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Chief Clinical Officer,
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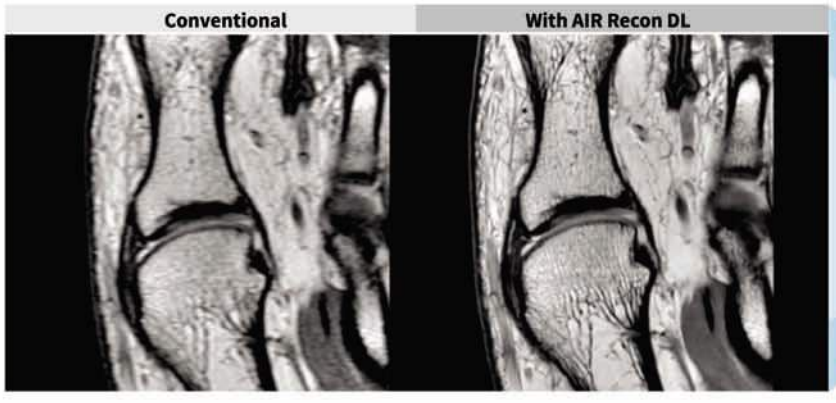

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Betting big on healthcare

As non-healthcare players increase stakes in the healthcare sector and investors continue to search for value buys, legacy players are repositioning themselves into more agile parts, to coax out more efficiencies and compete with more recent entrants.

But single specialty players, especially those with a trusted brand name and legacy in the markets they serve, could turn out to be the real winners in this race to attract market share and investor interest.

Consider the recent news that market leader Apollo Hospitals Enterprise (AHEL) got approval from its board to demerge its pharmacy and digital health business, as a precursor to an expected listing of the new entity in 18-21 months. As per a company release, this three step reorganisation would result in an omni-channel pharmacy distribution and digital health platform, with scale of Rs ~16,300 crores of revenue in FY25, with stated plans to achieve Rs ~25,000 Crores revenue by FY27, with ~7 per cent EBITDA margin. Subject to approvals from the regulator, the reorganisation represents a potential customer funnel of over 100 million individuals into the Apollo healthcare universe, as per the release.

AHEL's reorganisation has got the thumbs up from most analysts. A Motilal Oswal Financial Services Ltd (MOFSL) report titled, Strategic demerger sets stage for long-term value creation, the demerger allows for a sharper strategic focus, with Apollo Hospitals concentrating on core healthcare services, while NewCo drives growth in digital health and pharmacy distribution under dedicated leadership. The MOFSL report predicts additional benefits for AHEL, like the integration of pharmacy-related functions which is expected to enhance margin realisation through efficient supply chain management.

AHEL earlier refuted market buzz about the divesting of its maternity and children care division Apollo Cradle and Children's Hospital *(https://www.expresshealthcare.in/news/why-apollo-hospitals-is-divesting-apollo-cradle/449410/)* stating that "there is no truth to such rumours as reported. Apollo Cradle continues to pursue its path of growth with its distinct nurturing touch and care." AHEL subsequently announced expansion plans for the division, projecting the opening of 7-8 new centers across India within the next five years.

Groups like AHEL currently have the advantage over contenders like Amazon, which recently added diagnostics to its Medical services category, to complete the patient's journey from its existing teleconsultation and pharmacy services. *(https://www.expresshealthcare.in/news/not-having-diagnostics-was-not-an-option/449547/)*

India's health sector is in a sweet spot and everyone is aiming for pole position. As per a recent Angel One report, India's hospital market is expected to grow at a CAGR of 8 per cent and is expected to reach a size of $193.6 billion. Around 64 per cent of the market is controlled by private players who are expected to add around 10,000 beds in FY26. Planned greenfield expansions in metro and tier 1 cities by the private sector are expected to break even in 12-15 months, as per Angel One.

While the multi super speciality chains fight for market share, the single speciality care segment is proving that size is not everything, relevance is

AHEL led the private sector, with a bed count of over 10,000 beds across 73 hospitals but that lead is now under threat. Manipal Hospitals' acquisition of Medica Synergie and AMRI Hospitals gives it 10, 500+ beds across 37 hospitals. Manipal could further consolidate this lead if it succeeds in its bid for Pune-based Sahyadri Hospitals.

But as per media reports, Manipal has tough competition from peers like Max Healthcare as well as private equity (PE) investors like IHH Healthcare-backed Fortis Healthcare, KKR, Blackstone, and EQT Partners. The frenetic bidding for Sahyadri Hospitals continues the trend of PE investors investing in Tier 2/3 city based regional healthcare chains, and exiting at higher valuations once the regional player has scaled up. Fortis Healthcare, Aster Quality Care, Ujala Cygnus are also reportedly scaling up in their chosen niches.

While the multi super speciality chains fight for market share, the single speciality care segment is proving that size is not everything, relevance is. And growth rates could be more attractive, even on a smaller base. According to Avendus Capital's recent report titled, Breaking Away: How Single Specialties Are Carving Their Own Path in Indian Healthcare, organised single specialty chains,with a current market size of USD 4 billion and 27 per cent share within the single specialty segment, are expected to grow at 24 per cent CAGR to USD 9 billion by 2028. Their growth is underpinned by strong fundamentals - EBITDA margins exceeding 20 per cent, ROCEs above 30 per cent, and early break even within two years. The segment has attracted cumulative PE investments exceeding USD 3.7 billion since 2015, accounting for over 35 per cent of total hospital investments. 70 per cent of these investments have gone to established specialties such as IVF, eyecare, mother & child care, dialysis and oncology.

Investors have also widened their search to more segments. As the Avendus Capital report points out, in the last 2- 3 years, leading players in specialties such as dental care, urology / nephrology, skin and hair care have also started to attract investor interest due to significant whitespaces in the demand-supply in these specialties. These formats offer an ideal blend of low capital intensity, high specificity of care, and replicable business models that are increasingly appealing to institutional investors and founders alike.

Market leaders are clearly positioning themselves to make the most of increased investor interest. However, success would depend on the smooth execution of these planned reorganisations and integration of merged entities. Above all, while these could generate shareholder value, will patient outcomes and affordability benefit to the same degree?

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INTERVIEW

The focus of the dental industry has shifted towards prevention, smile improvement, and patient comfort

Lt. Gen. Dr Vimal Arora, Chief Clinical Officer, Clove Dental, sheds light on how the Indian dental industry has evolved over the years, its immense growth potential and how Clove Dental is keeping up with these changes in an interview with **Kavita Jani**

How has the dental sector evolved since you first started practising?
The dental sector has undergone a transformation which is unparalleled in healthcare, in the field of materials, armamentarium, digitalisation, techniques and technology and painless atraumatic dentistry. Way back in 1971, we had to perform treatments using foot-operated engines (speed of 700 rpm), which are now replaced with ceramic bearing air turbines (10 lakhs rpm). This has made procedures almost painless and faster for the patients. The silver alloy fillings (mercury-based), which needed a lot of tooth structure cutting, have now been replaced with composite tooth colored fillings, which are bonded to the tooth surface and are therefore much more conservative. The focus of the dental industry has shifted towards prevention, smile improvement, looking good, and patient comfort.

The most remarkable change that has revolutionised the dental industry is the adaptation of digital technology. The digitisation of the dental world has made an immense impact on the day-to-day workflow. The advent of intraoral scanners, 3D radiographic imaging (CBCT), and CAD-CAM systems has completely changed the dental roadmap in terms of diagnosis, treatment planning and prosthetic fabrication. I feel this is the best time to be in the dental industry, where everything is so automated that patient can visualise their predictable treatment outcomes and approve them.

What are the key challenges in scaling dental healthcare in India?
The key challenges are an exploding population, socio-economic variation and lack of awareness. The Government has been struggling to provide healthcare infrastructure across the country due to its vastness. The Health Ministry has launched several health policies under universal healthcare; however, oral health remains under-prioritised in the government initiatives.

As we know, the majority of the Indian population (66 per cent) dwells in rural regions where the dentist-to-population ratio ranges around 1:60,000 as against 1:7,500 as per the WHO. India has the highest number of dental colleges in the world, and almost 30,000+ dental graduates pass out every year, and most of them find no jobs. Oral healthcare infrastructure is better in urban settings where the dental workforce is heavily concentrated. This unequal distribution of resources limits access to quality dental care to a significant portion of our rural population.

Lack of awareness about oral health is a major hurdle in the growth of dental healthcare. Oral Diseases affect 84 per cent of the Indian population in one way or another. Oral cancer is one of the most common cancers in India and accounts for 60,000 cases every year. Despite this alarming trend of oral diseases, the majority of people seek dental care at an advanced stage. Preventive dental care is still a relatively new concept for the general public, leading to delayed diagnoses and higher treatment burdens.

In addition to inaccessibility and lack of awareness, lack of insurance for dental treatments poses a significant challenge, especially to middle/lower income brackets who consider dental treatments as non-essential due to perceived high cost.

How has patient awareness and expectation evolved, particularly in urban vs semi-urban areas, and how has Clove adapted to these changes?
Patient awareness and expectations have shown a significant improvement in urban and semi-urban areas, and the dentist-to-population ratio of 1:5000 in these areas is conclusive enough that people are giving priority to their oral health. People are seeking interventions which can make them look good and improve their smile. In addition, the focus is also towards improving the lifestyle rather than settling for routine treatments.

The demand for fixed dentures (implants) and invisible braces (aligners) is on the rise as compared to conventional removable dentures and wired braces. The younger generation is differently driven with a complete shift towards fun, enjoying life, looking good, getting confident and to put it in one word- YOLO (you only live once).

It's a matter of great pride to share that Clove has undertaken this responsibility of creating awareness at the urban and semi-urban levels in the most challenging way. We conduct more than 2000 dental health camps every month across the country. The camp dentist uses an intraoral camera and patient education tools to bring awareness to the masses. The interest level goes up tremendously with the use of an intraoral camera when the person can actually see their teeth and oral cavity and can appreciate the description by the dental surgeon, along with measures to prevent and control dental diseases.

What are the most impactful technological advancements you have seen in dental care delivery in recent years?
Technology has changed the entire landscape of dental practice. The advancements offer less invasive techniques, improved accuracy, reliability, predictability of treatment, improved oral health and better quality of life.

I believe that dental implants and aligners have been the two most disruptive innovations in the dental practice. Dental implants offer a long-term solution for tooth replacements that closely simulate natural teeth as these have become more accurate, reliable, predictable and accessible. In the field of Orthodontics, aligners have revolutionised the way irregular teeth are corrected as these provide a discreet, comfortable, and digitally driven alternative to conventional wires and brackets.

The intra-oral scanner is another innovation which has taken the profession to new heights of advancements by allowing the capture of digital impressions and eliminating the need for conventional messy impressions. The digital files of the scans, combined with AI-powered treatment simulation

software, allow patients to visualise the outcomes of treatment. The introduction of digital radiography and 3D radiography techniques (CBCT) has remarkably given an extra edge to the diagnostic precision and treatment planning. CAD-CAM designed prosthesis can replicate exact anatomical details and result in well-fitting dental rehabilitation.

Do you see a future where AI-driven diagnostics or robotics play a routine role in dental procedures?
AI is the future, and we are already beginning to see its impact in dentistry. Machine learning algorithms can now analyse intraoral images/radiographs, which can detect oral diseases and even early signs of cancer with very high accuracy. AI-based tools are being used in Clove Clinics across the country for monitoring the sterilisation of the dental operatory. The new AI modules enhance the accuracy of implant placement, minimising complications and maximising success. In orthodontics, AI can predict tooth movements and thus optimise treatment timelines by designing aligners. All these tools have become a routine part of clinical practice, assisting dentists in faster, more consistent diagnoses and treatment planning.

Robotics-assisted dentistry is still in very early stages, being used for precise, minimally invasive implant placements. These systems combine real-time data with haptic feedback and digital planning to improve outcomes and reduce human error. Soon, we can expect a hybrid model where dentists leverage AI for decision-making and robots for performing repetitive, high-precision tasks.

What are the biggest gaps/challenges in the dental industry? How can these be bridged?
The dental industry in India holds immense potential, but several structural and strategic challenges must be addressed to achieve the next phase of growth of the dental sector. The key gap lies in our economy, infrastructure and distribution of resources. To bridge this gap, a robust private partnership model is essential. The synergy can be harnessed to bring evolution in infrastructure, insurance, innovation and employment. The PPP collaboration can help to create a more structured dental market where costs are predictable and care is standardised. The private sector can build platforms which can support health missions digitally by offering remote consultation and virtual screening, which can make oral care accessible in remote locations.

Another critical challenge in the growth of the dental industry is India's heavy reliance on imported dental equipment and materials, which inflate the treatment costs. There is an urgent need to promote 'Made in India' products. Building a strong indigenous dental manufacturing ecosystem will not only reduce costs but also drive global competitiveness.

How is dental education/training in India adapting to the requirements of modern healthcare?
Dental education in India is gradually evolving to align with the demands of modern, technology-driven healthcare. Many dental institutions have begun integrating digital dentistry, intraoral scanning, CAD/CAM, CBCT and laser dentistry in their academic curriculum. However, the adaptation is inconsistent. There is a noticeable gap between what students are being taught and what is required in real-world private practice or a corporate dental setting. The teaching models are mostly outdated, with very limited hands-on exposure to contemporary technologies, which is forcing fresh graduates to resort to highly expensive certification courses for skill enhancement. To bridge this, the dental education must place greater emphasis on evidence-based practice, interdisciplinary learning, and technology adoption at colleges. The realignment of curriculum must include training in the latest and emerging fields of implantology, aligners, digital dentistry and practice management, which should form the core curriculum. Further, the dental graduates lack the practical aspects of communication skills and patient management, which need to be included in the curriculum. A stronger push from regulatory bodies with curriculum reforms is vital to prepare future dentists for the evolving landscape of oral healthcare in India.

From leading military dental services to scaling and managing a dental clinic chain, what leadership lessons have translated across both sectors?
Clove Dental, for me, is a journey of persistence, foresight and team empowerment in a space where no roadmap existed. During my 10 years of service with Clove Dental, I could steer the clinic's growth from 30 odd clinics to 600+ clinics across the country with over 15,000 dentists on the payrolls of Clove Dental, making us the largest in the world. This has been extremely satisfying and fulfilling for me to see Clove Dental as a pioneer model of organised dentistry in a highly fragmented industry.

Unlike the military, where responsibilities were distributed across various specialised agencies, at Clove, we manage all departments and operations, including the infrastructure, ourselves. The service with the military created a strong foundation in discipline, organisation handling and team management and emphasis on uniformity, standardisation and team building. At Clove Dental, we had to build the system from the ground zero and lay down the guidelines and SOPs for all functions and roles. Clove has now come to exist as the real-time, people-driven organisation where we lead by example, make quick decisions and constantly innovate to remain abreast to provide the best care to our clientele.

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BEYOND THE BIN
RETHINKING BIOWASTE MANAGEMENT IN HEALTHCARE

As India builds a future-ready healthcare ecosystem, the silent burden of biomedical waste demands urgent, coordinated attention

By Kalyani Sharma

As India builds a future-ready healthcare ecosystem, the silent burden of biomedical waste demands urgent, coordinated attention merging compliance with innovation, investment with infrastructure, and action with accountability.

While the Biomedical Waste Management Rules, 2016, provide a regulatory framework, gaps in execution, awareness, technology adoption, and equitable infrastructure development remain.

The current landscape

Recent statistics reveal a startling truth: improper disposal of medical waste, particularly needles, has resulted in countless deaths and infections worldwide. According to the World Health Organization (WHO), over 1.3 million people die each year due to infections caused by needlestick injuries, which occur when healthcare workers or waste handlers come into contact with improperly discarded needles, risking exposure to infectious diseases such as HIV, hepatitis B, and hepatitis C.

Apart from the immediate risk to human lives, improper needle disposal also poses significant threats to the environment. When needles are discarded inappropriately, they can end up in open dumps, landfills, or even water bodies, leading to soil and water pollution, thereby endangering the health of wildlife and compromising the overall health of our ecosystems. The presence of these hazardous materials in the environment creates a cycle of contamination that can have far-reaching consequences for generations to come.

"In India, biomedical waste management (BMWM) is governed by the Biomedical Waste Management Rules, 2016, issued by the Ministry of Environment, Forest & Climate Change. As per these rules, Health Care Facilities (HCFs) including hospitals and diagnostic labs are directly responsible for segregation, collection, pre-treatment (where required), in-house transportation, and storage of bio-waste," says Dr Ravneet Kaur, Laboratory Head-Microbiology and Serology, Agilus Diagnostics.

Emerging technologies like plasma pyrolysis and gasification are gaining attention in biomedical waste management for their high waste destruction efficiency, volume reduction, and minimised harmful emissions

Dr Ravneet Kaur
Laboratory Head-Microbiology and Serology,
Agilus Diagnostics

Semi-urban facilities often struggle with irregular waste pickups and insufficient on-site storage capacity, leading to heightened public health risks

Dr Kriti Ganguly
Consultant-Microbiology,
Marengo Asia Hospitals

A key concern is the inadequate number of treatment facilities, particularly in rural and semi-urban regions, where improper disposal methods like open dumping and uncontrolled incineration are still prevalent

Dr Sunita Kapoor
Director & Laboratory Head,
City X-Ray and Scan Clinic

While Tier 1 cities typically have structured waste management protocols and third-party tie-ups for treatment and disposal, many Tier 2 and Tier 3 cities continue to struggle with inadequate segregation, limited awareness, and lack of compliance

Dr Aashish Chaudhry
Director & Head-Orthopaedics & Joint Replacement,
Aakash Healthcare

In response to a directive from the National Green Tribunal issued on January 12, 2024, the Central Pollution Control Board (CPCB) compiled data submitted by 36 state and union territory pollution control authorities. According to this consolidated report, India has approximately 393,242 healthcare facilities (HCFs). Of these, about 67.8 per cent are non-bedded units, which include entities such as clinics, diagnostic laboratories, blood banks, veterinary centers, and dispensaries.

The remaining 32.2 per cent comprise bedded facilities—hospitals, nursing homes, and similar institutions with inpatient care capabilities. Out of the total, 156,540 facilities have received formal authorisation from the respective State Pollution Control Boards (SPCBs) or Pollution Control Committees (PCCs). The rest are still undergoing the approval process. Notably, Uttar Pradesh, Karnataka, and Bihar account for the highest number of facilities pending authorisation.

Burden beyond the big cities

The divide is sharper in semi-urban and rural belts, where infrastructure and capacity are limited. "Semi-urban facilities often struggle with irregular waste pickups and insufficient on-site storage capacity, leading to heightened public health risks," says Dr Kriti Ganguly, Consultant-Microbiology, Marengo Asia Hospitals.

Even more troubling is regulatory non-compliance. According to Dr Sunita Kapoor, Director & Laboratory Head, City X-Ray and Scan Clinic, "Nagpur alone saw 314 healthcare establishments fined Rs 74 lakh over five years for improper waste disposal. Furthermore, limited awareness and inadequate training

among healthcare workers have been noted, contributing to improper handling and disposal of biomedical waste."

Adding to this, Dr Aashish Chaudhry, Director & Head-Orthopaedics & Joint Replacement, Aakash Healthcare explains, "Biowaste generation in hospitals and diagnostic labs has grown significantly in both urban and semi-urban regions due to increased healthcare access, patient load, and testing volumes. While Tier 1 cities typically have structured waste management protocols and third-party tie-ups for treatment and disposal, many Tier 2 and Tier 3 cities continue to struggle with inadequate segregation, limited awareness, and lack of compliance."

"In semi-urban areas, biomedical waste is often mixed with general waste, leading to serious health and environmental hazards. Moreover, many small clinics and diagnostic labs either remain unregistered or do not follow mandated protocols due to lack of resources or monitoring."

Some facilities are now exploring AI-based dashboards to track waste generation trends and improve segregation compliance

Dr Chandermani
Unit Head, Clinical Services, Jupiter Hospital, Pune

Smart bins integrated with IoT systems and RFID tracking systems improve waste segregation accuracy while enabling real-time waste monitoring from collection to disposal

Dhrubaa Ghosh
Partner-Healthcare, BDO India

Real impact of digitalisation lies in reducing indirect waste such as excess consumables, redundant paperwork, and unnecessary manual interventions

Dr Bilal Thangal
Medical Lead,
NURA

Emerging technologies and digital solutions

Despite the structural challenges, Indian healthcare facilities particularly in metro clusters are gradually adopting modern technologies to improve the quality and safety of biowaste handling.

From IoT-enabled smart bins and RFID-based tracking to decentralised microwave sterilisation, innovation is stepping up to solve legacy challenges.

"Emerging technologies like plasma pyrolysis and gasification are gaining attention in biomedical waste management for their high waste destruction efficiency, volume reduction, and minimised harmful emissions," shares Dr Kaur.

"Plasma pyrolysis operates at very high temperatures, making it suitable even for moist or hazardous waste types, and produces by-products like syngas which can be used as fuel. Gasification, similarly, takes place in an oxygen-deficient environment and offers clean energy recovery options.

These technologies present a compelling solution for environmentally responsible disposal, especially in high-density healthcare clusters. However, their adoption comes with challenges such as high initial capital expenditure, specialised equipment requirements, and intensive operational planning and maintenance", added Dr Kaur.

Several hospitals are embracing compact, decentralised treatment systems. "Decentralised waste treatment units, such as compact autoclaves and microwave disinfection systems, are making inroads, especially in smaller hospitals. These allow in-house treatment, reducing dependency on external vendors and lowering transportation risks and costs. Some facilities are now exploring AI-based dashboards to track waste generation trends and improve segregation compliance." notes Dr Chandermani, Unit Head-Clinical Services, Jupiter Hospital, Pune.

Adding a diagnostics sector perspective, Dr Ganguly says, "Several hospital in India have already adopted to the latest technologies like real time monitoring apps, barcode-based waste tracking system, and onsite autoclaving units that are directly integrated with the State Pollution Control Board System. Such innovations and technology not only helps in enhancing the compliance but also curbs down the reliance on manual handling, and thus enhancing worker safety and reduces any risk of infection."

Dhrubaa Ghosh, Partner-Healthcare, BDO India highlights, "Autoclaving together with microwave disinfection and plasma pyrolysis treatment methods generate reduced hazardous emissions and lower operational costs in the long term... Smart bins integrated with IoT systems and RFID tracking systems improve waste segregation accuracy while enabling real-time waste monitoring from collection to disposal."

Further elaborating on safety innovations, she adds, "Automated handling systems and robotic arms perform dangerous material management to protect workers from infectious waste and sharp objects... Mobile waste treatment units operate in limited-resource environments to perform on-site processing which eliminates transportation risks and expenses."

Dr Bilal Thangal, Medical Lead, NURA also adds, "Emerging technologies such as AI-led screening, automation, and digital workflows are reshaping healthcare delivery by enhancing efficiency, safety, and cost-effectiveness. In diagnostic and preventive care settings, especially those focused on non-invasive procedures, the generation of biomedical waste is inherently low. However, the real impact of digital-

isation lies in reducing indirect waste such as excess consumables, redundant paperwork, and unnecessary manual interventions."

"This shift is especially valuable in urban and semi-urban India, where infrastructure gaps and cost pressures persist. Technology-enabled models offer scalable, resource-efficient solutions that improve traceability, support compliance, and elevate patient safety. As the healthcare sector evolves, integrating such innovations will be crucial in building more resilient, efficient, and environmentally conscious care ecosystems."

Investment and partnership trends in the bio waste management sector

With ESG becoming a boardroom priority and sustainability indices gaining prominence, the biomedical waste sector is attracting interest from government, private players, and institutional investors alike.

"The biomedical waste management sector is witnessing a steady increase in investments and strategic partnerships, driven by tighter regulatory oversight and the growing emphasis on environmental sustainability and ESG compliance within healthcare," says Dr Kaur.

This shift is evident in investment flows. "In 2024, the sector was valued at approximately USD 286.98 million and is projected to grow to USD 486.09 million by 2033 at a CAGR of 6 per cent," shares Dr Kapoor.

"Investments are being directed towards the development of new treatment facilities, adoption of advanced waste treatment technologies like autoclaving and chemical disinfection, and integration of IoT-based monitoring systems to improve operational efficiency."

Dr Ganguly echoes this trend, "The Bio Medical Waste Management sector in India is now witnessing a rising momentum pertaining to increased Public Private Partnerships (PPP), Investment by private sector, and the tech-driven innovations."

"Large hospital networks are exploring partnerships with certified waste management firms to set up centralized treatment facilities or integrated waste management systems. Startups offering tech-driven solutions for waste segregation and monitoring are also attracting seed funding", added Dr Chaudhry.

From the hospital operator's view, Dr Chandermani adds, "There is growing interest from private players and startups in the biomedical waste sector. With increasing regulatory enforcement and demand for professional waste management services, several companies are offering turnkey solutions to hospitals, including collection, treatment, data reporting, and training."

Public-private partnerships (PPPs) are also picking up. Some large hospital chains have partnered with waste management firms to co-develop treatment facilities or digital tracking systems. The National Clean Air Programme and Swachh Bharat Mission have brought some focus and funding toward improving hospital waste infrastructure.

Bridging the gaps: What still needs urgent attention

Despite the progress, glaring disparities and inefficiencies persist particularly in the policy-practice gap.

"Despite the establishment of a clear regulatory framework through the Biomedical Waste Management Rules, 2016, gaps in infrastructure and policy implementation remain a major concern, especially in semi-urban and rural areas," says Dr Kaur.

"A key concern is the inadequate number of treatment facilities, particularly in rural and semi-urban regions, where improper disposal methods like open dumping and uncontrolled incineration are still prevalent. The uneven distribution of infrastructure has resulted in urban centres being better equipped, while less developed regions remain underserved", Dr Kapoor added.

Ghosh underscores systemic issues, "The operational challenges of India's healthcare waste management system become evident through observations which demonstrate ongoing deficiencies in rural and urban healthcare facilities... The personnel responsible for waste handling in these areas perform their duties without wearing appropriate protective equipment or receiving proper training."

Dr Ganguly adds, "Many districts are still lacking Common Bio-medical Waste Treatment and Disposal Facility (CBWTF) coverage, which leads to accumulation of waste beyond the saturation limit, or improper disposal. On the contrary, in the rural sector, the enforcement is quite limited due to lack of awareness, training and monitoring. Furthermore, some of the home-made diagnostic or telemedicine kits, a segment which has seen a sharp rise in the recent times post COVID, are not covered under the current policy frameworks."

From the enforcement perspective, Dr Chandermani explains: "Training and awareness among healthcare workers, especially support staff, remain limited. Waste segregation at the source is often poor... While the law is clear, enforcement is uneven. Fines and closures are rare, even in cases of gross violations."

The way forward

Addressing the biomedical waste challenge requires a multi-pronged strategy spanning regulation, infrastructure, digitalisation, and behavioural change.

To begin with, India must increase the number and geographic distribution of CBWTFs, especially in semi-urban and rural areas. The inclusion of mobile or modular treatment units would provide flexibility and last-mile access.

Digital tracking tools must be made mandatory and seamlessly integrated with State Pollution Control Board dashboards. Uniform reporting systems would aid compliance and data-led policymaking.

Capacity building should also be institutionalised. "Mobile-based gamified applications function as essential educational tools to deliver continuous training for healthcare service providers," says Ghosh.

With robust laws, increasing awareness, scalable innovations, and investor interest, the country stands on the cusp of a breakthrough in sustainable waste management. Healthcare stakeholders must think beyond the bin towards circular solutions.

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INTERVIEW

Bridging technology and healthcare

Ratish S Nair, CEO of Sanrad Medical Systems, speaks to **Express Healthcare** about making advanced imaging technologies more accessible and affordable across India. He shares insights on the rise of pre-owned equipment, innovations like digital PET/CT, and Sanrad's role in supporting digital transformation in healthcare

How has the landscape of medical imaging technology evolved in recent years, particularly regarding accessibility and affordability?
Medical imaging has seen substantial technological progress, but the real challenge lies in making these technologies accessible to healthcare providers across India's diverse geography. At Sanrad, we work with both new and pre-owned equipment to address different market needs. The pre-owned equipment market has grown, especially in tier 2 and tier 3 cities where cost considerations and maintenance requirements are primary concerns.

What role does quality assurance play in your pre-owned equipment offerings?
Our pre-owned equipment undergoes inspection, necessary upgrades, and testing to meet manufacturer specifications. All imported pre-owned equipment must comply with regulatory requirements. We provide spare parts and technical support for 7-8 years after installation to ensure continued operation and long-term reliability.

What role does advanced imaging play in enhancing minimally invasive surgeries, and what new modalities do you see impacting surgical planning?
Our imaging systems support surgical planning and minimally invasive procedures through several capabilities. Some systems feature deep learning reconstruction that produces clearer images for surgical navigation. Multi-area scanning within a single breath hold helps with complex surgical planning. Higher-end systems include automated bone removal features for imaging clarity. Metal Artifact Reduction technology proves useful for post-operative imaging, particularly with metallic implants present.

Our Digital PET/CT system offers an expanded axial field of view and digital gating technology for molecular imaging that assists with tumor localisation and surgical approach planning. Free-breathing scanning capability benefits respiratory-gated procedures and thoracic surgeries.

These imaging tools provide anatomical and functional data that help surgeons plan and execute minimally invasive procedures more effectively.

> Our pre-owned equipment undergoes inspection, necessary upgrades, and testing to meet manufacturer specifications. All imported pre-owned equipment must comply with regulatory requirements

Looking ahead, what developments in medical imaging technology are you most excited about?
Our latest addition is a Digital PET/CT system - a molecular imaging scanner that combines scanning precision with dose management algorithms. The system uses Digital SiPM-based PET technology integrated with ScintCare Blue Series CT, featuring passive calibration and digital gating technology. These features collectively enhance both the patient experience and diagnostic accuracy.

We're also seeing potential in AI-integrated imaging systems that could improve diagnostic capabilities and reporting workflows.

How does Sanrad support healthcare facilities in their digital transformation journey?
We provide technical support, maintenance services, and training programs alongside equipment. Our recently launched leasing services offer customisable plans that allow facilities to upgrade technology over time.

We fully recognise that digital transformation takes time, which is why we make sure we're there for our partner facilities at every step of their technology adoption process.

Finally, what are your thoughts on the future of medical imaging accessibility in India?
We're working toward broader access to imaging technology through multiple channels - new equipment sales, pre-owned equipment solutions, and leasing options. The growing acceptance of pre-owned equipment and positive response to leasing programs indicates progress in this direction. Our focus remains on expanding access to diagnostic capabilities across India's healthcare system.

Smiles and scalability: The evolving landscape of India's dental industry

The dental industry is witnessing steady growth driven by rising awareness, aesthetics-focused demand, and digital innovation. Backed by a strong workforce, it holds vast potential. But gaps in access, insurance, and regulation remain key hurdles, highlights **Kavita Jani**

With oral health increasingly recognised as a key component of overall well-being, the dental sector in India is beginning to command greater attention, both from consumers and investors.

Once considered a luxury or an afterthought in healthcare, dental care in India is now undergoing a transformation. From routine check-ups and cavity fillings or root canals, oral health is evolving into a preventive healthcare space. Moreover, dental care is now given importance for its cosmetic/aesthetic appeal rather than mere oral health and well-being.

Market size

According to the General and Dental Healthcare Industry in India by the Indian Dental Association, the global dental market size was valued at $ 36.32 billion in 2021. The market is projected to grow from $ 38.84 billion in 2022 to $ 63.93 billion by 2029, exhibiting a CAGR of 7.4 per cent during the forecast period. The market size of the Indian Dental market was approximated to be around $ 2 billion.

Talking about the market size, Sameer Merchant, Managing Director and CEO, Laxmi Dental said, "Oral health in India is witnessing a significant transformation. With the Indian dental market expected to grow from $ 653 million in 2022 to $ 1,339 million by 2030 at a CAGR of 9.4 per cent, we are seeing a clear shift in both awareness and demand. This growth is being driven by higher disposable incomes, an ageing population, and increasing patient awareness around preventive and aesthetic dental care."

Today's patients are moving beyond basic treatments like tooth extractions to seeking advanced solutions such as aligners, implants, crowns, and cosmetic enhancements. This evolution is supported by modern dental techniques, improved access, and the integration of digital dentistry

Sameer Merchant
Managing Director and CEO,
Laxmi Dental

The Government has been struggling to provide healthcare infrastructure across the country due to its vastness. The Health Ministry has launched several health policies under universal healthcare; however, oral health remains under-prioritised in the government initiatives

Lt. Gen. Dr Vimal Arora
Chief Clinical Officer,
Clove Dental

This combination of high-value transactions and low practitioner density creates a unique opportunity: one that calls for better access, smarter procurement, and stronger clinical support

Dr Vikas Agarwal
CEO & Founder,
Dentalkart

"Today's patients are moving beyond basic treatments like tooth extractions to seeking advanced solutions such as aligners, implants, crowns, and cosmetic enhancements. This evolution is supported by modern dental techniques, improved access, and the integration of digital dentistry."

With a growing appetite for cosmetic procedures, a rising burden of lifestyle-related oral diseases, and a strong pipeline of dental professionals, the sector is poised for significant growth.

Gaps and challenges

While awareness of oral health and dental aesthetics is an observed phenomenon among the urban population, rural India faces problems such as a lack of awareness, having less disposable income on average, and a severe shortage of dental professionals, with dentist-to-population ratios below recommended standards. Dental care remains under-penetrated, particularly in rural and semi-urban regions where infrastructure is limited.

Merchant highlights, "A significant portion of the population still lacks access to quality dental care, with many relying on unverified sources rather than licensed practitioners. Awareness is another major hurdle; many individuals seek treatment only when issues become acute, and the concept of preventive dental healthcare is still not widely embraced."

◆ **Lack of awareness:** Oral health receives limited attention within the broader public healthcare system, leading to gaps in early diagnosis, routine care, and patient education.

Lt. Gen. Dr Vimal Arora,

Chief Clinical Officer, Clove Dental, states that oral Diseases affect 84 per cent of the Indian population in one way or another. "Oral cancer is one of the most common cancers in India and accounts for 60,000 cases every year. Despite this alarming trend of oral diseases, the majority of people seek dental care at an advanced stage," he explains. Dr Arora believes that the delayed diagnoses and higher treatment burdens are caused due to preventive dental care still being a relatively new concept for the general public.

That the key challenges are an exploding population, socio-economic variation and lack of awareness. "The Government has been struggling to provide healthcare infrastructure across the country due to its vastness. The Health Ministry has launched several health policies under universal healthcare; however, oral health remains under-prioritised in the government initiatives," he explains.

◆ **Urban vs rural penetration:** Dr Arora continues to explain the disparity that exists within the Indian dental landscape. "As the majority of the Indian population (66 per cent) dwells in rural regions where the dentist-to-population ratio ranges around 1:60,000 as against 1:7,500 as per the WHO," he states.

"India has the highest number of dental colleges in the world, and almost 30,000+ dental graduates pass out every year, and most of them find no jobs. Oral healthcare infrastructure is better in urban settings where the dental workforce is heavily concentrated," asserts Dr Arora. This unequal distribution of resources limits access to quality dental care for a significant portion of the Indian rural population.

Emerging trends and growth opportunities

Dr Vikas Agarwal, CEO & Founder, Dentalkart, highlights the key indicators of growth in the Indian dental market. He explains that while the overall audience size remains relatively limited, the value per dentist is exceptionally high. Dr Agarwal explains, "This combination of high-value transactions and low practitioner density creates a unique opportunity: one that calls for better access, smarter procurement, and stronger clinical support." The surge in preventive and aesthetic procedures, investments in clinic digitisation, and greater patient awareness are strong indicators of long-term, sustainable growth.

> Increasing oral health awareness, equitable workforce distribution, better insurance coverage, stronger regulatory frameworks and accessibility across urban and rural regions must be prioritised to ensure qualitative and quantitative growth

◆ **Demand in urban areas:** He further analyses the rising demand from Tier 2 and Tier 3 cities. "Clinics in these regions are modernising faster than ever, driven by increased awareness, social media influence, and rising affordability," adds Agarwal. This awareness among the consumers also propels practitioners to invest in trusted consumables, equipment and latest innovations.

Agarwal mentions that dentists are also actively pursuing hands-on training, certification courses, and attending events platform which aggregates key workshops and conferences, to upskill themselves through integrated learning.

◆ **At-home services:** At-home dental services are becoming an increasingly popular model of business in the sector. For example, Cura Care, an at-home wellness services brand, raised Rs 5 crore in pre-seed funding in April of this year. Founded in January 2025 by an IIT Delhi alumni duo and an oral surgeon, the company offers at-home services like teeth cleaning, scaling, polishing, and whitening, delivered by DCI-certified dentists using customised portable dental units.

These services gained momentum post-pandemic as concerns about hygiene, travel, and waiting-room exposure led to increased demand for in-home healthcare. Although still a niche offering, at-home dentistry is gaining traction in metros and Tier I cities, especially among the elderly, differently abled, and time-constrained working professionals.

◆ **Digital transformation:** Emerging technology and artificial intelligence (AI) are reshaping the healthcare industry, streamlining diagnostics, treatment planning, and patient engagement; dentistry is no exception. From diagnostics to treatment planning, new-age technologies are helping practitioners deliver faster, safer, and more accurate care. Among these, AI is emerging as a game-changer in everyday clinical workflows.

Dr Arora opines that AI is the future, and it has already begun to impact dentistry. "Machine learning algorithms can now analyse intraoral images/radiographs, which can detect oral diseases and even early signs of cancer with very high accuracy," he shares. The new AI modules enhance the accuracy of implant placement, minimising complications and maximising success. In orthodontics, he explains, "AI can predict tooth movements and thus optimise treatment timelines by designing aligners." All these tools have become a routine part of clinical practice, assisting dentists in faster, more consistent diagnosis and treatment planning.

He also added, "Robotics-assisted dentistry is still in very early stages, being used for precise, minimally invasive implant placements. These systems combine real-time data with haptic feedback and digital planning to improve outcomes and reduce human error. Soon, we can expect a hybrid model where dentists leverage AI for decision-making and robots for performing repetitive, high-precision tasks."

As AI adoption increases, it promises to make dental care more precise, accessible, and patient-centric.

Reach, relevance, and readiness: Strategy for growth

◆ **For B2B providers:** Dr Agarwal suggests focusing on three strategic pillars - reach, relevance, and readiness- to evolve as a B2B provider within the sector.

He explains, "Scaling last-mile logistics infrastructure through a pan-India network of micro-warehousing hubs will enable reliable fulfilment in both urban and underserved geographies."

Curating a globally sourced product portfolio with unique SKUs and providing access to the latest in dental innovation, the provider can maintain relevance. "By offering procedure-based bundles, we make purchasing intuitive and clinically relevant for dentists," adds Dr Agarwal.

To implement readiness, Dr Agarwal explains how Dentakart implements a digital-first approach. "This includes tools like Smart Quotation Engines, AI-based auto-replenishment, and an in-app assistant for real-time procurement and support," he says. Dentalkart also hosts a CME-certified education platform and diagnostic-to-delivery support for clinics.

"Together, these initiatives position us not just as a supplier, but as a strategic partner in every clinic's growth journey," he concludes.

◆ **For dental practitioners:** Dr Arora explains the key ways in which patient awareness can be improved to bridge the barrier of ignorance and limited awareness.

He describes how Clove Dental conducts more than 2000 dental health camps every month across the country. "The camp dentist uses an intraoral camera and patient education tools to bring awareness to the masses. The interest level goes up tremendously with the use of an intraoral camera when the person can see their teeth and oral cavity and can appreciate the description by the dental surgeon, along with measures to prevent and control dental diseases."

He says, "Patient awareness and expectations have shown a significant improvement in urban and semi-urban areas, and the dentist-to-population ratio of 1:5000 in these areas is conclusive enough that people are giving priority to their oral health."

Dr Arora states that an increasing number of people are seeking interventions which can make them look good and improve their smile. In addition, the focus is also towards improving the lifestyle rather than settling for routine treatments. The demand for fixed dentures (implants) and invisible braces (aligners) is also on the rise as compared to conventional removable dentures and wired braces.

Conclusion

The Indian dental industry stands at a promising crossroads driven by growing demand, technological advancements, and increasing consumer awareness. As innovation reshapes diagnostics, treatment, and patient experience, the sector presents an opportunistic space for investments and market expansion.

However, to sustain this growth, systemic improvements will be necessary. Increasing oral health awareness, equitable workforce distribution, better insurance coverage, stronger regulatory frameworks and accessibility across urban and rural regions must be prioritised to ensure qualitative and quantitative growth. With strategic integration into national health policies and public health initiatives, the dentistry sector in India has the potential to evolve into a high-impact, high-volume vertical one that improves oral health outcomes and contributes meaningfully to India's broader healthcare goals.

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Evolution of healthcare quality: Lessons from the past, strategies for the future

Dr Sunil Khetarpal, Director, Association of Healthcare Providers (India) (AHPI) stresses that in the future, healthcare in India will not only need investments in infrastructure and human resources but a paradigm cultural change

India's health system has evolved significantly from its early roots of reactive, fragmented care. Traditionally, healthcare focused on the treatment of illness after it has happened, with minimal prevention and long-term wellness care. The establishment of the National Health Policy in 1983 and the National Rural Health Mission in 2005 provided the foundation to overcome these weaknesses. With time, advancements in infrastructure, maternal and child healthcare, and immunisations started bearing fruit.

As pointed out in EY's 2024 report Decoding India's Healthcare Landscape, infant mortality fell from 58 to 28 per 1,000 live births between 2005 and 2020, and maternal mortality fell from 254 to 97 per 100,000 live births. Both of these were complemented by higher government expenditure in healthcare, which went up from 0.9 per cent of GDP in 2003–04 to 2.1 per cent in 2022–23. Nevertheless, there were challenges like underequipped rural centers, fragmented delivery systems, and excessive out-of-pocket payments that remained, indicating the need for more profound, systemic change.

From cure to prevention: A paradigm shift

India's healthcare system is currently undergoing a significant transformation, moving its emphasis from treating illnesses to preventing them in the first place. This shift is fuelled by the growing prevalence of non-contagious diseases like diabetes, high blood pressure, and mental health disorders. Advances in wearable tech and AI-powered diagnostics allow for earlier detection and management of health problems. What were once simple step counters or sleep trackers now have the capability to perform ECGs and even forecast heart issues, leveraging real-time data and smart algorithms.

Further encouraging this trend is the government's Ayushman Bharat programme. More than 1.7 lakh Ayushman Arogya Mandirs (AAMs) have been set up to provide comprehensive primary care which includes everything from early screening and diagnoses to mental health interventions and palliative care. Digital initiatives such as e-Sanjeevani and the Ayushman Bharat Digital Mission have eliminated barriers by providing healthcare directly to people's homes with more than 22 crore teleconsultations conducted and more than 73 crore digital health IDs, known as ABHA, created.

The role of technology in modern healthcare

Technology isn't just an extra feature anymore; it's central to how healthcare is changing. Artificial intelligence is key to diagnosis, personalising treatment, and managing patients at home, in a manner never before possible. AI-supported tele-ICUs are providing specialists in major urban hospitals with an opportunity to consult with and help rural doctors and their critically ill patients, saving lives and improving outcomes.

Looking ahead, 5G connectivity promises to revolutionise healthcare access even further. With ultra-low latency and high bandwidth capabilities, it makes remote surgeries and telepathology possible, since expert surgeons are able to operate on patients in distant locations using robotic instruments. Such a connectivity leap in healthcare can improve diagnostics and real-time collaboration of healthcare professionals to provide specialized care to patients located in the furthest places in the country.

Women's health and the rural divide

Barring advances, Indian women's health continues to be marked by significant challenges. While there has been an increase in the use of contraception and decline in maternal mortality, the EY report refers to disconcerting state and district-level disparities. Domestically, violence and unequal access to healthcare services continue, with alarming reports of an increase in gender-based violence between NFHS-4 and NFHS-5.

Rural India is still underserved. The government is looking to address the urban-rural health divide by taking steps to promote public-private partnerships (PPP), encouraging private hospitals and clinics to enter small towns and rural areas. The Production-Linked Incentive (PLI) scheme is also allowing for the production and manufacturing of affordable medical devices locally, cutting out reliance on imports and subsequently allowing for wider access to diagnoses and essential treatment.

Diagnostics, AI, and preventive screening

Preventive healthcare has also triggered increasing demand for sophisticated diagnostics. Lifestyle diseases require early detection more than ever before. Individuals and employers are now spending on periodic tests and wellness packages. Diagnostic tools with AI capabilities are gaining relevance, particularly in rural settings where there might not be full-fledged labs. Handheld AI-backed devices can provide accurate real-time outputs, allowing for early intervention and greatly reducing the long-term load on healthcare facilities.

Virtual healthcare and remote access

Telemedicine and virtual healthcare have seen explosive growth, especially in recent years due to COVID-19. Platforms that enable patients to consult with doctors in their own homes are greatly increasing accessibility for millions of people. AI-driven systems are also being used to triage symptoms, suggest treatments, and even generate prescriptions with minimal in-person meetings.

Tele-ICUs, supported by these advances in technology, allow real-time surveillance and specialist engagement with patients in rural hospitals. Once 5G is implemented, this model will be further enhanced with remote procedures and high-definition diagnostics, allowing for almost instant communication. Collectively, these solutions provide a means of overcoming the geographic, economic, and infrastructure barriers to timely and effective care.

The road ahead: Strategies and vision for the future

India's healthcare plan for the next decades is both visionary and ambitious. The nation plans to substantially improve its healthcare infrastructure by 2047—doubling doctors, increasing hospital beds by 30 lakh, opening a medical college in each district, and achieving 100 per cent health insurance coverage. A big emphasis is also being put on creating a universal digital health ecosystem, where all citizens will have an individual health ID, allowing for seamless coordination of care across different providers and platforms.

In the future, healthcare in India will not only need investments in infrastructure and human resources but a paradigm cultural change. The focus will be more on community-level interventions, a robust primary healthcare system, and proactive health management and less on the treatment of illness. This will call for a blend of traditional wisdom with the latest innovations, and the coordinated effort of public institutions and private entrants.

While the country is transitioning to a more inclusive, preventative, and data-driven model of care, the real problem will be ensuring equitable access and widespread acceptance of this new model of care. Indeed, it will also be about aligning digital tools with the human aspect of care. However, if India continues with its present focus on prevention, accessibility and innovation, it will not only improve citizen's health but also act as a model for healthcare systems to emulate in a global context.

INTERVIEW

Agentic AI will shift healthcare from being transactional to continuous

Dr Adil Khan, CEO, Tulu Health in an intercation with **Kalyani Sharma** talks about agentic AI transforming the Indian healthcare and stresses that it's an adaptive digital infrastructure that evolves with patient needs and delivers measurable value to both hospitals and individuals

What sets Tulu's AI apart from other chatbot or hospital engagement tools in the market?
Unlike traditional healthcare chatbots that are reactive and often limited to static, scripted responses, Tulu Health's AI agents function as proactive, intelligent care coaches. They don't just respond to queries-they guide patients step-by-step through their care journey, from booking appointments to managing discharge plans. These agents are context-aware, deeply embedded within hospital systems, and capable of handling operational workflows like follow-ups, medication orders, and pre-op prep. What we're building goes beyond a chatbot-it's an adaptive digital infrastructure that evolves with patient needs and delivers measurable value to both hospitals and individuals.

How do you ensure the accuracy, security, and compliance of your AI agents, especially when dealing with sensitive health data?
Trust is the foundation of everything we do at Tulu Health. Our AI agents are designed for non-diagnostic, high-volume tasks supporting patients with guidance, not medical advice. They rely on evidence-based protocols and are trained on curated, clinically validated datasets to avoid misinformation or hallucinations.

On the infrastructure side, we operate on a secure, compliant architecture with strict access controls, encrypted data handling, and detailed audit trails. We take a zero-compromise approach to security, ensuring our platform aligns with the highest standards of patient privacy and regulatory compliance. For us, accuracy and safety aren't features-they're non-negotiables.

Tell us about the AI Agent Platform recently launched. You've already onboarded seven organisations. What has the response been like from your hospital partners?
The response has been incredibly encouraging. One of the most consistent pain points we heard was that over 98 per cent of patients visiting hospital websites were dropping off before engaging meaningfully. With Tulu's AI Agent Platform, we're closing that gap.

Our agents don't just assist-they build trust, guide patients, and enable smoother transitions into actual care. Hospitals now see more patients follow through with appointments, procedures, and treatment plans, often above industry conversion benchmarks. Most importantly, they're witnessing clear ROI within weeks. It's not just a tech upgrade; it's a tangible transformation in how care is initiated and sustained.

Tulu Health is onboarding major institutions like AIIMS, GTB, and LNJP. What are some of the challenges and opportunities when working with public health institutions?

Public institutions offer tremendous scale and impact, but the journey isn't without challenges. Integration with legacy systems and fragmented workflows takes time and close collaboration. Budget constraints are another hurdle, even as these institutions remain eager to innovate. We believe there's a pressing need for greater public and private funding to support this digital shift-especially in hospitals that serve large, under-resourced populations.

That said, the opportunity is immense. These institutions cater to thousands of patients daily, and Tulu can make a real difference by streamlining engagement, reducing operational burden, and supporting frontline staff with intelligent assistance-all while staying aligned with their mission of equitable care.

How do you see the evolution of Agentic AI transforming the Indian healthcare space in the next 2-3 years?
Agentic AI will shift healthcare from being transactional to continuous. Today, you seek care only when you're sick. In the near future, intelligent agents will proactively remind you to take medication, interpret diagnostics, flag warning signs, and follow up after discharge-all autonomously.

In a country like India, where doctor-patient ratios are stretched, this will be a game-changer. AI agents won't replace doctors-they'll extend their capacity. We believe India is uniquely positioned to lead this shift at a population scale, showcasing how AI can enable inclusive, scalable, and always-on care.

What's your broader vision for Tulu Health? What problem do you ultimately want to solve?
Our vision is to build a personalised care coach for every individual, making healthcare as accessible, intuitive, and continuous as a single click. Today's system is fragmented-patients navigate it alone, while providers are overwhelmed, and critical data remains siloed.

We're reimagining this with AI agents that unify people, data, and care journeys, creating a seamless experience that works in real time. Whether you're booking a test, managing recovery, or seeking insurance clarity, care should come to you, in your language, on your platform, and on your terms. That's the world we're building-a world where care is proactive, personal, and always within reach.

What's the vision behind combining healthtech and fintech? How critical is financial accessibility to the future of digital health?
India has one of the highest out-of-pocket healthcare expenditures globally, with individuals bearing over 55 per cent of the total health spending. As a result, more than 60 million Indians are pushed into poverty each year due to medical expenses. Healthcare here isn't just a clinical issue - it's a financial one. In fact, it's the leading cause of bankruptcy in the country. That's why at Tulu, we don't treat financial accessibility as an add-on - it's foundational. We've integrated fintech into our healthcare experience so that when you're booking a surgery, you instantly see what your insurance covers, what subsidies apply, and how you can finance the rest, all without leaving the interface. From diagnostics to medications, patients can move forward without upfront payments or friction. Our belief is simple: you can't solve health without solving affordability. By bridging care and cost in one seamless journey, we're making healthcare truly inclusive and accessible for all.

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INTERVIEW

Innovation is central to how India's healthcare system is scaling sustainably and efficiently

Shakeel Iqbal, Head – Service Sales and Education Solutions, GE HealthCare, in an interaction with **Express Healthcare,** shares insights on how innovation in services is driving sustainable, efficient, and patient-centric growth in the healthcare sector

As India moves towards a more self-sufficient healthcare ecosystem, what trends and innovations do you foresee shaping the future of service models in the MedTech industry?
India's healthcare landscape is evolving rapidly and as the country moves towards greater self-sufficiency, we will see transformative shifts in how MedTech service models are designed and delivered.

One key trend is the localisation of service infrastructure, with growing investment in regional service hubs, training of local biomedical talent, and the development of certified third-party maintenance networks particularly for tier 2, tier 3 cities, and rural health centres. This aligns with India's Atmanirbhar Bharat vision and supports the creation of a more agile, responsive service backbone.

Another major trend is the rise of data-driven, value-based service models. OEMs like GE HealthCare are already leveraging AI, IoT, and digital twin technology to enable predictive maintenance and performance benchmarking.

These technologies are evolving into full life-cycle asset management platforms, helping providers make smarter decisions around procurement, utilisation, and maintenance.

We will also see service models shift from ownership to outcome-based engagement—think subscription models, pay-per-use, or shared-risk frameworks where service quality and uptime are linked directly to patient outcomes and provider satisfaction.

Finally, interoperability and platform integration will become critical. As hospitals adopt more digital tools—like EHRs, imaging systems, and diagnostics—there will be rising demand for service models that support integrated ecosystems rather than isolated devices. This means service teams will need cross-disciplinary expertise across software, hardware, and compliance. The future of MedTech services in India is going to be smarter, more decentralised, and deeply aligned with clinical impact. And that's not just a technological shift—it's a mindset shift towards viewing service as a strategic enabler of healthcare delivery.

Unplanned equipment downtime can disrupt clinical workflows and delay critical care. How is GE HealthCare minimising these risks through predictive, preventive, and real-time service models?
Unplanned downtime is a serious risk—not just to clinical efficiency, but to patients' lives. At GE HealthCare, minimising that risk is a core part of our service philosophy. We are using a three-pronged approach: predictive, preventive, and real-time service models.

First, predictive service tools like TubeWatch and OnWatch use machine learning algorithms to analyse equipment usage patterns and performance data. This helps us forecast potential failures before they happen—essentially allowing us to fix problems before they impact care. Second, our preventive maintenance strategy—GE Professional Maintenance follows rigorous OEM-recommended schedules for inspections, calibrations, and software updates. This ensures the equipment is always performing at peak efficiency, reducing wear and tear over time.

Third, our real-time service model, iCenter, relies on IoT-enabled devices that continuously stream data to central monitoring hubs. If a machine starts showing irregular behavior, alerts are triggered instantly, allowing us to initiate remote diagnostics or dispatch a field engineer right away. This kind of fast intervention minimises workflow disruptions and ensures continuity of care.

Overall, these models help us shift from a reactive to a proactive service mindset, ensuring that healthcare providers can focus on what matters most—delivering timely and safe care to patients.

With India's diverse geography, clinical needs, and infrastructure gaps, what are the most critical service challenges healthcare providers face and how do these shape GE HealthCare's approach to

solutioning and engagement?
One of the biggest challenges in India is the inconsistency in maintenance standards, especially in public hospitals and remote regions, where up to 60 per cent of medical equipment can be non-functional. That's a huge risk to patient outcomes.[1].
A noticeable shortage of skilled biomedical engineers further complicates the effective management of sophisticated medical devices. GE HealthCare is addressing this by doubling down on OEM-driven service contracts like Comprehensive Maintenance Contracts (full blown service contract covering parts and labour) and Annual Maintenance Contract (labour contract only), ensuring devices are maintained to global standards. We are also leveraging remote diagnostics so we can provide proactive support—even in areas that lack on-site access. The aim is not restricted to selling a device, but to be a long-term partner in delivering reliable, accessible healthcare across every corner of the country.

From a services perspective, what role is innovation playing in ensuring growth, that is sustainable, efficient, and patient-centric?
Innovation is central to how India's healthcare system is scaling sustainably and efficiently. A strong example is predictive maintenance powered by AI and IoT, which is helping hospitals reduce equipment downtime. This ensures critical devices remain operational when patients need them most, significantly enhancing both safety and efficiency. We are also seeing smart partnerships between OEMs and healthcare providers, where real-time monitoring and data analytics are being used to proactively manage devices. This shift is not just about fixing equipment when it breaks—it's about anticipating issues before they impact patient care. That's what makes the approach truly patient-centric. Plus, with the rise of digital tools and mobile platforms, even facilities in tier 2 and tier 3 cities are now able to access quality maintenance services, which goes a long way in addressing India's geographical and infrastructural diversity.

> AI and IoT are game changers for MedTech, and GE HealthCare is at the forefront of that transformation. We are using these technologies to move beyond reactive maintenance to a more intelligent, predictive model

AI and IoT are transforming MedTech service delivery. How is GE HealthCare leveraging these to drive predictive maintenance, reduce downtime, and deliver proactive insights to healthcare providers?
AI and IoT are game changers for MedTech, and GE HealthCare is at the forefront of that transformation. We are using these technologies to move beyond reactive maintenance to a more intelligent, predictive model.

Through IoT-enabled devices, we collect real-time data on equipment performance—ranging from usage patterns to temperature fluctuations and software logs. That data is then analysed using AI algorithms that can detect anomalies, predict failures, and recommend timely interventions. This means we are no longer waiting for equipment to fail. Instead, we can alert service teams or even perform remote troubleshooting before issues escalate, reducing unplanned downtime, extending the life of the equipment, and ensuring that providers have uninterrupted access to diagnostic and therapeutic tools.

We are also using AI to generate proactive insights for hospitals—like which machines might need upgrades, how to optimise asset utilisation across departments, or when to plan preventive maintenance during low-traffic hours to avoid workflow disruption. It's all about giving healthcare providers the tools to be more efficient, more resilient, and ultimately more patient focused.

Beyond uptime, service innovation now shapes the entire customer journey. How is GE HealthCare using digital tools—like remote monitoring and self-service platforms—to elevate service responsiveness and provider satisfaction?
Today, service is not just about fixing issues, it's about creating a seamless and empowered experience across the entire customer journey. GE HealthCare is doing that by embedding digital tools into every touchpoint of the service lifecycle.

We use remote monitoring platforms like iCenter that track equipment health 24/7, enabling real-time diagnostics and early detection of anomalies. This lets us respond faster, often solving problems before providers even know there's a risk. In many cases, remote troubleshooting can resolve issues instantly—no wait time, no technician needed on-site.

We are investing in self-service platforms that give providers direct access to service history, maintenance schedules, real-time alerts, and even on-demand training or parts ordering. That kind of transparency and control increases provider confidence and satisfaction.

For instance, our AI-driven solution, such as AIR™ Recon DL enables medical professionals to achieve pin-sharp images more quickly. AIR™ Recon DL challenges the inherent trade-off between SNR, scan time and image resolution. Using an AI based reconstruction algorithm, AIR™ Recon DL improves SNR by making use of the raw data to remove image noise and ringing. The equipment can produce high-quality images with shorter scan times, enabling greater patient throughput and increased return on investment.

We have also introduced digital tools like the My GE HealthCare app which is an easy way to manage your GE Healthcare service and support in one place – anytime, anywhere. It's simple and fast to create and track service requests from initial contact to completion, monitor planned service needs, initiate unplanned service calls, and proactively manage service for your entire diagnostic imaging fleet, whenever and wherever you want. We also have a first-of-its-kind ecommerce portal called Service Shop where our customers can procure parts, accessories and even contracts online making it convenient for them. These initiatives ensure that our solutions remain at the forefront of healthcare innovation, aligned with the evolving needs of the industry.

Cost remains a barrier to technology adoption, especially for mid-sized and Tier 2/3 healthcare providers. What role do flexible service contracts, value-based partnerships, or pay-per-use models play in expanding access?
That's a critical issue in the Indian healthcare landscape. Many providers in tier 2 and tier 3 cities operate with limited budgets, but they still need high-quality, reliable equipment. That's where flexible service models really come into play.

At GE HealthCare, we offer customised Annual Maintenance Contracts (AMC) and Comprehensive Maintenance Contracts (CMC) that bundle services across devices or allow for staggered payments—making it easier for smaller hospitals to afford OEM-level maintenance. We're also exploring digital pay-per-use models, where providers only pay per scan, which aligns costs directly with revenue cycles.

Beyond contracts, we're forming value-based partnerships focused on long-term outcomes rather than one-time transactions. These partnerships may include shared risk models, co-branded training programs, or tech-enabled capacity building.

TruPay—our pay-per-use service contract for Revolution CT equipment offers specialised services designed to streamline operations and improve equipment uptime.

It provides complete care for three years with 95 per cent uptime, including planned maintenance visits and service support within a few hours, 365 days a year. Optional QA tests and calibration services are also available. Its pay-per-use model ensures that providers pay only for actual equipment usage, making it financially viable for smaller hospitals.

The goal is to remove barriers to access—financial, logistical, and technical—so that every healthcare provider, regardless of size or location, can deliver safe, timely, and effective care. Because access to technology shouldn't be a privilege—it should be a standard.

Reference:
1. https://www.nhm.gov.in/New_Updates_2018/NHM_Components/Health_System_Strengthening/BEMMP/Biomedical_Equipment_Revised_Guidelines.pdf

Can India build a MedTech identity that's more than just affordable

Himanshu Baid, Managing Director, Poly Medicure stresses that the future of Indian healthcare and the role in the global MedTech ecosystem depends on the collective ability to innovate at scale, speed, and depth

India's image in the global healthcare ecosystem has long revolved around its ability to deliver affordable solutions. From generic pharmaceuticals to low-cost surgical procedures, India has consistently positioned itself as a value-based healthcare provider. In recent years, the medical technology sector has begun to follow this trajectory. However, as India matures in this space, the question arises: Can India build a MedTech identity that transcends affordability and asserts leadership in innovation, quality, and global relevance? The answer is certainly yes.

The future of Indian healthcare and the role in the global MedTech ecosystem depends on the collective ability to innovate at scale, speed, and depth.

The affordability paradigm

India's MedTech landscape has evolved rapidly over the last two decades. Fueled by domestic demand, supportive government policies, and the rise of homegrown manufacturers, the country has become a hub for cost-effective devices. These products, crucial for both domestic and global markets, address the urgent need for accessible healthcare.

Companies operate in a rapidly evolving landscape where technological advancements and patient needs are constantly shifting. To stay competitive and deliver cutting-edge solutions, it is imperative that they significantly increase their investment in innovation and R&D. 5-7 per cent of annual revenue should be allocated to these areas to ensure sustained product development, regulatory compliance, and the integration of new technologies such as AI, robotics, and personalised medicine. This level of commitment is not just an investment in future growth but a necessity to address unmet clinical needs, improve patient outcomes, and maintain a leadership position in a highly dynamic global market.

Why innovation is not optional: It's urgent

India faces a dual burden of disease: rising non-communicable diseases and lingering infectious conditions. Our health infrastructure is stretched, our skilled workforce limited, and access to quality care uneven. Innovation is not a luxury, it's a necessity. Clinical trials in India take over 5-7 years on average, with high risk and regulatory complexity. Streamlining these timelines through digital health tools and local innovation can drastically reduce time-to-market. Despite India's engineering talent and scientific base, VC funding in Indian life sciences was only $0.2 billion over the last five years, compared to $90–100 billion globally. With over 70 per cent of medical devices still imported, there is a massive opportunity and responsibility for companies to develop indigenous, world-class solutions.

To redefine its MedTech identity, India must invest more deeply in innovation. The country's burgeoning startup ecosystem offers promising signals. With over 3,000 health tech startups and increasing interest from venture capitalists, India is seeing a rise in indigenous innovation from AI-powered diagnostics and wearable health monitors to robotic surgical systems.

A call to collaborate, invest and lead

The MedTech innovation engine cannot run on passion alone, it needs capital, collaboration, and commitment. Encouragingly, the government is stepping up, with initiatives like the Rs 5,000 crore Promotion of Research & Innovation Programme, and schemes through BIRAC to fund early-stage startups.

But public support must be matched by private sector leadership. It is crucial to actively invest in R&D, build partnerships with academic institutions, and foster global collaborations to bring advanced, affordable, and accessible devices to market.

India's MedTech future will be shaped by its ability to:

◆ Invest deeply in R&D, not just manufacturing

◆ Forge cross-border and cross-sector partnerships, combining engineering with clinical insight

◆ Attract and retain high-risk capital for breakthrough innovations

◆ Nurture MedTech talent through academic programs, fellowships, and startup incubators

Way forward

The world is ready for a MedTech leader that delivers both innovation and inclusion. India can be that leader but only if we dare to build, patent, and scale solutions that the world hasn't seen yet.

To build a MedTech identity that transcends affordability, India must embrace incremental innovation as a strategic pillar. While breakthrough technologies often steal the spotlight, it is incremental innovation - small, continuous improvements in existing products, processes, and delivery systems that can drive scalable impact in India's diverse and resource-constrained healthcare landscape. By adapting global technologies to local needs, enhancing usability, reducing maintenance complexity, and improving durability, Indian MedTech companies can create differentiated solutions that serve both domestic and international markets. This form of innovation also allows for faster regulatory pathways and more predictable returns on investment, making it an attractive route for both start-ups and established firms. Moving beyond cost competitiveness, incremental innovation positions India to deliver high-quality, context-relevant MedTech solutions that are globally respected and locally transformative.

And that future must be innovative, inclusive, and Indian.

Medikabazaar announces partnership with COMEN to bring advanced healthcare tech to India

This partnership will provide cutting-edge solutions in patient monitoring, ICU & critical care, anaesthesia workstations, fetal and maternal monitoring and medical imaging

Medikabazaar, India's leading B2B healthcare platform, has entered into an exclusive partnership with COMEN, a global leader in patient monitoring and critical care equipment.

Through this collaboration, Medikabazaar will offer the complete range of COMEN products to healthcare providers across the country, making advanced medical technology more accessible than ever before.

This partnership will provide cutting-edge solutions in patient monitoring, ICU & critical care, anaesthesia workstations, fetal and maternal monitoring and medical imaging.

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Dinesh Lodha, Group CEO, Medikabazaar said, "At Medikabazaar, our commitment is to make healthcare innovation accessible across India. This partnership with COMEN allows us to offer world-class technology that will strengthen the capabilities of hospitals and healthcare facilities nationwide."

Krishwen, Regional Director - South Asia, COMEN said, "India's healthcare sector is expanding rapidly, and we are proud to join hands exclusively with Medikabazaar. Their extensive reach and expertise will help bring COMEN's trusted medical solutions to more healthcare providers across the country."

Medikabazaar remains focused on strengthening India's healthcare ecosystem by ensuring that reliable, high-quality medical technology is available to every hospital, clinic, and diagnostic centre—whether in cities or remote regions. Together with COMEN, Medikabazaar is advancing healthcare delivery and improving patient care across India.

Revolutionize Blood Product Verification with Innovative Irradiation Confirmation Method

RADTAG

Process Verification for Blood Irradiation
PRODUCT INFORMATION SHEET

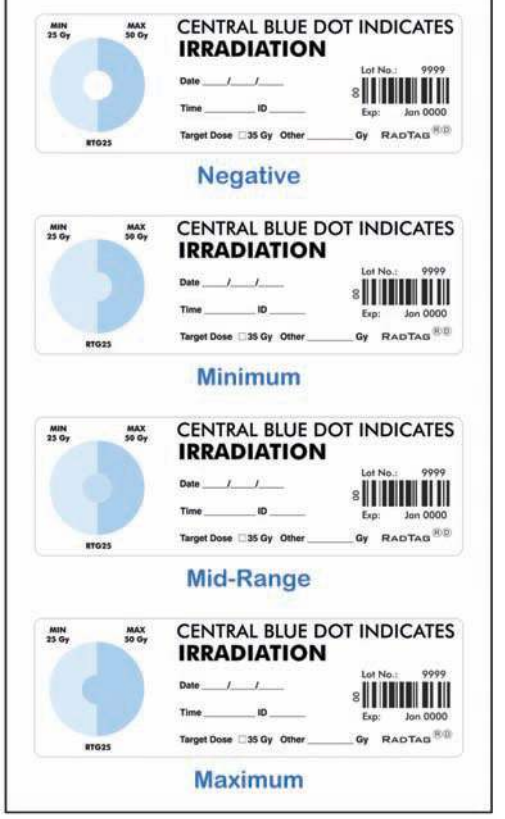
RTG25 Gamma Irradiation Indicator (RTG15 also available)

RTX25 X-Ray Irradiation Indicator (RTX15 also available)

KEY FEATURES:

- Simplicity with in-depth insights.
- Functions as a YES/NO device, ensuring compliance with European/UK/AABB guidelines for dose ranges.
- Adaptable to syringes, especially suitable for neonatal applications.
- Available in both Gamma and X-ray versions.
- Sole indicator guaranteeing that the delivered dose aligns with recommended limits (25 Gy to 50 Gy) for blood and its components.
- Includes printed lot number (barcode) and expiration date for traceability.
- Swift order processing with a commitment to quality and exceptional customer service.

Sample Interpretation



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Sysmex CN-3000: Elevating coagulation testing to a new standard

Srinivas Naidu, Senior Product Manager-Coagulation Marketing, Sysmex India Pvt Ltd explians how Sysmex CN-3000 is a standout model in Sysmex's CN Series

Introduction

In the dynamic and high-stakes world of hemostasis and coagulation diagnostics, laboratories require analyzers that offer not only speed and precision but also adaptability and ease of use. The Sysmex CN-3000, a standout model in Sysmex's CN Series, embodies these values through its intelligent design, automation, and diagnostic reliability.

Tailored for mid-sized laboratories, the CN-3000 delivers the technological sophistication of larger systems within a compact footprint. It combines multi-wavelength photometry, an extensive assay menu, and efficient workflow automation to offer exceptional performance in both routine and specialised coagulation testing. As healthcare evolves toward faster turnaround times and enhanced quality control, the CN-3000 is engineered to meet these expectations with accuracy and consistency.

Background and evolving needs

The clinical importance of coagulation testing is growing rapidly. Whether diagnosing clotting disorders, monitoring anticoagulant therapy, or assessing bleeding risk before surgery, accurate and timely results are critical. Mid-sized laboratories are under constant pressure to improve efficiency, reduce error, and respond to emergencies with rapid diagnostics.

Yet, many of these labs face resource constraints, including limited staffing, space, and budget. The CN-3000 directly addresses these issues by offering the core functionalities .

Key features of the CN-3000

Compact and high-throughput design

Though compact, the CN-3000 is built for performance. It delivers impressive throughput, capable of processing up to 225 PT tests per hour, depending on the mix of assays. This enables laboratories to handle daily workloads with ease, especially during peak hours or high-demand periods.

Its random-access testing allows for flexible sample processing, and STAT (urgent) samples are automatically prioritised, ensuring critical diagnostics are not delayed by routine samples.

Comprehensive test menu

The CN-3000 supports a wide array of assays to accommodate both basic and specialised coagulation diagnostics, including:

- PT (Prothrombin Time)
- APTT (Activated Partial Thromboplastin Time)
- Fibrinogen (Clauss method)
- D-Dimer
- Anti-Xa assays
- Thrombin Time (TT)
- Lupus Anticoagulant (LA) screening
- Chromogenic assays (e.g., Protein C, Protein S, Antithrombin)
- Clotting factor assays
- Immunoturbidimetric assays
- Platelet Aggregometry using Light Transmission Aggregometry

This versatility allows the CN-3000 to consolidate multiple testing needs onto one platform, improving operational efficiency and reducing sample handling.

Multi-wavelength LED

At the core of its analytical capability is multi-wavelength LED, enabling precise clot detection and measurement. The analyzer automatically selects optimal wavelengths to suit the specific assay, minimising interference and enhancing test accuracy.

An advanced fibrin detection algorithm ensures reliable clot detection, even in samples with weak clot formation. Additionally, the analyzer detects and flags common sample interferences—hemolysis, icterus, and lipemia—before analysis, improving result validity and reducing reporting errors.

Automation and workflow optimisation

The CN-3000 automates a range of functions that reduce manual effort and turnaround time:

◆ Automated cuvette loading and waste management
◆ Integrated barcode readers for sample and reagent identification
◆ Auto-rerun and reflex testing based on pre-set rules
◆ Dedicated STAT functionality for urgent samples

Its efficient reagent management system supports onboard cooling for up to 20 reagent positions, maintaining stability and reducing waste.

Smart software and intuitive interface

The user experience is enhanced through a modern, icon-driven touchscreen interface. Laboratory personnel can easily navigate through:

◆ Reagent inventory tracking
◆ Real-time QC monitoring
◆ Result validation
◆ Maintenance scheduling

The built-in QC module features Levey-Jennings charts, Westgard rules, and multi-level QC performance review. Integration with Laboratory Information Systems (LIS) enables seamless bidirectional data flow, ensuring timely and accurate result reporting.

Clinical and operational impact

Reliable, reproducible results

The CN-3000 ensures excellent intra-assay and inter-assay precision, crucial for diagnosing conditions such as hemophilia, thrombophilia, and disseminated intravascular coagulation (DIC). Automated pipetting and robust algorithmic decision-making remove much of the variability associated with manual processes.

Faster turnaround for better clinical decisions

In emergency settings such as surgical bleeding, trauma, or sepsis—rapid coagulation results can directly impact patient survival. The CN-3000's STAT capabilities, combined with its high throughput, support time-sensitive decision-making in intensive care units, emergency departments, and operating rooms.

Improved laboratory efficiency

By minimising manual intervention, the CN-3000 frees up laboratory staff to focus on critical thinking and problem-solving. Its continuous loading of samples and reagents, along with automated rerun logic, reduces bottlenecks and ensures smooth workflow, even with limited human resources.

> Though compact, the CN-3000 is built for performance. It delivers impressive throughput, capable of processing up to 225 PT tests per hour, depending on the mix of assays. This enables laboratories to handle daily workloads with ease, especially during peak hours or high-demand periods

Scalability and adaptability

For labs planning to expand test volumes or transition to greater automation, the CN-3000 offers a scalable solution. Its modular design and compatibility with Sysmex's total lab automation (TLA) frameworks make it a future-ready investment. The platform also supports software upgrades and the addition of new tests as diagnostic needs evolve.

Sysmex assurance: Quality and support

Sysmex's reputation for reliability extends beyond its instruments. Laboratories investing in the CN-3000 benefit from:

◆ Comprehensive training programs, both on-site and remote
◆ Proactive technical support including remote diagnostics
◆ Preventive maintenance and service contracts
◆ Access to the Sysmex Academy, offering continuous education and best practice sharing

This ecosystem of support ensures long-term satisfaction and system uptime, maximising return on investment.

Customer feedback and global presence

From community hospitals in India to diagnostic centers across Europe and Asia-Pacific, the CN-3000 has become a trusted choice for mid-sized laboratories aiming to modernise coagulation workflows. Commonly cited benefits include:

◆ High instrument uptime with minimal maintenance
◆ Reduced staff training time due to intuitive design
◆ Consistent, reproducible results across different users and shifts

Its global adoption is a testament to its reliability and versatility in various healthcare environments.

Conclusion

The Sysmex CN-3000 represents a pivotal advancement in coagulation diagnostics for mid-sized laboratories. Offering the power of automation, intelligent software, and broad assay capabilities in a compact system, it delivers precision without complexity. Whether a laboratory is replacing aging equipment, scaling operations, or simply seeking greater efficiency, the CN-3000 provides a strategic and future-ready solution.

By investing in the CN-3000, laboratories are not only enhancing test performance but also embracing a partnership with Sysmex—a global leader dedicated to diagnostic excellence, innovation, and long-term support. In an increasingly complex clinical landscape, the CN-3000 stands as a dependable, intelligent, and transformative addition to any hemostasis lab.

Ditch the old Embrace the Liquid: The LSR Advantage

Atharwa Mishra, Sales Executive, Ami Polymer Pvt. Ltd explains why the company now leans on Liquid Silicone Rubber (LSR) injection moulding instead of the older High Consistency Rubber (HCR) and compression methods

In todays crowded marketplace, speed, accuracy, and tidy surfaces matter more than ever, especially when silicone parts end up in health gear, cars, lunch boxes, or cameras.

Thats why Ami Polymer Pvt. Ltd. now leans on Liquid Silicone Rubber (LSR) injection moulding instead of the older High Consistency Rubber (HCR) and compression methods.

While the traditional approach still needs hours of hands-on work and can leave rough edges, LSR allows almost fully automated runs that turn out flawless, flash-free parts in record time.

With better flow, tighter measurements, and tighter process control, Ami Polymer gives its clients top quality pieces, easy growth, and sensible savings, raising the bar for what silicone moulding can achieve.

Why Ami Polymer preferred LSR injection moulding over compression & HCR moulding?

Introduction

Ami Polymer Pvt Ltd Liquid Silicone Rubber (LSR) injection moulding uses a low-viscosity, two-component (platinum-catalysed) system to produce high-precision elastomer parts.

In contrast, High Consistency Rubber (HCR, aka solid silicone) and compression moulding use manual techniques and higher-viscosity materials. Understanding their differences is key to choosing the right process for your product.

Viscosity and material flow: LSR: Low viscosity enables flow into thin walls and complex geometries with ease HCR/Compression: High viscosity requires manual insertion and trimming, limiting flow ability.

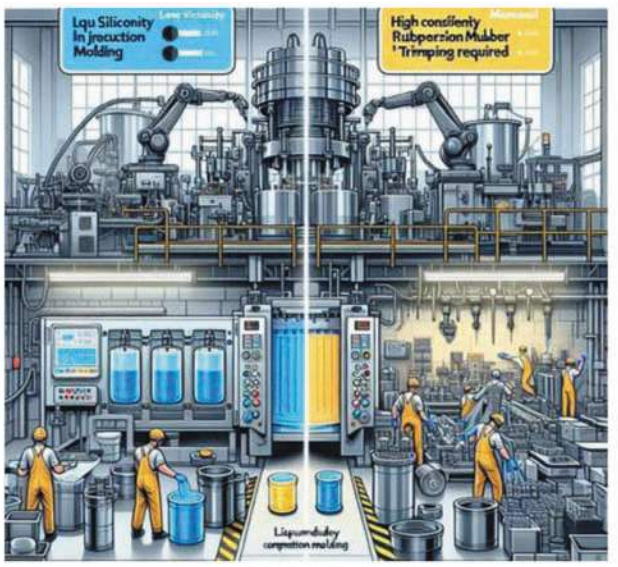
Production speed and automation cycle time:

LSR: 10–90 seconds per part with automated robots Compression/HCR: 3–10 minutes per part, manual work dominates

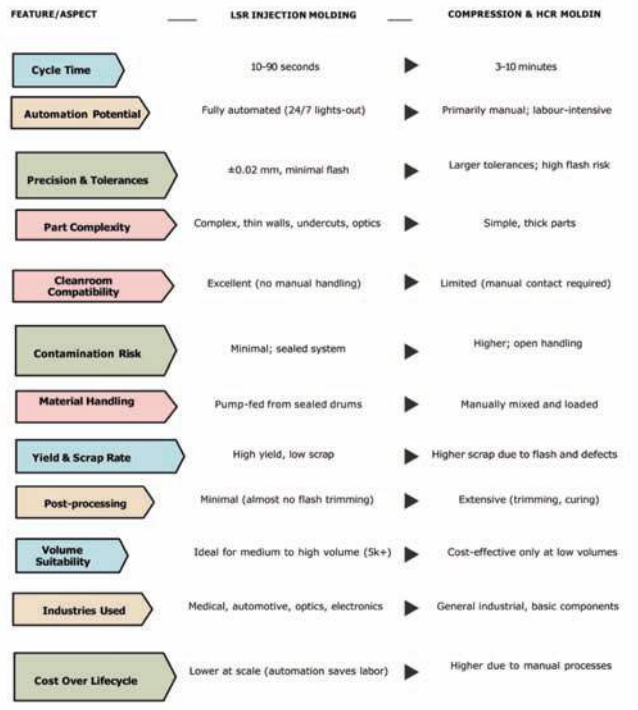
Automation potential

LSR: Fully automated — metering, injection, demoulding, inspection. HCR/Compression: Mostly manual; secondary trimming is common

Impact: For medium to high production runs, LSR drastically lowers labor cost and boosts throughput.



LSR	COMPRESSION/HCR
Superior flowability: fills tiny features & thin walls	Limited flow-thick parts only
Near-flashless molding with cold-runner systems	Excess flash common-needs manual trimming
Tight tolerances ±0.02mm achievable	Larger tolerances due to manual variation
No trapped air-vacuum degassing possible	Air entrapment & voids more likely



Part quality and precision

LSR enables: Thin walls (<0.5 mm), intricate features, optical surfaces Tight tolerances (fl0.02 mm), minimal flash due to cold-runner system

HCR/Compression results: Flash common, manual trimming adds time and variability Air entrapment, voids, less dimensional

Impact: For precision parts (medical, optical, seals), LSR delivers unmatched consistency

and quality.

Cleanliness and contamination risk

LSR: Delivered in sealed drums and pump-fed; no direct manual handling reduces contamination.

HCR/Compression results: Flash common, manual trimming adds time and variability Air entrapment, voids, less dimensional.

Impact: Critical for fields demanding sterility— medical, food, baby care.

Design freedom

LSR advantages : Over-moulding onto plastic/metal in the same mold Undercuts, flexible geometries, multi-color via inline pigment mixer High clarity optical parts via precision moulds.

HCR/Compression constraints: Bonding separate parts manually Thick part limitations, manual demoulding.

Impact: Enables innovative product designs and multifunctional components.

Cost analysis

LSR: Higher initial tooling, but fast amortisation with volume.

HCR/Compression results: Lower tooling costs, but expensive labor and slow cycles

Break-even volume: Typically around 5,000 10,000 parts—beyond that, LSR becomes more economical.

Performance and durability

LSR properties: Temperature range from –50 °C to 250 °C; resistant to UV, ozone, chemicals, moisture Excellent electrical insulation, tear strength, elongation.

HCR/Compression constraints: Similar properties but slower stable cure; possible residual strain, reduced elongation.

Impact: LSR parts are more reliable and consistently high performance immediately after moulding.

Interpretation for management

LSR provides consistent high-quality parts faster and cheaper at scale, enabling entry into modern product segments.

Real case examples

Medical industry example

Product: Neonatal silicone breathing mask

Challenge: Extremely thin wall section (< 0.5 mm), must be biocompatible and free of defects.

Compression/HCR Outcome: Poor wall consistency, high scrap rate, visible flash, could not meet ISO 10993 standards

LSR outcome: Fully automated process, no flash, perfect surface quality, passed biocompatibility tests — production scaled to 500,000 parts/year.

Automotive industry example

Product: Automotive electrical connector seal (weatherproof)

Challenge: Part with integrated sealing lips, requires high elasticity and UV resistance; 1 million+ parts/year.

Compression/HCR outcome: Manual post curing, uneven lips, poor repeatability.

LSR outcome: Fully automated 32-cavity mold; cycle time 28 seconds; parts used in BMW and Audi vehicles — zero field failures.

Declaration: Ami Polymer Pvt. ltd.-commitment to advanced LSR technology

At Ami Polymer Pvt. Ltd., we are committed to offering the highest quality, precision-engineered silicone products to meet the evolving needs of advanced industries such as medical, healthcare, automotive, food and beverage, optics, and more. As part of this commitment, we have invested in and operate state-of-the-art Liquid Silicone Rubber (LSR) Injection Moulding Machines within our manufacturing facilities.

Our adoption of LSR technology is based on clear strategic and technical advantages: Superior precision and surface finish for complex geometries.

Fully automated production with minimal human handling — essential for cleanroom and medical grade components.

Fast cycle times and scalable production — allowing us to meet both prototype and high-volume demands Consistent quality with reduced post processing and waste.

At Ami Polymer, we prefer and promote the use of LSR technology over traditional Compression Moulding or HCR processing wherever technical feasibility and customer applications allow — ensuring that our customers receive next-generation, precision-moulded silicone components with:

1. Lower total cost of ownership
2. Improved performance and reliability
3. Faster delivery timelines

By leveraging LSR, we enable innovation and competitive advantage for our customers across India and global markets. We are proud to declare that Ami Polymer Pvt. Ltd. is fully equipped and experienced in Liquid Silicone Rubber (LSR) processing and ready to support your advanced silicone moulding needs. For any queries or project discussions related to LSR moulded components, please contact us — our team will be happy to collaborate with you.

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It is carefully crafted and adapted to the changing requirements of healthcare organizations, including the need for faster workflows, universal accessibility, and sound economics.

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https://global.medical.canon/

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