions listed in Box I. Since diagnostic stewardship is an integral part of AMS, a well-equipped functional microbiology laboratory is crucial to establishment of ID block. Having well-equipped microbiology infrastructure at DHs will therefore, be an excellent opportunity to introduce AMR surveillance and improve practices of infection control, diagnostic and AMS, within the DHs without worrying about their sustainability (Box II). The National Essential Diagnostics List (NEDL) also recommends the culture facility (manual /automated) for all clinical specimens to be available at DH level in India¹⁶. All this will collectively result in improved diagnosis, reducing the number of hospital-acquired infections and increase in the appropriateness of antimicrobial prescriptions, thus positively influencing cost of treatment and AMR rates. Strengthening culture facility and antimicrobial susceptibility testing in district-level hospitals will enable capturing community AMR trends and patterns, which is currently lacking, thus creating an opportunity for local leadership and ownership of the State-level response for containment of AMR.

Box I. Role of infectious disease (ID) physicians in rationalizing antimicrobial prescriptions

Understand and interpret the patterns of antimicrobial resistance and antimicrobial use in a healthcare institution

In collaboration with microbiologists

- Strengthen the antimicrobial susceptibility testing for relevant drug-resistant organisms and reporting procedures, create antibiograms to guide antimicrobial prescriptions
- Provide support for infection control measures to prevent clonal spread and outbreaks of drug-resistant organisms in hospital, support development of relevant guidelines/policies and monitor compliance
- Introduce interventions for antimicrobial stewardship
- Improve appropriateness of prescriptions in terms of duration, dosage, *etc.*
- Engaging and informing physicians and surgeons on decreasing antimicrobial selective pressure by improving antimicrobial use practices
- Inclusion of antimicrobial resistance as a focus area for educational programmes for prescribers and other healthcare workers, healthcare administrators and patients

Source: Ref 15

Box II. Infectious diseases (ID) blocks at district hospitals will offer the following opportunities**Opportunities**

Availability of necessary clinical microbiology laboratory setup responsive to hospital needs

Set up structure and process of infection control practices and antimicrobial stewardship at secondary-level hospitals

Institutionalize the training and capacity building activities for IPC and AMSP at secondary-level hospitals

Opportunity to be part of national surveillance networks

Timely detection of outbreaks and interrupt clonal spread

Contribute to State-level leadership for AMSP and infection control along with local stakeholders

IPC, infection prevention and control; AMSP, antimicrobial stewardship programme. Source: Ref 15

Road ahead

The approach to interrupt AMR transmission is now moving away from conventional institution-based efforts to coordinated prevention approaches to prevent AMR transmission such as improving evidence, reducing infections in hospitals through a structured infection control and rationalizing antimicrobial prescriptions through an AMS programme. Many States in India have developed State Action Plans on AMR, whose implementation depends on the availability of necessary resources and infrastructure within the State. The initiative to introduce ID blocks in DHs is therefore timely and will provide momentum to the State-level AMR containment activities. Equipped with local evidence of antimicrobial usage and AMR levels, DHs can work with regulators in enforcing antibiotic policies in States and with the help of local stakeholders such as civil societies, non-government organizations (NGOs) and local medical associations to ensure free flow of information and communication, thus enhancing the impact of coordinated prevention approaches. The

ICMR AMR network, having previous experience of initiating these activities in tertiary care setup, can provide necessary leadership through its network of hospitals, in creating a cadre of Master trainers at State level who can further provide necessary hand-holding to the States through the designated State-level expert groups. There will, however, be many challenges in implementing this plan (Box III). The first and the most important challenge is the absence of ID physician posts in DHs and the dearth of trained ID physicians in the country, which has been previously highlighted in India as well as other low- and middle-income countries^{17,18}. To improve the availability of trained ID physicians, the country should look at creating more ID fellowship opportunities which can be offered online, with compulsory practical training for a short period. This will help create a pool of ID physicians quickly who can be employed at DHs. Till that happens, interested clinicians from other specialities could lead the ID and AMR activities after undergoing necessary training on IPC and AMS as mentioned above. An

Box III. Challenges in establishing infectious disease blocks in district hospitals

Adequate funding for human resources and infrastructure required for creation ID blocks

Creating permanent positions for ID physicians, microbiologists, clinical pharmacists in DHs

Overcoming the dearth of trained ID physicians in the country

Establishing clinical microbiology laboratories to provide diagnostic support

Creating a pool of infection control nurses in hospitals

Resources for continuous structured training programmes

ID, infectious disease; DHs, district hospital

ID physician cannot function without a support of clinical microbiologist. As per the revised guideline for DHs issued in 2012¹⁰, the post of microbiologist is desirable and not essential. There is no mention of infection control nurses (ICN) and clinical pharmacists at DH, which are crucial to IPC and AMS programmes implementation, respectively. The infection control nurses would be crucial to contain the hospital-acquired infections, which are currently managed by excessive antimicrobial use leading to development of highly drug-resistant pathogens. This is especially challenging as there is no government body which is responsible for IPC. Till the time a national body for IPC is established, the requirement of ICN should be mandatory for *Swachata* programme and also integral part of the ID blocks in hospitals that have intensive care units (ICUs). All these gaps would need to be plugged and necessary funding be allocated as the nationwide plan for implementation of creating ID blocks is drawn.

Conclusion

As India moves towards universal health coverage (UHC), proper attention needs to be given to some key considerations around AMR. By proposing to establish ID blocks in all hospitals, the Government of India has recognized the need to strengthen the way IDs are handled at secondary-level hospitals. Having specialized ID blocks at DHs will provide much-needed push to the management of IDs and will have a direct impact on the containment of AMR, in terms of capturing data and implementation of interventions to interrupt AMR. This along with other initiatives of the Government of India, focussing on laboratory workforce development and quality system improvement will be a significant step towards expanding the reach and

penetration of ongoing national initiatives addressing AMR to the next level of healthcare.

Conflicts of Interest: None.

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