

# The Clasp of CLABSI

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Even after central venous pressure monitoring has lost its relevance in critical care practice, central venous lines continue to be the inevitable accesses of facilitating care to critically ill patients. Consequently, central line-associated bloodstream infection (CLABSI) has become the much avoidable evil in the intensive care units (ICUs) all over the world. The ICUs in our country are no exception to this troublesome complication. The CLABSI is the term used for surveillance purposes, and central line-related bloodstream infection (CRBSI) is the term used for clinical purpose.<sup>1</sup> The CLABSI has added significantly to the cost and outcome burden in critical care, irrespective of the etiology of the critical sickness. India spends about 4.7% of gross domestic product on health, with one-fourth (1.15%) of it in public sector and the rest in private sector (3.55%).<sup>2</sup> The commendable contribution of critical care services in improving the all-round outcomes of the otherwise poor prognostic status of critically ill patients is being eroded due to the various healthcare-associated infections, especially the CLABSI. The occurrence of hospital-acquired infections (HAIs) has unfortunately coincided with the rise of antimicrobial resistance (AMR) and emergence of multi- and pan drug-resistant (MDR and PDR) bacterial strains in healthcare setups. This has compounded the disease burden and affected the outcomes very adversely. The average cost of treatment of an MDR or a PDR infection is more than a year's wage of an average Indian rural worker.<sup>2</sup> This effect becomes all the more sinister in vulnerable patients such as those with liver diseases.

The CLABSI rate varies considerably in the different studies reported from India. While capturing the magnitude of various HAIs across the world, among other such syndromes, Mehta and Rosenthal reported the incidence of CLABSI [then referred to as central venous catheter (CVC)-BSI] rate as 7.92/1,000 device days in India in 2007.<sup>3</sup> While the study conducted by Singh et al.<sup>4</sup> reported a CLABSI rate of 0.48 per 1,000 central line (CL) days, other studies showed CLABSI rates of 27.0 and 16.0 per 1,000 CL days.<sup>5,6</sup>

In their novel work published in this volume of *IJCCM* by Khodare et al.,<sup>7</sup> the authors monitored and tried to improve the incidence of CLABSI in liver intensive care patients. The two notable points in their work are the character of CLABSI in their liver intensive care unit and the impact of intervention on incidence of CLABSI. While the incidence of CLABSI, both in quantity and in character, in their cohort was worrisome, the reduction in CLABSI from 11.78/1,000 catheter days to 3.99/1,000 catheter days (i.e., 66.1% reduction!) was commendable as a result of the introduction and strict implementation of CLABSI bundle. The two bundles included three elements in CVC insertion bundle and five elements in CVC maintenance bundle. This study also stands out as the first effort to showcase the incidence of CLABSI in liver patients in India where the high incidence of MDR gram-negatives and MRSA is quite concerning, which need to be urgently addressed with focused strategies. In contrast, the common organisms that other CLABSI studies reported are coagulase-negative staphylococci,

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*Staphylococcus aureus*, *Enterococci*, *Escherichia coli*, *Klebsiella*, and *Candida*.<sup>8–10</sup>

The International Nosocomial Infection Control Consortium (INICC) revisited its data in 2016 and compared the progression of CLABSI from 2002 to 2015. Reduction in the incidence of CLABSI and other HAIs rates as well was encouraging. Presented as pooled means with 95% confidence interval, these rates decreased from 12.5 (11.7–13.3) in 2002–2005 period to 9.2 (8.8–9.7) in 2002–2007 period, to 7.6 (7.4–7.9) in 2003–2008 period, 6.8 (6.7–7.0) in 2004–2009 period, 4.8 (4.7–4.9) in 2007–2012 period and 4.19 (4.1–4.3) 2008–2013 period.<sup>11</sup> It will be a highly productive and learning exercise to look into the factors that led to the decrease in these HAIs and that will form the platform for the strategies that will take us forward in winning the war on HAIs.

Centers for Disease Control and Prevention has consistently evolved definitions and recommendations for all HAIs including CLABSI and strongly advocated bundle approaches to preempt this problem.<sup>12</sup>

It is INICC's stated goal to facilitate education, training, basic and cost-effective tools and resources, such as standard forms, and an online platform, to tackle this problem effectively and systematically.<sup>11</sup> Toward this goal, the INICC has recommended the use of a multidimensional approach including bundles, education, outcome, process surveillance, and feedback on burden of CRBSI and on performance.<sup>13</sup>

There is adequate and strong evidence to prove that a bundle approach goes a long way in preventing HAIs including CLABSI. A study assessing the implementation and impact of the INICC Multidimensional Approach on CLABSI rates showed a 39% reduction in India (6.4 vs 3.9 CLABSIs per 1,000 CL days).<sup>14</sup> In another study conducted by Lin et al., implementation of CLABSI bundle decreased the CLABSI rate in their ICUs from 7.40 to 3.93 per 1,000 central-catheter days.<sup>15</sup> Apisarnthanarak et al. in a hand hygiene-reinforced CLABSI bundle interventional study recorded significant improvement in CLABSI rate of 14/1,000 catheter days in the year before bundle introduction, which dropped to 6.4/1,000 catheter days after bundle introduction. This further dropped to 1.4 cases/1,000 catheter days with hand hygiene reinforcement.<sup>16</sup>

It was also proved in a National Healthcare Safety Network hospitals' survey in the USA by Furuya et al. that the reduction in CLABSI rate is directly proportional to the magnitude of strict bundle compliance in ICUs.<sup>17</sup> These studies clearly point out to the evidence-based fact that CLABSI prevention bundles play a vital role in improving CLABSI rates.

Several governmental and nongovernmental organizations (NGOs) have taken serious note of the situation of HAIs and rising AMR and proposed strategies to control them. In India, various actions have been taken including setting up of a National Task Force on AMR Containment (2010), "Chennai Declaration" by a consortium of the Indian Medical Societies (2012), setting up of ICMR national surveillance network of laboratories, "Redline" campaign for educating public and National Action Plan (NAP) on AMR (2017). One initiative that deserves mention is Chennai Declaration, to which the Indian Society of Critical Care Medicine (ISCCM) contributed.<sup>18</sup> This was a road map meeting of various governmental and nongovernmental healthcare stakeholders in the field of infectious diseases (IDs), infection control, and antibiotic usage. They have recommended several key steps to regulate practices in these fields. Another initiative by Government of India is "National Action Plan (NAP) for antimicrobial Resistance (AMR)" released in 2017 by the Union Ministry of Health and Family Welfare.<sup>19</sup> The objectives of the NAP include improving awareness, enhancing surveillance measures, strengthening infection prevention and control, research and development, promoting investments, and collaborative activities to control AMR. While focusing mainly on AMR, the NAP has stressed on gaps in infection prevention and control as well. Citing Chennai Declaration, under "Strategic Priority 3", NAP has suggested that infection control programs (ICP) should be made mandatory for licensing both private and public-sector hospitals. The NAP also noted serious deficiencies such as lack of infrastructure, shortage of trained staff, high staff turnover, and high workloads as the major barriers to enforcing effective ICPs.<sup>20</sup> The "Strategic Priority 4" of NAP concentrates, among other, on optimizing antibiotic use, surveillance of antibiotic use, and antibiotic stewardship in both human and nonhuman health sectors, and strengthening the existing regulatory framework, with the objective of controlling AMR.

To address the issue of lack of trained manpower resource, several efforts are underway. Once again, this effort has seen notable progress in public-private partnership. Apart from several private institutions, the Medical Council of India and National board of examinations has developed Doctorate of Medicine (DM) and Fellow of National Board (FNB) programs in IDs for physicians. At the nursing level, several organizations have created certificate courses for infection control nursing (ICN). University of Hyderabad (<https://www.uohyd.ac.in/>) has started a postgraduate diploma in infection prevention and control, targeting doctors, nurses, and healthcare administrators, in collaboration with Infection Control Academy of India ([www.ifcai.in](http://www.ifcai.in)), an NGO, which is leading the awareness and education of infection prevention and control in India and other low-resource countries. Several more of such initiatives are needed to fill the manpower resource gap in the area of HAIs and AMR.

Quality and safety are not some privileges we offer to our patients; they are patient's fundamental rights. The HAI prevention programs and antimicrobial stewardship should be part of the quality and safety initiatives in healthcare system. The challenge is not only in creating these systems but in ensuring strict compliance to them as well. How do we go about achieving it? An increasing number of healthcare institutions are turning to voluntary mode

by accrediting themselves to organizations such as National Accreditation Board of Hospitals (NABH) and Joint Committee International (JCI), which have stringent criteria of quality control, including infection control. Should such accreditations be made mandatory? Should this voluntary quality control be made regulatory? Should institutes that meet these standards be given incentives by regulatory authority? At least, an infection and antimicrobial stewardship committee and trained infection control nurses should be made mandatory for all healthcare organizations. Their data should be in an open-access forum and should be brought under right to information act.

In summary, a multipronged approach encompassing all the areas discussed above only can lead us to solve the vexing issue of HAIs in general and CLABSI in particular. These issues have acquired a global character and we do not exist in isolation. While respecting the international recommendations, we need to customize them to Indian conditions keeping our strengths and weaknesses in view. Studies such as the one done by Khodare et al.<sup>7</sup> are eye-openers and we need more of them. All-round responsibility, participation, and regulatory compliance seems to be the need of the hour. An encouraging trend of reduction in HAIs and CLABSI resulting from strict implementation of preventive interventions are the lights at the end of tunnel. A strategy of ICPs coupled with antimicrobial stewardship is the only way forward to achieve the goal of eliminating HAIs and AMR and thus producing better outcomes. It is high time that we all commit ourselves to that goal.

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