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Healthcare access expands, affordability still a challenge

The National Health Authority recently announced that 90 crore citizens of India now have Ayushman Bharat Health Accounts (ABHAs), as part of the Ayushman Bharat Digital Mission. This is indeed a milestone worth celebrating as it means that 90 crore citizens now have access to India's universal health coverage scheme.

Experts hoped that the recently released National Health Accounts (NHA) estimates for India 2022-23 would also reveal some milestones in terms of increase in government spend on healthcare but while the numbers were in the right direction, reality did not live up to expectations. NHA 2022-23 shows that the share of Government Health Expenditure (GHE) in the country's Gross Domestic Product (GDP) rose from 1.15 per cent in 2013–14 to 1.43 per cent in 2022–23.

As per the new GDP series with base year 2022-23, GHE as per cent of GDP is 1.48 per cent. Similarly, GHE's share in General Government Expenditure (GGE) has increased from 3.78 per cent to 4.89 per cent over the same period, underscoring the growing prioritisation of health in public spending. In per capita terms, GHE has increased nearly 2.7 times, from Rs. 1,042 to Rs. 2,786 between 2013-14 and 2022-23.

The report claims that the decadal trend of increased Government Health Expenditure (GHE) has resulted in overall reduction in the Out-of-Pocket Expenditure (OOPE) as a share of the Total Health Expenditure (THE). The share of GHE in THE has reportedly increased by almost 15 percentage points, from 28.6 per cent in 2013-14 to 43.7 per cent in 2022–23, but experts point out that these include the COVID years when the government increased the health expenditure significantly to 1.84 per cent of GDP in 2021-22 to manage the pandemic situation, most of which had to be spent on the world's largest mass COVID vaccination programme.

As public health expert and economist Nachiket Mor's comments on LinkedIn, the more balanced conclusion is therefore that the pre-COVID decline in OOPE may have been driven substantially by expenditure compression, possibly linked to continuing household financial stress, while the post-COVID comparison between 2019-20 and 2022-23 offers a genuine sign of improved pooling and public financing. However, he points out that sadly, it offers no sign of a reversal in the stress on household income that drove the secular reduction in THE as a proportion of GDP over the last decade, beyond indicating that it did not increase further, despite the devastating impact of COVID-19.

Similarly, there is an increase in Social Security Expenditure (SSE) on healthcare, the share of SSE in THE—which includes government-funded health insurance such as the AB PM-JAY, medical reimbursements to government employees, and social health insurance programmes—has increased from 6 per cent in 2013-14 to 9.9 per cent in 2022–23.

With medical inflation rising, trust in hospitals and the health insurance sector decreasing, isn't it an irony that India's patients face a health debt trap, while the sector continues to be attractive for investors?

But NHA 2022-23 data also shows an increase in the share of private health insurance in THE, from 3.4 per cent to 9.2 per cent. While one reading is that this indicates improved health-seeking behaviour due to awareness, and the population's purchasing power, it could also mean that India's citizens are forced to seek more expensive private health insurance. Hospitals have complained of delayed reimbursements and could be de-prioritising treatment under government-funded health insurance schemes such as the AB PM-JAY.

In fact, a recent report from ManipalCigna India titled Health Quotient highlights the 'Health Debt Trap', where 36 per cent of the surveyed population say that investing in their health is straining their finances and 41 per cent of urban Indians say financial goals drive stress. This underlines the vicious circle of financial stress impacting health, and the cost of staying healthy adding to financial strain.

India's private healthcare sector continues to grow, with Grant Thornton Bharat's latest Q1 2026 Pharma & Healthcare Dealtracker pointing to a strong focus on healthtech, AI diagnostics, and preventive care. Pharma & hospitals lead M&A activity, with a rising interest in wellness & preventive healthcare. In PE/VC, Healthtech and wellness led volumes, with strong momentum in early-stage and growth investments across digital health, AI platforms, and preventive care.

Medical devices remain active (for example, Alkem Medtech's USD 117 million acquisition of a 55 per cent stake in Occlutech Holding). Healthtech and diagnostics also see steady traction, while single-specialty platforms (like IVF) are gaining investor attention. Investment activity was particularly robust across Healthtech and wellness segments, including AI-led diagnostics, preventive healthcare, and digital care platforms, highlighting continued interest in scalable, tech-enabled healthcare models.

With medical inflation rising, trust in hospitals and the health insurance sector decreasing, isn't it an irony that India's patients face a health debt trap, while the sector continues to be attractive for investors? Is this a definition of patient centricity that we can live with?

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INTERVIEW

Ageing needs dedicated institutional attention rather than fragmented interventions

Kerala government's recent announcement of a dedicated department for senior citizens, may be a first-of-its-kind move in India but it was driven by the demographic pressure of a stage where nearly one in five residents is elderly. While some initiatives at the national level have created a foundation, **Rajagopal G,** Group Director & CEO - KITES Senior Care, Lifebridge Group and Current Chairman, Association for Senior Living India (ASLI) explains to **Viveka Roychowdhury** why India's policy makers need to move toward integrated ageing frameworks as investments made today in preventive health, active ageing, community care, geriatric training, age-friendly infrastructure, and digital health systems will significantly reduce future healthcare burdens

What are the latest statistics of India's rapidly growing senior population? Are certain states ageing faster and how is this impacting delivery of healthcare services?
India is undergoing a major demographic transition. Today, nearly 11% of the population is above 60 years of age, and this is expected to cross 20% by 2050, translating into more than 320 million senior citizens.

However, ageing in India is not uniform. States such as Kerala, Tamil Nadu, Himachal Pradesh, and Punjab are ageing faster due to lower fertility rates, better life expectancy, and migration patterns. Kerala, in particular, is already approaching a stage where nearly one in five residents is elderly.

This shift is significantly impacting healthcare delivery. India's healthcare ecosystem was historically designed around acute and episodic care, whereas ageing populations require long-term, continuous, and multidisciplinary support. We are witnessing a sharp rise in chronic diseases, dementia, frailty, mobility limitations, and the need for assisted living, rehabilitation, palliative care, and home-based healthcare. At the same time, caregiver availability is shrinking because of migration, nuclear families, and changing social structures.

> While Kerala's approach is rooted in local demographic realities, the broader thinking aligns with international trends where ageing is treated as a dedicated policy area rather than a fragmented welfare issue

The challenge is no longer just about increasing lifespan, but about supporting healthy ageing, dignity, and quality of life.

What has been India's policy response to this demographic shift, at the centre and state level?
India's policy response has evolved steadily over the years, though implementation remains uneven across states.

At the national level, initiatives such as the National Policy on Older Persons, the Maintenance and Welfare of Parents and Senior Citizens Act, Ayushman Bharat, and the National Programme for Health Care of the Elderly (NPHCE) have created an important foundation. There is also increasing recognition of geriatric care, palliative care, and community-based elder support within the public health framework.

What is changing now is that ageing is no longer viewed only as a welfare issue. It is increasingly being recognised as a healthcare, economic, urban planning, and social infrastructure priority.

At the state level, some governments have moved faster because demographic pressures are already visible. Kerala has emerged as one of the most proactive states with policies focused on active ageing, elderly healthcare, community support systems, and age-friendly governance.

The next phase of policymaking must move toward integrated ageing frameworks that combine healthcare, housing, social participation, mental wellness, digital inclusion, and financial security.

What were the triggers for the Kerala government's recent announcement for a dedicated department for senior citizens? How has it been operationalised?
Kerala's decision reflects demographic reality more than symbolism. The state has one of the highest proportions of elderly citizens in India, along with rising longevity, migration of younger populations, increasing numbers of elderly people living alone, and growing care dependency.

The announcement also comes at a time when the conversation around ageing has become more urgent.

Traditional family caregiving structures are changing, while demand for geriatric care, dementia support, assisted living, and community-based services is increasing rapidly.

Kerala has already built several elder-focused initiatives over the years, including Vayomithram, palliative care networks, senior citizen welfare programmes, and a dedicated elderly budget. The new department appears to be an effort to bring these efforts under a more coordinated administrative framework.

Operationally, the focus is expected to be on integrating healthcare, welfare delivery, protection mechanisms, and community support for senior citizens through a more structured governance model.

Was it modelled on similar initiatives in other countries?
While Kerala's approach is rooted in local demographic realities, the broader thinking aligns with international trends where ageing is treated as a dedicated policy area rather than a fragmented welfare issue.

Countries such as Japan, Singapore, and several European nations have already developed specialised frameworks around ageing populations, long-term care systems, dementia support, assisted living, and age-friendly communities. Japan, in particular, has integrated healthcare, social support, and community care very effectively in response to rapid ageing.

Kerala's model is not a direct replication of any one country, but it reflects a growing global recognition that ageing societies require specialised governance structures and long-term planning.

Is this scalable to a national ageing policy implementable in other states, given that each state has its own demographic realities?
Yes, but the implementation model cannot be identical across India.

India is ageing at different speeds across states. Southern states are already dealing with advanced ageing-related pressures, while some northern states are still relatively younger demographically. Therefore, policies must be adaptable rather than uniform.

What can certainly be scaled nationally is the broader framework:
- integrated geriatric healthcare,
- community care systems,
- caregiver support,
- dementia preparedness,
- age-friendly infrastructure,
- Insurance framework,
- and senior-focused social services.

States should have the flexibility to prioritise based on their demographic profile and healthcare capacity.

The larger lesson from Kerala is not merely the creation of a department, but the acknowledgement that ageing needs dedicated institutional attention rather than fragmented interventions.

At an individual level, has senior living and healthcare become more affordable?
Affordability has improved in some areas, but significant gaps remain.

Healthcare access has improved through insurance expansion, diagnostics, telemedicine, home healthcare, and government schemes. Similarly, senior living today is available across multiple formats — independent living, assisted living, memory care, and continuum care communities.

> What is changing now is that ageing is no longer viewed only as a welfare issue. It is increasingly being recognised as a healthcare, economic, urban planning, and social infrastructure priority

However, affordability remains a major concern for middle-income families. Long-term care is still largely financed out-of-pocket in India, and there is limited insurance coverage for assisted living, dementia care, rehabilitation, and chronic caregiving support.

At the same time, there is a growing shift in perception. Earlier, senior living was often viewed as niche or luxury-oriented. Today, more families are recognising it as a structured support ecosystem that combines healthcare access, safety, companionship, and quality of life.

The sector is gradually becoming more accessible, but India still requires far greater policy support, financing models, and long-term care planning to make eldercare affordable at scale.

What are the gaps in healthcare, housing, mental wellness, and assisted living for seniors? Can these be bridged by healthtech customised for senior citizens?
The biggest gap is that India's systems are still not fully designed around ageing.

There is a shortage of geriatric specialists, trained caregivers, dementia support services, rehabilitation infrastructure, and organised long-term care systems. Mental wellness among seniors also remains under-recognised despite rising loneliness, depression, cognitive decline, and social isolation.

Housing is another major challenge. Most homes in India are not age-friendly in terms of mobility, accessibility, emergency response, or assisted care integration.

Healthtech can certainly help bridge some of these gaps. Remote monitoring, AI-enabled diagnostics, wearable devices, medication adherence systems, teleconsultations, emergency response systems, and digital health records can improve continuity of care and independent living.

However, technology alone cannot solve ageing-related challenges. Seniors still require human interaction, emotional support, community engagement, and trusted caregiving ecosystems. The future lies in combining technology with compassionate, person-centred care models.

Are there any examples of public-private collaboration models or opportunities in elder care?
Japan's "community integrated care" system is often seen as a strong example of effective public-private collaboration in elder care. The model brings together local governments, private care providers, hospitals, insurers, volunteers and technology firms to deliver decentralised and continuous support for seniors, while the government focuses on regulation, funding and policy direction.

There is significant opportunity for similar collaborations in India as well, particularly in states like Kerala, where strong local governance systems, a robust public health network and high literacy levels create a favourable environment for integrated eldercare models. Public-private-community partnerships can help expand access to senior living, rehabilitation, home healthcare, dementia care and assisted living services in a more sustainable and coordinated manner.

Given tight healthcare budget allocations and multiple health priorities, how can policymakers proactively prepare for the "silver economy" and longevity-led demographic shifts?
The key shift required is to stop viewing ageing only as a future welfare burden. Longevity is also an economic, healthcare, and social transformation opportunity.

India still has time to prepare proactively. Investments made today in preventive health, active ageing, community care, geriatric training, age-friendly infrastructure, and digital health systems will significantly reduce future healthcare burdens.

Policymakers should focus on:
- strengthening primary healthcare for chronic disease management,
- integrating geriatric care into public health systems,
- expanding palliative and home healthcare,
- building caregiver capacity,
- incentivising senior-friendly housing,
- and supporting public-private partnerships in eldercare.

The "silver economy" will create demand across healthcare, technology, housing, wellness, financial services, mobility, and community living. Countries that prepare early will not only improve quality of life for seniors but also unlock major economic and employment opportunities.

Ultimately, the goal should not simply be adding years to life, but ensuring dignity, independence, participation, and wellbeing in later years.

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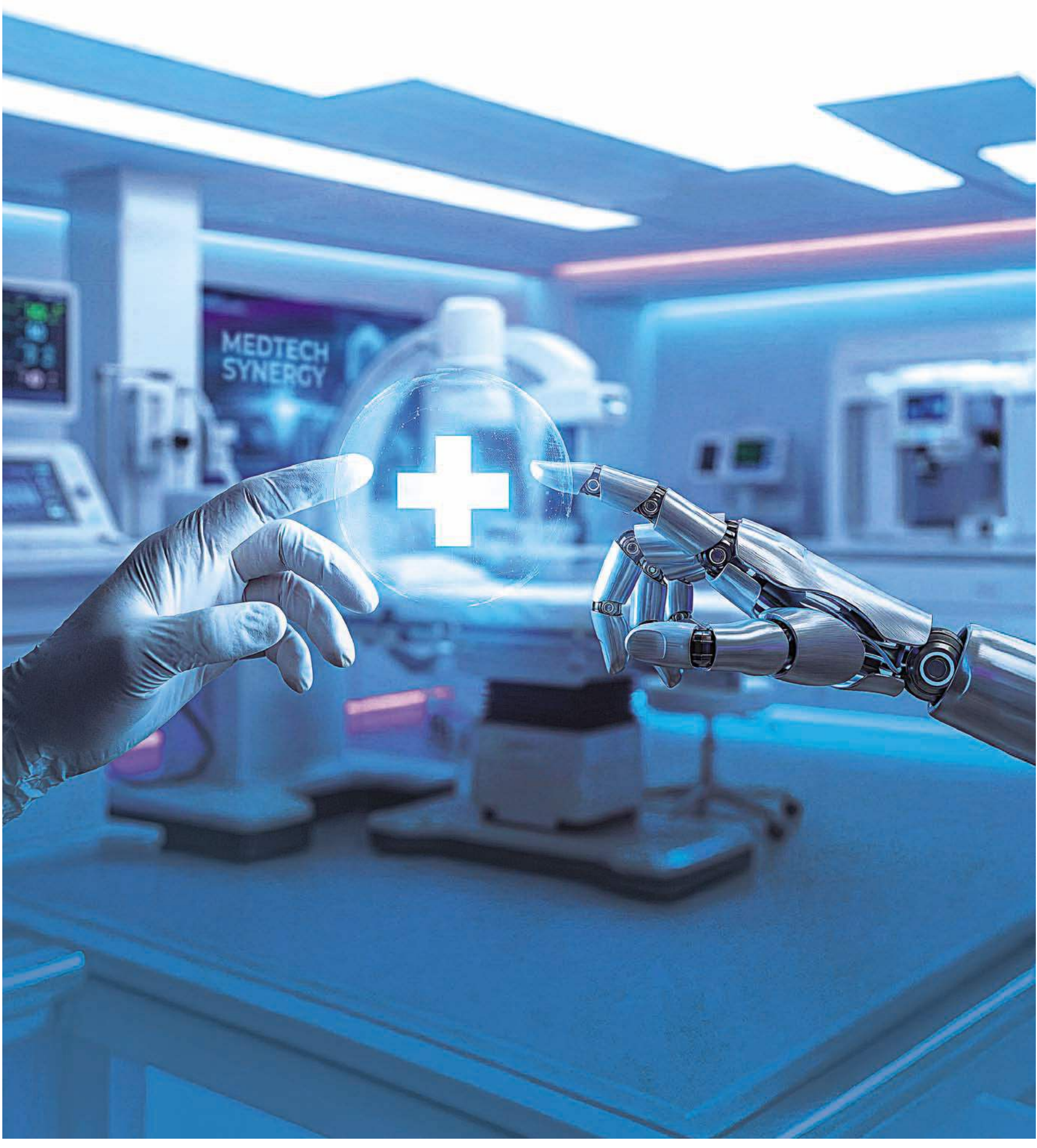
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INSIDE INDIA'S MEDTECH MISSION

As global supply chains grow increasingly uncertain, MedTech zones are becoming central to the country's push for self-reliance, innovation, and export competitiveness

Kalyani Sharma

India's healthcare sector has long operated on a structural paradox. The country built world-class clinical capability, scaled tertiary care infrastructure, and trained an exceptional medical workforce yet remained heavily reliant on imported equipment to deliver that care. As per Aditya Kohli, CFO and Director, Allied Medical Limited, “Roughly 70 per cent of medical devices used in Indian hospitals were sourced from overseas, with critical care equipment among the most import-intensive segments.”

The pandemic turned that structural vulnerability into a crisis. And in 2026, the geopolitical context has grown more challenging, not less. Red Sea disruptions, US-China trade tensions, rising tariff walls, and semiconductor shortages have made medical devices what they always should have been recognised as: strategic assets tied directly to national healthcare security.

The numbers are unambiguous. As per Vivek Tiwari, Principal Investor, Truevis Technologies Pvt. Ltd., “India continues to rely heavily on imported medical devices, with imports at Rs 94,664 crore against exports of Rs 28,106 crore in FY26.”

The question before policymakers, manufacturers, and investors is no longer whether India should build domestic manufacturing capability. It is whether the ecosystems being built the dedicated MedTech zones, shared infrastructure clusters, and integrated parks are deep enough, fast enough, and integrated enough to actually reduce the country's exposure when the next disruption arrives.

From industrial policyto healthcare security

The National Medical Devices Policy 2023 and the Production Linked Incentive (PLI) schemes have provided the policy scaffolding. But dedicated manufacturing clusters like the Andhra Pradesh MedTech Zone (AMTZ), and the emerging parks in Uttar Pradesh, Madhya Pradesh, Tamil Nadu, and others are where the actual work of building India's MedTech capability is happening.

Tiwari frames the stakes precisely, "Geopolitical shifts and ongoing supply chain disruptions have made MedTech manufacturing a strategic priority for India, not just an industrial one.”

“In this environment, MedTech manufacturing zones become critical because they offer the clustered infrastructure needed to scale production faster, lower dependence on fragile cross-border supply chains, and strengthen resilience against future shocks. They also help India build domestic capacity in high-dependence segments such as imaging, diagnostics, and consumables, which are especially important for uninterrupted hospital functioning and diagnostic services. In that sense, these zones are not just about manufacturing efficiency; they are about healthcare security, strategic autonomy, and creating a more dependable supply base for the country."

Rajiv Nath, Forum Coordinator, Association of Indian Medical Device Industry (AiMeD), has been making this argument consistently, "The last few years have fundamentally reshaped the global healthcare supply chain. Pandemic-era shocks, ongoing geopolitical conflicts, Red Sea disruptions, semiconductor shortages, and rising protectionism have made it clear that medical devices are no longer just commercial commodities—they are strategic assets tied directly to national healthcare security. India’s continued dependence on imported highend devices, sensors, specialised polymers, and precision-engineered components exposes the country to significant vulnerabilities whenever global supply chains come under stress. These risks have elevated the strategic importance of dedicated MedTech manufacturing zones.”

Anish Bafna, CEO and MD, Healthium Medtech, adds historical context that the sector cannot afford to forget, "During the pandemic, hubs such as

AMTZ is not just a manufacturing park. It is a complete MedTech ecosystem

Dr Jitendra Sharma
MD and Founder CEO,

AMTZ

Integrated ecosystems help address challenges by integrating manufacturing, testing, precision engineering, biomaterials, and translational R&D within one cluster

Divya Patil
Material Scientist,
AMTZ

These zones are not just about manufacturing efficiency; they are about healthcare security and strategic autonomy

Vivek Tiwari
Principal Investor,
Truevis Technologies

Manufacturing is the beginning; resilient healthcare supply chains require dependable lifecycle support

Brijesh Suneja
Director,
Phantom Healthcare

AMTZ had demonstrated the ability to rapidly scale domestic manufacturing of ventilators, RT-PCR kits, and oxygen concentrators when international supply chains were disrupted. Aligned with initiatives such as Make in India and Atmanirbhar Bharat, such ecosystems are positioning India as a globally competitive MedTech manufacturing hub."

Kohli puts it plainly, "What has unfolded since is a structural shift in how medical devices are designed, manufactured, and serviced in India. The Production Linked Incentive (PLI) scheme for medical devices has been central to this. By offering financial incentives tied to incremental sales of domestically manufactured products in target segments, including critical care and respiratory equipment, the scheme has shifted the conversation from assembly-level localisation to genuine value addition."

Prashant Krishnan, CEO, TI Medical, echoes this assessment, "The PLI scheme provides financial incentives for manufacturers to establish or expand their manufacturing activities in India, therefore encouraging both Indian and global manufacturers to set up manufacturing within India. This initiative will assist in building India's medical technology manufacturing base and provide opportunities for India to become a global centre for advanced manufacturing of medical devices."

"With increasing manufacturing capacity in India, there will also be lower costs of production of these devices which will improve patient outcomes by increasing access to advanced medical technologies in tier 2 and tier 3 cities," Krishnan adds.

What AMTZ has actually built

Dr Jitendra Sharma, MD and Founder CEO, Andhra Pradesh MedTech Zone (AMTZ), and Divya Patil, Material Scientist, AMTZ, describe an ecosystem that goes well beyond a conventional industrial park.

"India's medical technology sector is moving from an import-dependent ecosystem to a manufacturing and innovation-driven ecosystem, and MedTech zones such as Andhra Pradesh MedTech Zone are central to this transition. A few years ago, India was importing more than 80–85 per cent of its medical devices. Today, through integrated ecosystems like AMTZ, we are building end-to-end domestic capability across the entire healthcare spectrum. At AMTZ, we manufacture everything from masks, gloves, syringes, catheters to medical consumables to advanced technologies such as ventilators, implants, CT/MRI subsystems, precision engineered components, and even radioisotopes for clinical applications. In several consumable categories, we have already achieved 60–70 per cent localisation."

"What makes AMTZ unique is that it is not just a manufacturing park—it is a complete MedTech ecosystem integrating cleanrooms, testing labs, sterilisation, biomaterials, additive manufacturing, precision engineering, regulatory infrastructure, and R&D within a single campus. This reduces infrastructure and compliance costs by nearly 30–40 per cent and enables rapid scale-up during crises. During COVID-19, companies at AMTZ rapidly scaled ventilator and oxygen concentrator manufacturing because testing, sterilisation, and regulatory infrastructure compliant with IEC 60601 and CDSCO requirements were already available within the ecosystem."

Tiwari of Truevis, which is working within the AMTZ ecosystem describes the direct benefit, "For companies like Truevis Technologies Pvt Ltd, this kind of ecosystem is particularly valuable because it supports the localisation of high-value equipment such as CT and PET-CT scanners, while also creating a pathway for future categories like MRI. The presence of shared scientific and manufacturing infrastructure, including radiation testing, EMC and safety testing, biomaterial testing, 3D printing, laser centres, superconducting

Strengthening advanced digital capabilities is not just important — it is an absolute prerequisite for global survival

Radhika Bawa
Director,
Esbee Dynamed

Localisation is no longer a contingency strategy. It is becoming the default basis for building a credible Indian medical device industry

Aditya Kohli
CFO & Director,
Allied Medical

Innovation in MedTech is easy. Compliant innovation is hard

Vadeesh Budramane
Founder & CEO,
AlgoShack

If India is able to produce high-technology and high-quality medical devices at lower costs, the benefit can be passed on to Indian patients

Dr Saurabh Arora
Managing Director,
Auriga Research

magnet capabilities, gamma irradiation, and machining support, reduces development barriers and helps accelerate innovation."

Bafna of Healthium frames the shared-access model's significance for the broader industry, "Their biggest contribution lies in creating shared, world-class infrastructure that individual manufacturers, especially startups and SMEs, would otherwise struggle to build independently. Facilities for testing, sterilisation, calibration, biomaterial validation, additive manufacturing and regulatory support are available within a single integrated ecosystem, significantly lowering capital expenditure and reducing production costs."

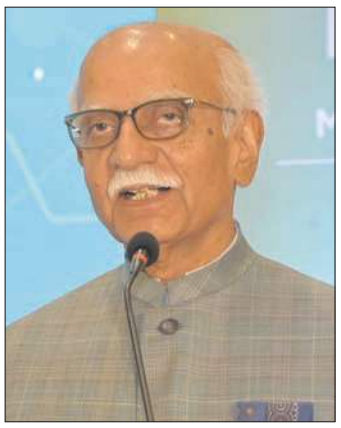
Dr Saurabh Arora, Managing Director, Auriga Research, explains why shared infrastructure matters structurally for this sector, "MedTech manufacturing is very different from other sectors because it is highly interdisciplinary and interdependent. It requires machine rooms, injection moulding, dyes, CNCs, engineering capabilities, hardcore manufacturing expertise, polymer understanding, biotechnology capabilities, and regulatory knowledge."

"All of this then interfaces with the human body, which means safety, efficacy, toxicology, and testing also become extremely important. If one company tries to build all of this on its own, the investment becomes very high. It would need to make dyes, manage injection moulding, handle biotechnology, develop antigens and antibodies for segments such as IVD, put everything together into a device, conduct trials and testing, get regulatory approvals, manage routine manufacturing, and also take care of sterilisation. This is where shared infrastructure becomes very valuable. Dedicated MedTech zones provide common facilities and bring different capabilities into one ecosystem."

AMTZ is also confronting supply chain risks at the frontier. As per Dr Sharma and Patil, conventional MRI systems require nearly 1,500 litres of liquid helium. "Ongoing geopolitical tensions in West Asia have increased helium prices, extended lead times, and impacted MRI installation and servicing costs globally. This clearly demonstrates the risks of excessive import dependence in critical healthcare technologies."

AMTZ is also developing low-helium MRI systems targeting <20 litres, along with future helium-free MRI technologies, to improve long-term supply security and technological self-reliance.

Today, AMTZ supports 180+ companies and 200+ startups across consumables, diagnostics, implants, imaging systems, AI-driven healthcare, and advanced medical technologies. At the same time, through organisations such as IBSC and Universal Biomedical Cross, we are not only manufacturing devices and technologies, but also actively upskilling biomedical engineers and developing specialised human resources required for the future healthcare technology ecosystem.



The shifting geopolitical landscape and persistent global supply chain disruptions have made a compelling case for India to decisively strengthen its domestic MedTech manufacturing base. For a nation of India's scale and ambition, this is precisely the moment to look inwardbuilding genuine self-reliance and sovereign capability in medical device production

Dr B.V.R. Mohan Reddy
Founder Chairman, Cyient Group

Medical devices are no longer just commercial commodities — they are strategic assets tied directly to national healthcare security

Rajiv Nath
Forum Coordinator,
AiMeD

These manufacturing ecosystems are being viewed not just as industrial infrastructure, but as long-term healthcare enablers

Anish Bafna
CEO & MD,
Healthium Medtech

With increasing manufacturing capacity in India, there will also be lower costs of production of these devices which will improve patient outcomes by increasing access to advanced medical technologies in tier 2 and tier 3 cities

Prashant Krishnan
CEO,
TI Medical

Why manufacturing alone is not enough

Brijesh Suneja, Director, Phantom Healthcare, approaches the MedTech zone conversation from a vantage point that often gets overlooked: what happens to a device after it ships.

"Medical devices are not "fit-and-forget" assets. They require preventive maintenance, corrective repairs, periodic upgrades, and dependable spare parts availability. In practice, operational availability often matters as much as the initial purchase price—particularly in imaging and diagnostics, where downtime directly affects patient throughput and care delivery."

When spares, qualified service capability, and validated repair processes come from abroad, hospitals particularly those outside major metros become acutely exposed to cross-border delays and sudden cost escalations. Refurbishment and upgrade pathways, when locally supported, can extend equipment life and improve

cost predictability in ways that procurement decisions alone cannot.

Suneja is clear about what MedTech zones must offer beyond factory space, “For MedTech zones to deliver strategic advantage, manufacturing infrastructure must scale alongside accredited testing and validation capacity. Certification facilitation aligned with global standards, reliable calibration facilities, and documentation-ready processes reduces time-to-market and strengthens quality discipline.”

His conclusion, "MedTech zones are well-positioned to reduce India’s strategic vulnerability to geopolitical shocks, but their impact will be strongest when they evolve into full-spectrum ecosystems. Manufacturing is the beginning; resilient healthcare supply chains require dependable lifecycle support—repair, refurbishment, upgrades, spares, testing, and validation—delivered with discipline and compliance.”

The ancillary gap: What needs to scale alongside the zones

Every expert makes the same point: a manufacturing zone is only as strong as the ecosystem surrounding it. And by most assessments, that surrounding ecosystem has significant gaps.

Nath enumerates them specifically, "India urgently needs to scale up testing and validation infrastructure — biocompatibility labs, EMC testing, calibration centres, accelerated ageing facilities, and simulation labs that meet global benchmarks; certification and regulatory support — in-park regulatory cells, documentation support, and harmonised standards to reduce dependence on overseas approvals; common R&D and tooling facilities — shared tool rooms, 3D printing hubs, moulding centres, and virtual prototyping labs, especially critical for MSMEs and startups; component manufacturing ecosystems — India still imports a large share of electronics, semiconductors, sensors, alloys, and medical-grade polymers; logistics and export facilitation — bonded warehouses, cold-chain systems, and export support centres; and skilling and academia collaboration-— specialised MedTech skilling programs, industry–academia R&D partnerships, and innovation incubation.”

> A manufacturing zone is only as strong as the ecosystem surrounding it. And by most assessments, that surrounding ecosystem has significant gaps

Dr Sharma and Patil frames the challenge from the manufacturing floor, “A medical device today must comply with standards such as ISO 13485, IEC 60601, ISO 10993, GMP, and CDSCO requirements, which means India needs significantly larger capacity in NABL-accredited testing labs, EMC/EMI facilities, biocompatibility centers, calibration labs, and clinical validation infrastructure. Without these, manufacturing scale-up becomes a bottleneck. Similarly, India still depends on imports for 30–40per cent of critical upstream components such as sensors, specialty polymers, semiconductors, industrial gases, precision motors, and imaging subassemblies.”

Dr Arora adds a practical manufacturing dimension, "Even within manufacturing, there is a need for tool rooms and common facilities where high-cost activities such as dye development and injection moulding can be carried out. Testing and certification are also very important because MedTech products need to go through regulatory approvals and quality validation. For example, certifications such as CE marking require proper testing, validation, documentation, and protocols. It is important to have the capability to understand what needs to be tested, how it should be tested, and what protocols need to be followed. Along with this, logistics hubs, effluent treatment plants, laboratories, certification bodies, ancillaries, suppliers, and component manufacturers should also be co-located within or around these zones. This will make the process faster, more efficient, and more scalable.”

Tiwari identifies the imaging sector's particular requirements, "For a company such as Truevis, the availability of CDSCO/ AERB approved and globally aligned testing labs, skilled regulatory and design talent, temperature-controlled logistics, and stronger local microelectronics and component manufacturing would reduce time-to-market, improve investor confidence, and make domestic manufacturing far more sustainable.”

Vadeesh Budramane, Founder and CEO, AlgoShack, points to the talent dimension that infrastructure conversations can overlook, "Skilled talent is the thread running through all of this. Engineering talent, regulatory affairs professionals, quality engineers, cybersecurity specialists, and clinical experts all need to exist in sufficient density around these zones for the ecosystem to function.”

Localisation gains and the work that remains

The picture on localisation is encouraging in some segments and stark in others.

India has made measurable progress in consumables and disposables, diagnostics and imaging accessories, orthopaedics and implants, critical care and renal care equipment, and cardiovascular products.

As per Bafna, “Government and industry estimates suggest import dependence began declining in 2023, with nearly 150 previously imported devices now being manufactured domestically. Over time, these ecosystems can help India transition from being a large MedTech consumption market to becoming a strategic global manufacturing and innovation hub with strong export potential.”

He identifies where the momentum is clearest, "The strongest gains so far have emerged in consumables, disposables, diagnostics, hospital consumable packs, basic surgical instruments, and selected implant categories. These segments combine high domestic demand with manageable regulatory complexity and relatively faster commercialisation cycles, making them ideal for near-term localisation."

A recent example illustrates both the progress and the remaining vulnerability. As per Dr Sharma and Patil, “West Asia geopolitical disruptions impacted petrochemical supply chains and pushed up prices of medical-grade polymers PP and PVC by nearly 20–40 per cent.

"Because India now has stronger domestic manufacturing ecosystems and localized consumable production capacity, the sector has been able to absorb these shocks more effectively without major supply disruptions in critical consumables like syringes, IV sets, and catheters.”

But high-value segments remain heavily import-dependent. As per Tiwari, “The PLI scheme has already supported 19-22 commissioned projects producing 44-55 products, including MRI/CT scanners, stents, dialysis machines, and heart valves, which shows that the ecosystem is beginning to move from policy intent to practical output. At the same time, radiology still represents one of the biggest whitespace areas in Indian MedTech. Advanced imaging systems, service-intensive components, and software-enabled diagnostics infrastructure continue to depend heavily on imports, while component localisation remains a bottleneck.”

Kohli notes a visible downstream effect, “Indian-manufactured ICU ventilators are now competing on clinical specifications rather than price. However, component-level localisation remains the harder problem. Several critical components continue to be imported. The PLI framework has begun to pull supplier ecosystems closer to the OEMs, and the parks are starting to attract Tier-2 vendors who previously had no commercial reason to set up in India.”

Nath identifies the structural work still required, "True localisation requires deep backward integration. Different MedTech segments need specialised clusters aligned with common technologies and materials, for example: electronics-focused clusters for imaging, monitoring, and AI-enabled devices; stainless steel and alloy-based ecosystems for surgical instruments and orthopaedic implants.”

Suneja frames the same point from an operational perspective, “Over time, these clusters can also help build a deeper supplier base for electronics, precision components, medical-grade materials, and specialised consumables — an area that is critical for meaningful localisation.”

Dr B.V.R. Mohan Reddy, Founder Chairman of Cyient Group, Chairman of the Board of Governors at IIT Hyderabad, and Founding Director of T-Hub, offers a structural argument for why progress is achievable, “The shifting geopolitical landscape and persistent global supply chain disruptions have made a compelling case for India to decisively strengthen its domestic MedTech manufacturing base. For a nation of India’s scale and ambition, this is precisely the moment to look inward building genuine self-reliance and sovereign capability in medical device production. A structural advantage works in India’s

favour here. Unlike cutting-edge semiconductor applications that demand 4 or 5 nanometre chips, most medical devices function effectively on mature 28 or 40 nanometre nodes-a segment where India is steadily developing indigenous manufacturing capability.”“Beyond semiconductors, the broader MedTech ecosystem is well within India’s reach. Over the next two years, the country has a real opportunity to not only deepen its medical device manufacturing capabilities, but to forge resilient domestic supply chains and build sovereign technological capacity establishing India as a globally competitive, self-reliant hub for healthcare manufacturing.”

Startups, innovation, and the indigenous IP question

For MedTech zones to evolve from import-substitution platforms into genuine innovation hubs, the startup ecosystem within them is a critical test.

Dr Sharma and Patil describes what AMTZ has built, "MedTech zones such as Andhra Pradesh MedTech Zone are creating an integrated innovation ecosystem where startups can move from concept to commercialisation much faster. Instead of investing independently in expensive infrastructure such as cleanrooms, testing, sterilisation, precision engineering, and regulatory validation, startups can access these through shared common facilities — reducing development cost by nearly 30–40 per cent and significantly shortening time-to-market."

AMTZ has supported 180+ companies and incubated more than 175 startups.

Dr Arora frames the same dynamic, "MedTech zones support innovation and startups by reducing the cost of entry. For startups, it is difficult to build expensive infrastructure such as tool rooms, injection moulding facilities, testing labs, certification support, and regulatory systems on their own. When these facilities are available in a shared ecosystem, startups can focus more on product development and innovation instead of spending heavily on infrastructure."

Suneja adds another dimension, “MedTech zones can also support innovation by addressing common barriers faced by startups and indigenous product teams: prototyping capacity, verification and validation access, regulatory guidance, and pathways to clinical evaluation. When these elements are available within a cluster, the distance between concept and compliant product reduces — improving not just speed, but also quality.”

Budramane, however, identifies a bottleneck that goes deeper than physical infrastructure, "Innovation in MedTech is easy. Compliant innovation is hard. For an Indian MedTech startup, building a working prototype of a software-driven device is only the first 20 per cent of the journey. The remaining 80 per cent is proving to CDSCO, the US FDA, or the EU MDR that the software and hardware are fundamentally safe. Indigenous developers often lack the massive, dedicated quality assurance and regulatory affairs teams that global Fortune 100 companies possess. When these startups attempt to manually test their software and build compliance documentation from scratch, their cash burn accelerates, and their time-to-market stalls."

His proposed solution, "If a MedTech zone provides its tenants with access to enterprise-grade, AI-augmented software testing platforms and shared regulatory expertise, it fundamentally levels the playing field. By automating the generation of test cases, executing them autonomously, and producing audit-ready documentation aligned with global standards like IEC 62304 and ISO 14971, AI-led quality assurance allows a startup with a small engineering team to punch far above its weight."

Tiwari adds that the most significant innovation opportunities now span hardware and software together, "Many of the most promising opportunities now sit at the intersection of devices, software, AI, and data analytics, particularly in diagnostics and connected healthcare, where solutions must be affordable, serviceable, and designed for Indian operating conditions. In that sense, MedTech zones are not just manufacturing hubs; they are enabling platforms for startups and companies like Truevis to build products that can serve both domestic healthcare needs and future export markets.”

Affordability and the patient at the end of the chain

Every argument about manufacturing policy ultimately has to answer one question: does it translate into better, more affordable care for Indian patients?

As per Bafna, Industry estimates suggest that even advanced Class-C devices manufactured in India can be around 10 per cent to 40 per cent more affordable than imported alternatives, demonstrating the growing maturity of domestic manufacturing ecosystems.

As per Dr Sharma and Patil, by localising manufacturing, testing, sterilisation, and component integration within a single ecosystem, infrastructure and production costs reduce by nearly 20–40 per cent. "India is now moving toward a model where high-quality medical technologies can be made more accessible at Indian price points, while also strengthening long-term healthcare security and supply-chain resilience.”

Dr Arora makes the connection between shared infrastructure and patient benefit directly, "If India is able to produce high-technology and high-quality medical devices at lower costs, the benefit can be passed on to Indian patients. Local manufacturing can also reduce dependence on imports, reduce foreign exchange risk, and make medical devices more accessible in the domestic market."

Bafna identifies where affordability gains are most visible, "The strongest affordability gains are emerging in high-volume, standardised categories such as syringes, needles, dressings, sutures, surgical disposables, diagnostic consumables and selected implants. These products benefit significantly from localized inputs, shorter supply chains, and integrated manufacturing infrastructure, enabling faster scale-up and more efficient distribution."

Tiwari highlights what this means for access in smaller cities, "For imaging systems in particular, local production can lower lifecycle costs significantly, while also improving service responsiveness and reducing downtime through stronger domestic support networks. Locally manufactured imaging solutions can make advanced diagnostics more viable for Tier-2 and Tier-3 cities, where patients often still have to travel to metros for scans and follow-up care."

Suneja adds the long-term cost dimension, “A strong ecosystem that supports refurbishment and lifecycle care can reduce the total cost of ownership and help providers sustain diagnostic services over time.”

The software frontier: A gap that cannot be ignored

One of the most pointed observations to emerge from this reporting came from Radhika Bawa, Director, Esbee Dynamed Pvt. Ltd. — a company building active medical technologies with significant software components.

"As India's MedTech ecosystem shifts from being hardware-centric to heavily software-driven, strengthening advanced digital capabilities is not just important — it is an absolute prerequisite for global survival. However, there is a stark gap between the conceptual design of centralised MedTech manufacturing zones and the operational reality for software-led innovators."

Bawa identifies three realities the ecosystem has not yet fully addressed. On competitive standards: "To compete internationally, bulletproof software lifecycles and cybersecurity are non-negotiable. Patient safety now hinges as much on code as it does on hardware." On skills: "While India has a massive talent pool for general software development, specialised expertise in MedTech software and standards such as IEC 62304, HL7 and FHIR is still lagging." On structural disconnection: "Because traditional manufacturing hubs remain hardware-centric, software-driven companies naturally build their own infrastructure independently. We have not explored physical MedTech zones because, frankly, they are not yet structured to cater to digital product lifecycles."

Budramane reinforces this with regulatory urgency, "The US FDA's evolving guidance on software-as-a-medical-device, the EU MDR's post-market surveillance expectations, and India's CDSCO framework are all signalling the same direction: regulators expect documented, continuous, evidence-based software validation, not a snapshot taken at the end. A manufacturer that treats software testing as a final-stage activity discovers defects at the worst possible moment — after clinical validation, after submission, or sometimes after deployment."

He raises the cybersecurity dimension, "Connected medical devices are attack surfaces. A compromised infusion pump or a manipulated diagnostic reading is not merely a data breach; it is a patient safety event. Manufacturers that are not building cybersecurity testing into their development lifecycle today may face compliance gaps that become expensive to close later."

Tiwari echoes the imperative from the product development side, "As MedTech becomes more software-driven, patient safety, device reliability, and regulatory compliance increasingly depend on rigorous software testing, validation, cybersecurity, and AI-led quality assurance across the product lifecycle." His company is building "secure-by-design engineering and validated software architecture" as a core element of its next-generation imaging and therapy systems.

Dr Sharma and Patil confirms that AMTZ treats

this as a priority area, "As MedTech increasingly becomes software-driven, strengthening capabilities in software validation, cybersecurity, AI-led quality assurance, and digital compliance is becoming absolutely critical. To ensure patient safety and global market acceptance, MedTech zones must build strong capabilities around standards such as IEC 62304, ISO 13485, IEC 81001, cybersecurity validation, AI model verification, and software lifecycle management."

Industry's expectations from the next generation of zones

With new zones in various stages of planning across multiple states, the industry's expectations are specific and demanding.

Nath mentions, "Companies now expect fully integrated, professionally managed ecosystems that enhance innovation, reduce operational costs, and improve ease of doing business. Key expectations include shared testing and certification infrastructure-sterilisation units, validation labs, and global-standard testing facilities; plug-and-play manufacturing-ready-to-use units with utilities, cleanrooms, and compliant layouts; common tool rooms and simulation labs-essential for MSMEs and start-ups; vendor development and component ecosystems-to reduce import dependence; export facilitation and logistics support-bonded warehouses, customs support, and global shipping integration; single-window regulatory systems — faster approvals and reduced compliance burden; and stable, autonomous governance-professionally managed SPVs insulated from political cycles."

Dr Sharma and Patil goes further in articulating what the next generation of zones must be designed for, "Industry now expects MedTech zones to evolve beyond manufacturing parks into advanced innovation ecosystems for next-generation healthcare technologies such as Biodesign, AI-driven healthcare, Robotics, Quantum technologies, Meta Materials, advanced biomaterials, and translational R&D. The future MedTech zone will integrate manufacturing, clinical innovation, digital health, simulation labs, advanced imaging, rapid prototyping, and indigenous IP development within one ecosystem."

> The long-term aspiration for India's MedTech zone ecosystem goes beyond import substitution. The goal is export leadership

"We are actively developing capabilities in AI, Robotics, advanced materials, precision engineering, and next-generation imaging technologies, while integrating Alternative Investment Funds (AIFs) and innovation capital to support deep-tech healthcare technologies that typically require 5–7 years for validation and commercialisation."

Dr Arora makes the same point in operational terms, "The expectation from newer MedTech manufacturing zones is that they should address ecosystem gaps in a more integrated way. They should not only provide manufacturing infrastructure but also support testing, validation, certification, logistics, component manufacturing, regulatory approvals, and access to shared facilities. These zones should also co-locate ancillaries, suppliers, laboratories, certification bodies, and service providers so that companies can access everything they need in one ecosystem."

Bawa has a specific ask for software-driven companies, "For MedTech zones to deliver genuine value to the next generation of medical technology, they must evolve. They need to look beyond land and power, and begin integrating shared digital testing environments, specialised software regulatory expertise, and advanced training centers for medical-grade software development. Until that shift happens, software-first innovators will continue to build and scale entirely outside traditional physical hubs."

Tiwari mentions, "The most important ecosystem gaps these upcoming zones are expected to address include deeper component localisation, affordable compliance infrastructure, and stronger support for high-capex categories that are still heavily import-dependent. In practical terms, that means distributed manufacturing to reduce concentration risk, on-site regulatory support for faster approvals, industry-academia hubs to build engineering talent, and better logistics access for export-oriented production."

Nath summarises the principle, "Industry expects these zones to complement — not compete with — existing clusters by specialising in specific technologies, materials, and manufacturing processes."

The export horizon: From substitution to dominance

The long-term aspiration for India's MedTech zone ecosystem goes beyond import substitution. The goal is export leadership.

As per Bafna, “India’s domestic medical device production has expanded significantly over the last five years, with the domestic industry now addressing nearly 30 per cent of national demand compared to about 10 per cent earlier. At the same time, industry projections indicate India’s MedTech exports could reach nearly Rs 1,69,000 crore by FY30, reflecting growing global confidence in India’s manufacturing capabilities.”

Dr Arora believes the trajectory is achievable, "India's MedTech manufacturing zones have the potential to evolve into globally competitive manufacturing and export hubs. If India can support high-quality manufacturing, regulatory readiness, international standards, and export-oriented capabilities, these zones can help the country become self-sufficient and also serve global markets."

Nath sets out what is still required, "Component and semiconductor ecosystems, precision engineering and specialised materials, common R&D and innovation infrastructure, regulatory reform and harmonisation, financing and skilling support especially for MSMEs, and export-oriented trade diplomacy to secure market access and mutual recognition of standards. If these enablers are implemented consistently with support of tariff structuring, India can move beyond import substitution and emerge as a trusted global hub for affordable, innovative, technology-driven MedTech solutions."

AMTZ has already taken early steps. The World Trade Center (WTC) AMTZ has initiated an export-promotion ecosystem, and AMTZ is strengthening its role as a WHO Collaborating Centre for Global Innovation. Dr Sharma's stated vision, "Position India not just as a low-cost manufacturing base, but as a globally trusted MedTech innovation and export hub."

Tiwari maps what policy needs to deliver, "Mutual recognition agreements with the FDA and EU MDR, lower export financing costs, faster patent approvals, more ISO 13485-certified manufacturers, stronger R&D incentives, certification subsidies, standards harmonisation, and procurement preference for locally manufactured devices."

Budramane frames the software quality dimension as a market-access issue, "India has the engineering talent and manufacturing ambition to become a serious global MedTech player. The software quality and cybersecurity infrastructure needs to match that ambition. The MedTech zones that build this capability from the start will be better positioned to produce devices that reach global markets. The ones that treat it as a later-stage problem may find it becomes a permanent constraint."

The long game

Six years after the pandemic exposed India's healthcare supply chain as import-dependent and structurally fragile, the country is building something that could genuinely change the picture. The zones are real. The investments are real. The companies setting up within them are real. The localisation gains, while incomplete, are real.

As Kohli said, “Localisation is no longer a contingency strategy. It is becoming the default basis for building a credible Indian medical device industry. Hospitals and clinicians have a meaningful role in this transition. Specifying Indian-manufactured equipment where clinical equivalence is established, participating in post-market surveillance, and engaging with OEMs on real-world feedback will accelerate the ecosystem’s maturity. The capability is here. Adoption is what will make it permanent.”

India is building zone by zone, company by company, component by component, the manufacturing depth it will need when the next geopolitical disruption arrives. And in the current global environment, that is not a question of whether it will happen. Only when.

Krishnan is optimistic about where this leads, “If we continue at this pace, India will be able to reduce its dependency on imported goods and enhance the healthcare system by lowering costs, increasing participation and ensuring increased self-reliance.”

The zones, if designed comprehensively and supported consistently, could be a decisive part of India's answer.

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INTERVIEW

To truly accelerate domestic value addition, the MedTech industry must act collectively

Naveen Rai, Director and Head-Government Affairs and Policy, India and South Asia, GE HealthCare in an interview with ***Express Healthcare,*** discusses how India's MedTech sector is entering a critical phase of growth, driven by policy reforms, domestic manufacturing initiatives, and a sharper focus on innovation

India's medical devices sector has seen significant policy momentum in recent years, from the National Medical Devices Policy to PLI schemes and dedicated MedTech parks. How are these reforms influencing the industry's next stage of growth?

Every step that the government is enabling is a promise towards strengthening domestic manufacturing to investing ambitiously in enhancing India's clinical, academic, and technological capacity, which in turn strengthens the environment needed for MedTech innovation to scale. By elevating India's position as a credible global destination for medical-value care, these hubs can accelerate the adoption of high-quality medical devices and create opportunities for the industry to serve both domestic and international markets. As the policy landscape becomes more supportive of advanced manufacturing and R&D, India is better positioned to transition from being a large MedTech consumer to becoming a meaningful global contributor, powering a new era of accessibility, innovation, and self-reliance in healthcare.

With India aspiring to become a global MedTech hub, what are the elements from a regulatory/policy standpoint that require further deliberation?

In India, the policy intent we have seen over the past few years, from the National Medical Devices Policy to dedicated manufacturing schemes and the broader "Make in India" vision, is both commendable and noteworthy. These efforts reflect a clear ambition: to shift the country from an import-dependent market to a global centre for MedTech innovation, manufacturing, and high-quality patient care. As India accelerates toward this goal, there are a few regulatory and policy elements that merit deeper deliberation to ensure the sector can truly scale to its full potential.

> As India aspires to become a global MedTech hub, addressing these regulatory and policy considerations, while building on the strong progress already made, will be key to unlocking the next phase of growth for the sector

A key priority is strengthening the regulatory environment to reflect the unique nature of medical devices. MedTech is fundamentally different from pharmaceuticals, involving mechanical, electrical, and software-driven technologies, and therefore requires policies and regulatory structures designed specifically for devices. Continued refinement of device-specific standards, clearer pathways for product approvals, and consistent interpretation of guidelines across states and institutions will help create a more predictable, innovation-friendly environment for manufacturers.

Another important area is harmonisation of Indian and global quality standards. As India positions itself as a global MedTech hub, alignment with international norms will be essential to ensure that locally designed and manufactured technologies are competitive in quality, safety, and reliability. Reducing overlapping regulations and ensuring uniform compliance requirements across ministries will help remove unintended barriers that currently add cost and complexity to domestic manufacturers.

To truly accelerate domestic value addition, the MedTech industry must act collectively by strengthening India anchored R&D beyond local assembly, designing solutions tailored to Indian use-cases while ensuring global scalability, and advancing supplier development, particularly across Tier-2 and Tier-3 ecosystems. This should be complemented by close collaboration with government on standards, regulatory clarity, and faster approval pathways, alongside a strong emphasis on workforce capability development. By aligning innovation, execution, and policy partnership, the industry can help India progress from a large healthcare market to a global MedTech innovation powerhouse, fully aligned with the vision of Viksit Bharat and Make in India.

As India aspires to become a global MedTech hub, addressing these regulatory and policy considerations, while building on the strong progress already made, will be key to unlocking the next phase of growth for the sector.

Despite policy momentum, India still imports over 70 per cent of its MedTech equipment, especially in high technology categories. In the context of Make in India and the government's push for deeper domestic value addition, how is Wipro GE HealthCare accelerating indigenous R&D, supply chain localisation, and India based product innovation to serve both domestic and global markets?

India's ambition to strengthen domestic MedTech capabilities strongly resonates with our belief that there is no Viksit Bharat without Viksit Health. For us, the starting point has always been the same: healthcare must be easy to access, affordable to experience, and comfortable for every patient, no matter where they live.

This philosophy comes alive in our growing portfolio of India-designed, India-manufactured innovations. The recently launched SIGNA™ Prime Elite, built at our PLI-supported Medical Device Manufacturing facility, is the latest addition to our "Made in India" lineup. It stands alongside innovations like the Revolution Aspire CT, conceptualised and manufactured entirely in India to deliver reliable performance even in constrained care environments, supporting consistent diagnostic outcomes across locations, including smaller cities.

For us, localisation has always meant far more than local assembly. It spans the full value chain, including indigenous R&D, engineering excellence, supply-chain localisation, and India-based product design. With over 35 years of designing and manufacturing in the country and four advanced manufacturing sites, we have been long-standing partners in India's MedTech journey. A cornerstone of this work is HTCI, the Healthcare Technology Centre India, our largest R&D centre, globally. HTCI has consistently contributed to healthcare innovation by developing technologies in India, for India and the world. We continue to invest heavily in expanding local manufacturing capabilities and building resilient domestic supply chains. This includes upwards of $4B invested in R&D and manufacturing in India since our inception, and an additional over $1B committed toward manufacturing output and local R&D over the next five years (announced in 2024). These sustained investments, along with collaborations with institutions such as AIIMS, research organisations, and startups, are strengthening India's position as a global MedTech hub.

As India moves toward deeper domestic value addition and greater self-reliance in MedTech, Wipro GE HealthCare remains committed to accelerating indigenous R&D, strengthening local supply chains, so that the technologies built here continue to elevate care, both at home and across global healthcare systems.

As India moves toward national AI governance frameworks and sector-specific guidelines for Medtech, how is Wipro GE HealthCare embedding responsible AI, data security, and clinical transparency principles across its innovation and product development pipeline?

As India moves toward national AI governance frameworks, Wipro GE Healthcare approaches AI across its innovations with a clear principle: AI in healthcare is a responsibility as much as an innovation. Our Responsible AI framework guides how every solution is designed, validated, and deployed, ensuring it is safe, clinically reliable, and built for real-world use.

We embed responsible AI across the entire product-development pipeline. This includes designing systems that are safe and reliable within their intended clinical context, while ensuring strong data security and resiliency to protect sensitive healthcare data.1 Clinicians also need clarity on how AI works, which is why we prioritise transparency, accountability, and explainability so they understand how AI-generated insights are produced. Equally important is our commitment to privacy and fairness. We build AI systems that safeguard patient autonomy and actively work to minimise harmful bias, ensuring that AI expands access to quality care rather than widening disparities.

As India pushes for greater self-reliance in healthcare, how is Wipro GE HealthCare strengthening partnerships across government, hospitals, and academia to support the country's Make in India and tech leadership aspirations?

As India pushes for greater self-reliance in healthcare, Wipro GE HealthCare continues to strengthen partnerships across government, hospitals, and academia with a singular purpose: to close critical gaps, scale innovation, and deliver impact where it matters most – patient care. Our collaboration-driven approach is grounded in the belief that India's healthcare transformation must be built with India, in India, and for India.

With the largest installation base in the country, across 22 states and supporting thousands of patients every day, we work closely with public and private health systems to ensure that technology is accessible, available, and designed around the realities of care delivery in India. But partnerships, for us, go much deeper than deployment. They extend into co-creation, research, and capability-building, because advancing India's MedTech ecosystem requires shared knowledge, shared learning, and shared innovation.

A key pillar of this approach is our commitment to strengthening collaborations that advance research and innovation. This includes the AI Health Innovations Hub at AIIMS, backed by an investment of nearly $1 million over five years, which is focused on accelerating the development of AI-enabled healthcare solutions across key clinical areas. In oncology, our Cancer Research & Innovation Center, developed in partnership with a leading cancer institute in Mumbai, is dedicated to advancing research and improving access to cutting-edge cancer care technologies.

Reference: GE HealthCare website - Responsible AI in Healthcare: From theory to practice

India's rise as a global MedTech hub

Himanshu Baid, Managing Director, Poly Medicure, highlights how India's MedTech sector is evolving from a cost-driven manufacturing base to an innovation-led industry. He discusses the role of policy support, regulatory advancements, industry collaboration, and technology adoption in positioning India as a global medical technology hub

India's medical technology industry is entering a transformative phase. Once recognised mainly as a cost-efficient manufacturing base for consumables and disposables, the sector is steadily evolving into an innovation-driven ecosystem with growing global relevance. Supported by stronger industry capabilities and favourable policy measures, India is positioning itself as a credible global MedTech hub.

A major shift has been the changing perception of made in India medical devices. For many years, domestic products were viewed primarily through the lens of affordability rather than quality or innovation. That narrative is now changing. Indian manufacturers have significantly improved quality standards, aligned with international regulatory expectations, and enhanced product reliability. This progress is being driven by higher investments in research, engineering, and clinical validation. Indian MedTech companies are increasingly investing in intellectual property creation and advanced product development.

Government initiatives have also played a critical role in strengthening the sector. The Production-Linked Incentive (PLI) scheme for medical devices, initiatives supporting import substitution and clinical research, and the development of medical device parks have all contributed toward improving domestic manufacturing capabilities and reducing import dependence. To maintain this momentum, the government should consider extending the PLI scheme by another four to five years and expanding it to cover a wider

range of product categories. A broader and longer-term framework would encourage greater investments in advanced technologies and support the growth of a stronger domestic manufacturing ecosystem.

At the same time, India's MedTech regulatory landscape has evolved considerably. The Central Drugs Standard Control Organisation (CDSCO) has brought greater structure and maturity to the sector through a more comprehensive regulatory framework. As a result, standards related to safety, quality, and performance have improved significantly. This has enabled Indian companies to gradually move from low-technology products toward more advanced and mid-technology segments. While consumables and disposables continue to dominate exports, Indian manufacturers are increasingly establishing their presence in areas such as cardiac devices, orthopaedic implants, and other specialised technologies.

Ultimately, the biggest beneficiary of this transformation is the patient. Increased domestic manufacturing, combined with better quality and innovation, can make advanced healthcare technologies more accessible and affordable. This aligns with India's broader healthcare goals while also strengthening the country's position as a reliable global supplier of medical devices.

However, sustaining and accelerating this growth will require stronger collaboration between the MedTech industry and healthcare providers. Healthcare innovation cannot happen in isolation. Medical devices and technologies must be developed with a deeper understanding of real-world clinical challenges. Too often, products are designed without sufficient engagement with end users. Going forward, hospitals, clinicians, and MedTech companies need to work together to co-create solutions that are practical, effective, and clinically relevant.

Academic institutions can play a vital role in enabling this collaboration. Organisations such as IITs and NIPERs can act as bridges between industry and clinical practice by bringing together engineers, researchers, and healthcare professionals. Such interdisciplinary collaboration can accelerate the development of globally competitive technologies that are also aligned with local healthcare needs.

There is also a growing need for closer cooperation in the training and development of healthcare professionals. Continuous education, hands-on learning, and regular upskilling are essential for ensuring the safe and effective use of modern medical technologies. Stronger partnerships between hospitals and MedTech companies can help bridge knowledge gaps, improve clinical outcomes, and ensure that innovation translates into better patient care.

India's strengths in engineering, information technology, and digital innovation provide another major advantage for the sector. The convergence of MedTech with artificial intelligence, data analytics, digital health platforms, and remote care solutions is opening new possibilities in diagnostics, precision medicine, and connected healthcare delivery. Leveraging this technological capability effectively will be key to building next-generation healthcare solutions.

Another important factor influencing the adoption of advanced technologies is health insurance coverage. As medical technologies evolve, reimbursement support becomes increasingly important for patient access. Insurance providers need to expand coverage for innovative medical devices and treatments to ensure affordability and wider adoption. In this context, stronger engagement between healthcare providers, the MedTech industry, and insurers will be essential.

India's MedTech industry today stands at the beginning of a new era defined by innovation, capability, and collaboration. The foundations for long-term growth are already in place - supportive government policies, improving regulatory systems, strong engineering talent, increasing global integration, and a rapidly growing domestic industry.

The next phase of growth will depend on how effectively these strengths are brought together. By aligning innovation with clinical needs, continuing to invest in quality and R&D, and building stronger partnerships among industry, academia, healthcare institutions, insurers, and policymakers, India can move beyond being seen only as a cost-efficient manufacturing destination and emerge as a global leader in medical technology. In doing so, the country will not only strengthen its own healthcare system but also contribute significantly toward improving patient outcomes across the world.

INTERVIEW

The long-term vision is to position Kerala as one of India's leading MedTech hubs by 2032

Balagopal Chandrasekhar, Chairman, Kerala State Industrial Development Corporation (KSIDC), outlines Kerala's vision to emerge as a leading MedTech hub through an ecosystem-led approach that brings together healthcare institutions, industry, startups, academia and government. In an interview with **Kalyani Sharma,** he discusses the state's MedTech ambitions, investment opportunities, policy priorities, and the importance of building trusted innovation ecosystems that can take products from concept to care at scale

Kerala has been actively promoting knowledge-driven industries. How important do you see MedTech becoming within the state's larger industrial growth strategy?

MedTech is strategically important for Kerala because it aligns closely with the State's core strengths — healthcare, human capital, research capability, engineering talent and digital systems. Unlike many traditional manufacturing sectors, MedTech innovation does not happen in isolation. Michael Porter's cluster theory becomes especially relevant here because successful MedTech ecosystems require deep integration between healthcare institutions, industry, startups, universities, research centres and regulators. Kerala already possesses many of these foundational strengths. Through the Kerala Medical Technology Consortium (KMTC), the State is attempting to build an orchestrated ecosystem approach rather than a standalone industrial approach. The long-term vision is to position Kerala as one of India's leading MedTech hubs by 2032, with an estimated industry opportunity of approximately USD 4.2 billion.

From an investment perspective, what are the biggest factors global and domestic MedTech companies are looking for before setting up operations in a state like Kerala?

MedTech companies evaluate far more than land and incentives. They look for access to clinical ecosystems, regulatory support, skilled talent, quality infrastructure, validation capabilities and long-term ecosystem maturity.

This sector is highly trust-driven and innovation-intensive. Companies increasingly prefer locations where hospitals, clinicians, researchers, manufacturers and technology developers can collaborate closely. Kerala's advantage lies in its strong healthcare system, high-quality human resources, digital health maturity and research depth. The State's ecosystem-driven approach through KMTC is also helping create stronger linkages across stakeholders, which is critical in MedTech.

India's MedTech sector still faces challenges around scale and manufacturing competitiveness. What policy or infrastructure interventions are most urgently needed?

India needs to strengthen the entire MedTech value chain not just manufacturing capacity. The priority areas include testing and certification infrastructure, clinical validation pathways, component ecosystems, regulatory support systems, design-to-manufacturing capabilities and export-readiness.

Manufacturing is, in any case, the lowest point in the "smile curve" of value addition and requires land, labour, power and water at scale. In the case of MedTech products, Kerala is already a major manufacturing hub for India, contributing over 15% of the country's output by value. The larger opportunity now is to move further up the value chain into design, clinical validation, quality systems, advanced manufacturing, regulatory capability and globally trusted innovation.

MedTech cannot scale through isolated interventions because innovation, validation, manufacturing and adoption are deeply interconnected. What India requires now are integrated MedTech ecosystems where industry, healthcare institutions, academia, startups and government systems work in closer coordination. Shared infrastructure and translational platforms will become increasingly important if India wants to build globally competitive MedTech products at scale.

How is KSIDC looking at partnerships between startups, research institutions and industry to strengthen Kerala's MedTech innovation ecosystem?

KSIDC sees MedTech as an ecosystem-building exercise rather than a conventional industrial development initiative. The role of KMTC is particularly important here as an ecosystem orchestrator that helps bring together startups, healthcare institutions, clinicians, universities, research centres, manufacturers, investors and government stakeholders onto a common platform.

In MedTech, breakthroughs often happen at the intersection of disciplines. A startup may have an innovative idea, but clinical validation may require hospitals, product refinement may require engineering institutions, and scaling may require industrial partners and regulatory support. KMTC's role is to reduce these silos and help accelerate the journey from concept to clinically trusted and commercially scalable products.

With healthcare becoming increasingly technology-led, do you see Kerala having the potential to emerge as a specialised hub for certain MedTech segments?

Yes. Kerala should focus on building leadership in selected high-potential segments where it has natural advantages. Areas such as medical electronics, software-enabled medical devices, assistive technology, diagnostics, digital health and specialised medical rubber-based products are particularly relevant.

Kerala's strong public healthcare network, early adoption of digital health systems, engineering talent base and clinical ecosystem provide a strong foundation for

these specialised segments. The opportunity is not necessarily to compete on scale alone, but to build a globally credible ecosystem focused on quality, innovation and clinically relevant solutions.

What would you identify as the single biggest opportunity for India's MedTech industry over the next five years, and how can states like Kerala capitalise on it?
The biggest opportunity for India is to emerge as a trusted global MedTech innovation and manufacturing destination at a time when global supply chains are diversifying and healthcare systems are seeking cost-effective, high-quality solutions.

India has the market size, engineering capability and policy momentum to build globally competitive MedTech products. States like Kerala can capitalise by focusing on ecosystem-led growth-strengthening clinical partnerships, supporting translational research, improving quality and regulatory readiness, enabling advanced manufacturing and fostering collaboration across stakeholders.

The future advantage in MedTech will not come only from low-cost manufacturing. It will come from the ability to build trusted ecosystems that can consistently take products from concept to care safely, smartly and at scale.

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INTERVIEW

We have identified five potential clusters in Kerala, and there is still work to be done on them

As Kerala strengthens its ambitions to emerge as a leading medical technology hub, building awareness, infrastructure and industry connectivity has become critical to sustaining growth. In this interview with **Kalyani Sharma, C. Padmakumar,** Special Officer, Kerala Medical Technology Consortium (KMTC), discusses the ecosystem gaps holding back the sector, the role of public-private collaboration, Kerala's progress in developing medtech clusters, and the opportunities he sees

Kerala is increasingly positioning itself as an emerging medtech hub. What are the key ecosystem gaps KMTC is working to address in order to strengthen the state's appeal for medical device innovation and manufacturing?
I think the first and most important gap is the lack of knowledge about the medtech industry among almost every stakeholder group. We are talking about businesses, government bodies, research institutions, academic institutions, start-ups, funding agencies and even the media.

I do not think there is enough awareness in the country about the medtech industry and its potential. So, that is the first gap we want to address.

The second gap is infrastructure. If you want to manufacture high-quality medical devices for the global market, you need the required infrastructure for testing, design, prototyping, validation, sterilisation and packaging. These facilities are fairly expensive, and this is where the government has an important

role to play. That is the second gap we are trying to address.

The third aspect is visibility. We already have a thriving medical device industry in the state, but very few people know about it within Kerala, across India or globally. So, promoting awareness about Kerala's medtech industry and what it has to offer through major conferences and events is another key focus area for us. These are the main things we are working on.

Kerala has often been discussed in the context of developing medtech clusters similar to established ecosystems like AMTZ. How do you assess the state's current progress in building dedicated medtech clusters?
When you say medtech zone, the medtech industry actually works in what are called clusters. While AMTZ calls itself a cluster, I am not entirely sure whether it fully conforms to that definition, although it is probably the closest example we have in India.

We believe that Trivandrum is actually the closest to becoming a medtech cluster, though it is not quite there yet. We have identified five potential clusters in Kerala, and there is still work to be done on them.

These locations already have something close to a critical mass of research institutions, teaching hospitals, universities and medtech companies in the same ecosystem. Our intention is to develop these clusters into well-connected and networked systems, enabling a free flow of not just information, but also people, between the different stakeholder groups.

How critical do you see public-private collaboration in accelerating medtech innovation and start-up growth in India, particularly in a sector as capital and infrastructure intensive as medical devices?
I think it is crucial, and we have not seen enough of it yet. KMTC itself is a good example of an organisation in the government sector working very closely with both the private and public sectors.

We collaborate with government hospitals and private hospitals, with government universities and private universities, as well as with public sector units and private medtech companies.

The intention is to bring all of them together, irrespective of

whether they belong to the public or private sector.

The reason public-private partnership is necessary is because all the required resources are not available within any one sector. Some resources are available in the public sector, while others are in the private sector. If we can combine these resources effectively, I believe we will see strong results.

Despite the growth of India's medical device industry, import dependence remains a significant challenge. Which segments continue to rely heavily on imports, according to you?

We are still heavily dependent on imports. It is estimated that nearly 75 per cent of our consumption remains import-dependent.

If you look at Class B, C and D devices — the higher-risk, more sophisticated and critical devices — many of them are still imported.

In the context of ongoing geopolitical uncertainties and global supply chain disruptions, what strategic measures should India prioritise to strengthen self-reliance in medtech manufacturing?

The positive side of such a crisis is that it will force both businesses and governments to finally do what they should have done decades ago. India has everything needed to succeed in medtech.

We have the people, the technology, the research institutions and the industrial capability to manufacture, I would say, nearly 95 per cent of medtech devices.

If more large business groups become aware of the opportunities in the medtech industry, we will very soon see a significant spurt in growth.

From an industry development perspective, how can dedicated medtech clusters and shared infrastructure facilities reduce entry barriers for start-ups and emerging companies?

One of the biggest costs for a medtech company lies in the early stages of design, development, testing and clinical trials. This is different from most other industries.

Large companies can manage these costs because they have the necessary resources. However, for start-ups, it becomes extremely expensive, and they simply cannot afford to build all these facilities on their own.

This is where shared infrastructure becomes important. Companies can pay only for using the facilities, making it a revenue expense rather than a capital investment.The areas where such common facilities are most needed include design, development, prototyping, validation and sterilisation. If these facilities can be made accessible, I believe the medtech industry will really take off.

Looking ahead, which medtech segments do you believe hold the strongest growth potential for Kerala over the next few years?

We have identified three broad segments. The first is rubber-based medical devices. Within this category, we see strong opportunities in urology products such as urine drainage bags, Foley catheters, different types of urinary catheters and related devices.

The second major segment is medical electronics. Kerala already derives a significant portion of its medtech revenue from medical electronics, and we believe the design of medical electronic devices could become a niche strength for the state. Specific components and PCB assembly could also emerge as areas where Kerala can excel.

The third segment, which we believe is vital, is assistive technology. Personally, I think this could become the biggest sector of all.

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Reimagining diagnostics from the ground up

Unlike conventional equipment suppliers whose engagement often concludes after installation, Truevis positions itself as a long-term partner to healthcare providers, supporting them through every stage of the equipment lifecycle

Truevis Technologies is building more than an imaging business — it is creating a resilient, end-to-end diagnostic ecosystem designed for the realities of modern India.

India's healthcare sector continues to face a significant paradox. While the demand for advanced diagnostic imaging such as CT, MRI, PET-CT, and DSA systems is rising rapidly due to increasing cases of cancer, cardiovascular disease, and neurological disorders, access to these technologies remains limited across large parts of the country. High capital costs, complex installation requirements, and inconsistent after-sales support have historically restricted advanced imaging infrastructure to major metropolitan hospitals, leaving Tier-II and Tier-III cities underserved.

Truevis Technologies Pvt Ltd aims to address this challenge through a comprehensive imaging ecosystem that integrates technology deployment, installation, clinical application training, and lifecycle service management under a single platform. Unlike conventional equipment suppliers whose engagement often concludes after installation, Truevis positions itself as a long-term partner to healthcare providers, supporting them through every stage of the equipment lifecycle.

The company's portfolio spans key areas of modern radiology, including CT, MRI, DSA, PET-CT, and Linear Accelerators. However, what differentiates Truevis is not only the technology itself, but the integrated infrastructure and support ecosystem built around it

Building a comprehensive imaging ecosystem

The company's portfolio spans key areas of modern radiology, including CT, MRI, DSA, PET-CT, and Linear Accelerators. However, what differentiates Truevis is not only the technology itself, but the integrated infrastructure and support ecosystem built around it.

By combining technical expertise, clinical application support, and service management into a unified offering, the company reduces the operational complexity often associated with adopting advanced imaging technologies, particularly within emerging healthcare markets.

This integrated approach was recently showcased at the IRIA Delhi Chapter 2026 held on 9th and 10th May 2026, where Truevis engaged with more than 250 delegates, radiologists, and industry professionals. During the event, the company presented its range of CT, MRI, PET-CT, and Cath Lab solutions, generating strong interest from institutions evaluating advanced imaging investments and reinforcing the growing market credibility the company is steadily building.

Advancing localisation through manufacturing

A key pillar of Truevis's long-term strategy is domestic manufacturing and system integration. The company is establishing its manufacturing and integration operations at Andhra Pradesh MedTech Zone (AMTZ), one of India's leading medical technology manufacturing clusters.

This move reflects a broader industry need to reduce dependency on global supply chains, which have become increasingly vulnerable to geopolitical tensions, logistics disruptions, and rising import-related costs.

By manufacturing and integrating imaging systems within India, Truevis aims to reduce the total cost of ownership for hospitals, improve supply chain resilience, accelerate deployment timelines, and strengthen localization capabilities within the healthcare technology sector.

Strengthening global technology partnerships

The technological foundation of these systems is supported through a strategic collaboration with Neusoft Medical Systems, a globally recognized imaging technology provider.

The partnership extends beyond product supply and includes technology transfer, platform localization, and structured clinical training tailored for Indian healthcare environments. This enables Truevis to bring globally advanced imaging technologies into India while ensuring they are adapted to local clinical workflows and operational realities.

Investing in service and clinical excellence

Alongside technology and manufacturing, Truevis has also invested significantly in building multidisciplinary teams across engineering, clinical applications, installation, and field service operations.

These professionals bring experience from leading global imaging organizations and support hospitals through every phase of an imaging system's lifecycle — from site planning and commissioning to workflow optimization, user training, preventive maintenance, and ongoing technical support.

In an industry where equipment downtime directly impacts patient care, this service-led approach forms a critical part of the company's value proposition and long-term vision.

Enabling the future of diagnostics in India

India is currently at a pivotal stage in healthcare infrastructure development, where the gap between the capabilities of advanced diagnostic technologies and their accessibility continues to widen. Addressing this challenge requires more than equipment imports — it requires a locally grounded ecosystem capable of deploying, servicing, and continuously supporting advanced imaging technologies at scale.

With expanding operations, a growing installation footprint across multiple regions, and a strong focus on localization, manufacturing, and service excellence, Truevis Technologies is steadily building that ecosystem with a long-term vision for improving access to advanced diagnostics across India.

Poly medicure strengthens leadership team to drive next phase of growth

Appoints **Indranil Mukherjee** as Chief Executive Officer, Asia Pacific and India to drive growth across key markets and advance the company's next phase of strategic expansion

Poly Medicure has announced the appointment of Indranil Mukherjee as Chief Executive Officer, Asia Pacific and India, effective 1 June 2026.

The appointment comes at a pivotal stage in Poly Medicure's growth journey as the company continues to strengthen its position as a leading global medical device manufacturer. With a growing international footprint, strategic acquisitions, expanding manufacturing capabilities, and a strong focus on innovation-led growth, Poly Medicure is broadening its presence across key markets and advancing its portfolio of high-value medical devices and healthcare solutions.

Based in India, Indranil will lead Poly Medicure's operations across India and the Asia Pacific region, with responsibility for driving commercial growth, deepening market penetration, strengthening strategic partnerships, and supporting the company's long-term expansion objectives.

Indranil is a seasoned medical technology executive with over 30 years of broad-based leadership experience spanning critical care, infusion therapy, renal care, surgical instruments, vascular systems, wound care, and implantable devices. He has demonstrated track record of acting as a change agent, scaling up business and leading market expansion, M&A and integration, organisational restructuring, and strategy execution. He combines deep industry insight with data-driven decision-making to deliver sustainable business outcomes.

He built the foundational years of his career at B. Braun, where he managed the company's portfolios across India, before being transferred to B. Braun's headquarters in Germany as Global Sales Manager in 2010, and subsequently serv-

ing as Regional Head for Hospital Care at the Asia Pacific headquarters in Penang, Malaysia. In his role as Managing Director at B. Braun Group in India, he delivered a turnaround and sustained profitable growth across multiple product lines spanning three manufacturing plants and a team of over 2,000 colleagues. He later served as Group Chief Executive Officer of Translumina Therapeutics, a global cardiovascular implants company with operations in India and Germany.

Commenting on the appointment, Himanshu Baid, Managing Director, Poly Medicure said, " Poly Medicure stands at a pivotal point in its journey today. Over the years, we have built a strong foundation in medical devices and established a growing presence across global markets. As we continue to invest in innovation, expand our portfolio into higher-value segments, and strengthen our international footprint through strategic investments and acquisitions, it is important that we have the right leadership to guide this next phase of growth. Indranil brings deep industry expertise, global perspective, and a proven ability to build and scale businesses. His experience will be invaluable as we continue our journey towards becoming a globally recognised medtech leader."

Commenting on his appointment, Mukherjee said, "Poly Medicure has built an exceptional platform over the years, combining strong manufacturing capabilities, a culture of innovation, and a growing presence across international markets. What particularly excites me is the Company's ambition to move beyond scale and create greater value through differentiated technologies, deeper market engagement, and a sharper focus on global growth. As healthcare systems across the world seek reliable, high-quality medical device partners, Poly Medicure is uniquely positioned to capitalise on these opportunities. I look forward to working with the leadership team and the board to strengthen our presence across India and Asia Pacific, accelerate growth in strategic markets, and contribute to the Company's long-term vision of becoming a globally recognised medical devices leader."

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Medikabazaar partners with Shreeyash Electro Medicals to expand India's healthcare presence globally

As India continues to gain recognition for its manufacturing capabilities and healthcare innovation, this partnership reflects a shared commitment to building stronger global access to trusted, Made-in-India medical products

In a major step towards strengthening India's global healthcare footprint, Medikabazaar has announced an exclusive global business partnership with Shreeyash Electro Medicals. The collaboration aims to take high-quality Indian healthcare and medical technology solutions to international markets while supporting the vision of "Make in India."

As India continues to gain recognition for its manufacturing capabilities and healthcare innovation, this partnership reflects a shared commitment to building stronger global access to trusted, Made-in-India medical products.

The collaboration brings together Medikabazaar's growing healthcare ecosystem and global reach with Shreeyash Electro Medicals' expertise in medical manufacturing. Together, both organisations aim to create stronger international healthcare supply chains and expand the reach of Indian healthcare technologies across global markets.

The partnership will focus on:

- Expanding the global reach of Indian healthcare products
- Increasing access to quality Made-in-India medical technologies
- Strengthening international healthcare distribution networks
- Showcasing India's healthcare manufacturing excellence worldwide

Speaking on the partnership, Dinesh Lodha, Group CEO and Managing Director, Medikabazaar, said, "India is steadily emerging as a strong global player in healthcare manufacturing and innovation. Our partnership with Shreeyash Electro Medicals is aligned with Medikabazaar's larger vision of taking Indian healthcare capabilities to the world. Together, we aim to create meaningful global opportunities for high-quality healthcare solutions developed in India."

Dr Sudhir Waghmare, Founder, Shreeyash Electro Medicals, added, "This partnership is an important milestone for Indian medical manufacturing. With Medikabazaar's strong ecosystem and global network, we look forward to expanding the international reach of Indian healthcare technologies and contributing to the growth of the Make in India initiative."

The collaboration reflects the growing confidence in India's ability to deliver reliable, innovative, and globally competitive healthcare solutions. More importantly, it highlights how Indian companies are now playing a larger role in shaping the future of healthcare beyond domestic markets.

At Medikabazaar, the focus continues to remain on building a healthcare ecosystem driven by quality, trust, accessibility, and innovation while taking India's healthcare strengths to the global stage.

INTERVIEW

Technology though complimentary in diagnostic processes, can never fully replace the holistic approach of a clinician

S.L. Raheja Hospital, Mahim-A Fortis Associate recently announced the launch of enhanced diagnostics and orthorobo care to mark 45 Years of clinical excellence. **Dr Kunal Punamiya,** CEO and **Dr Pravin Mahajan,** HOD-Histopathology, S.L. Raheja Hospital in an interview with **Kalyani Sharma,** discuss the role of advanced diagnostics in precision medicine, and the challenges and opportunities shaping the future of histopathology and cancer care in India

As S.L. Raheja Hospital marks 45 years, the advanced histopathology department's launch signals a forward-looking approach. How does this reflect a broader strategic shift towards integrated, technology-led care delivery?
Dr Kunal Punamiya: The hospital is now prepared to integrate the newer technologies in day-to-day operations of diagnostics as well as in other processes of the hospital. Our aim is to change this traditional, reactive treatment centre into a more proactive and digitalised ecosystem. This will help in turn to achieve greater precision, faster turnaround times, and improved patient care.

With the relaunch of the Histopathology Department at S.L. Raheja Hospital, what key improvements have been introduced in terms of diagnostic accuracy, turnaround time, and clinical support?
Dr Pravin Mahajan: The expansion of the new lab encompasses addition of new technologies like Fluorescence In Situ Hybridization (FISH) and expansion of the existing services like immunohistochemistry, with additional markers - predictive and prognostic, already added to the earlier panels. However, technology though complimentary in diagnostic processes, can never fully replace the

Dr Kunal Punamiya

Dr Pravin Mahajan

holistic approach of a clinician. And for this reason, as we continue to expand and incorporate every available technology as far as possible, the histopathology laboratory at S. L. Raheja Hospital continues to be clinically driven in meeting the needs of individual patients. We continue to strive to give accurate, comprehensive, and timely reports, which our histopathology department is known for and has been delivering all these years.

The department is known for handling complex referrals and second opinions. What factors have contributed to building this level of trust among clinicians?
Dr Pravin Mahajan: We have always believed in carrying out our work with the patient being the prime focus, and with the moto of "patient first, always". We have imbibed this culture of patient centric histopathology reporting, unique to this department, from none other than the best, our mentor late Dr Anita Borges. A strong and steady team of experienced doctors and technical staff has been built over the last two decades, who have been striving for excellence and perfection in their work. Our constant commitment to accuracy and excellence, combined with genuine care and empathy for our patients, has been instrumental in shaping who we are today.

With the addition of new diagnostic techniques and protocols, how do these changes support clinicians in making more informed treatment decisions?
Dr Pravin Mahajan: Introduction of new immunohistochemistry markers (and introduction of FISH, where applicable) helps in making more precise diagnosis, prognosticating outcomes and planning more tailored treatment protocols for individual patients.

In an era of precision oncology, is histopathology keeping pace with the demand for faster, more definitive diagnoses or is there still a gap between expectation and ground reality?
Dr Pravin Mahajan: Oncology is a rapidly evolving and expanding field. There is also a steady rise in cancer incidence across the general population. Histopathology is effectively keeping pace with the growing demand for accurate and timely diagnoses. But this aspect must be handled with care as this can be only achieved in the hands of experienced Histopathologists. A shortage of experienced histopathologists and training gaps exist, and we are dedicated to closing them. To address this, we have initiated a senior residency and a DNB training programme in pathology, contributing to the development of skilled professionals in the field.

As cancer cases grow more complex, how do histopathologists balance diagnostic accuracy with the pressure of quicker turnaround times without compromising clinical confidence?
Dr Pravin Mahajan: It is a big challenge but years of hard work, experience, constant reading and being abreast with the latest in medical & surgical oncology helps us corroborate and achieve accurate and timely diagnosis.

Given the rising reliance on second opinions in complex cases, what does this say about variability in histopathology reporting, and how can the field move towards greater standardisation?
Dr Pravin Mahajan: Yes, there is a certain degree of variability in reporting due to the inherent subjective nature of the branch as well as the experience of individual histopathologists in dealing with challenging cases. The variability can also be due to deficiency in quality training, failure in maintaining the lab standards, etc. leading to variability in reporting and diagnosis. This can be overcome by ensuring that all histopathology labs are NABL accredited to ensure technical compatibility and meet minimum standards of functioning. This must be complemented by ensuring regular participation in EQAS programmes to ensure the quality is maintained. Also, a robust training system will help to create a good pool of technicians as well as doctors to improve the overall quality of diagnosis and healthcare.

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The role of degree apprenticeships in tier II and III cities

Dr Nipun Sharma, CEO, TeamLease Degree Apprenticeship, highlights why work-integrated learning models are becoming essential to build a job-ready workforce, support the expansion of allied healthcare services, and align skill development with India's evolving healthcare infrastructure and policy priorities

India's healthcare sector is entering a new phase of expansion. Healthcare delivery is no longer concentrated in metro cities alone. Hospital chains, diagnostic networks, telemedicine providers, and allied healthcare services are rapidly expanding into Tier II and III cities, driven by rising healthcare awareness, insurance penetration, digital health adoption, and improving infrastructure.

This shift is creating significant employment opportunities across clinical, allied healthcare, diagnostics, administration, and patient support functions. At the same time, it is exposing one of the sector's biggest challenges: the shortage of job-ready healthcare talent.

The challenge is no longer only about increasing the number of graduates. It is about building a workforce that can contribute effectively from day one.

This concern has now received clear policy recognition in the Union Budget 2026–27. India aims to add 100,000 allied healthcare professionals over the next five years through the strengthening of existing institutions and the establishment of new institutions across the public and private sectors. The Budget also proposed NSQF-aligned caregiver programs and training for 150,000 caregivers, alongside Regional Medical Hubs that integrate healthcare, education, and research infrastructure.

These announcements reflect an important shift in healthcare workforce thinking. Infrastructure expansion alone cannot strengthen healthcare delivery unless talent systems evolve alongside it. This is where degree apprenticeships can become critical.

Healthcare growth in tier II and III cities is accelerating faster than workforce readiness. Multi-speciality hospitals, diagnostics centres, rehabilitation facilities, and home healthcare services are scaling steadily across smaller cities. However, the talent pipeline supporting this expansion remains fragmented

The workforce challenge in emerging healthcare markets

Healthcare growth in tier II and III cities is accelerating faster than workforce readiness. Multi-speciality hospitals, diagnostics centres, rehabilitation facilities, and home healthcare services are scaling steadily across smaller cities. However, the talent pipeline supporting this expansion remains fragmented.

Many graduates still enter the workforce with limited exposure to live healthcare environments. Employers therefore spend considerable time retraining new hires before they become operationally effective. Workforce shortages remain especially high across frontline and allied healthcare functions.

The challenge is particularly visible in roles such as:

- Medical laboratory technicians
- Radiology and imaging assistants
- Dialysis technicians
- OT assistants
- Patient care executives
- Emergency care support staff
- Billing and hospital operations professionals

These are roles where practical capability matters as much as academic knowledge.

Healthcare is fundamentally a practice-driven sector. Clinical coordination, diagnostics support, patient management systems, medical equipment handling, healthcare compliance, and hospital operations all require experiential learning.

Skills in healthcare are built through observation, repetition, supervised practice, and exposure to real work environments.

Why degree apprenticeships matter

Degree apprenticeships create a structured bridge between education and employment. They combine formal academic learning with long-term workplace exposure, allowing students to gain practical capability while continuing their degree programs.

For healthcare, this model is especially relevant because learning and service delivery must happen together.

Through degree apprenticeships, students can develop hands-on capability in:

- Diagnostics support
- Patient handling
- Healthcare administration
- Medical equipment coordination
- Laboratory operations
- Telemedicine workflows
- Digital health systems
- Hospital information systems

This improves workforce readiness significantly.

Instead of hiring graduates and retraining them entirely after recruitment, healthcare institutions can shape talent continuously within real clinical and operational environments.

The business impact is also becoming increasingly visible. Organisations adopting apprenticeship-led workforce models are seeing faster onboarding, lower hiring costs, improved productivity, and stronger retention outcomes. Our programs have demonstrated up to 20-25 per cent productivity improvement, 10-25 per cent reduction in attrition, nearly 50 per cent reduction in talent acquisition costs, and significantly lower time-to-hire through continuous talent availability.

For students, degree apprenticeships reduce the gap between learning and employability. For employers, they create a more predictable and sustainable workforce pipeline.

Degree apprenticeships also align closely with the Apprentices Act, 1961, which

mandates eligible establishments to engage apprentices between 2.5 per cent and 15 per cent of their workforce (full-time or contractual). As healthcare organisations expand across tier II and III cities, apprenticeships can help institutions meet compliance requirements while simultaneously building long-term talent pipelines in allied healthcare and operational roles.

Why tier II and III cities need this model more

The need for degree apprenticeships becomes even more important in emerging healthcare markets because workforce migration continues to impact smaller cities.

Many students move to metro cities for education and employment opportunities, while healthcare institutions in tier II and III locations struggle to attract and retain skilled professionals locally. Degree apprenticeship models can help reverse this trend.

When students gain work-integrated learning opportunities within local hospitals and healthcare networks, the likelihood of regional employment and retention improves significantly. Healthcare organisations gain access to locally trained talent. Students gain employability without relocating early in their careers. Patients benefit from more stable healthcare staffing.

This also supports local economic development by creating employment-linked education pathways within smaller cities. Importantly, the earn-while-learn structure of apprenticeships reduces the financial burden often associated with healthcare education, making professional healthcare careers more accessible.

Many students move to metro cities for education and employment opportunities, while healthcare institutions in tier II and III locations struggle to attract and retain skilled professionals locally. Degree apprenticeship models can help reverse this trend

Building allied healthcare capacity at scale

India's healthcare system increasingly depends on allied professionals to support diagnostics, rehabilitation, patient coordination, and operational continuity. However, workforce shortages remain high across these functions because traditional education systems often remain disconnected from actual hospital workflows.

Degree apprenticeships can help address this gap by embedding students directly into healthcare environments during their learning journey.

This creates a stronger balance between theory and practice while improving productivity for employers over time.

Technology is changing healthcare workforce needs

Healthcare delivery is becoming increasingly technology-enabled. Digital records, AI-assisted diagnostics, telemedicine, remote patient monitoring, and healthcare analytics are reshaping how hospitals operate.

As a result, healthcare workers today require a combination of:

- Clinical understanding
- Digital capability
- Process discipline
- Communication skills
- Technology familiarity

Traditional curriculum models often struggle to evolve at the pace of technological change.

Degree apprenticeships offer a more adaptive model because students learn within live operational environments where technologies and workflows evolve continuously.

This allows workforce capability to remain aligned with real industry demand rather than static academic cycles.

The importance of industry-academia collaboration

Building sustainable healthcare talent pipelines requires stronger collaboration between hospitals, educational institutions, healthcare technology providers, and policymakers.

Degree apprenticeships work effectively only when curriculum, assessments, and workplace learning are aligned closely with healthcare delivery systems.

This requires:

- Industry-aligned curriculum
- Structured on-the-job training pathways
- Defined competency frameworks
- Continuous assessment models
- Faculty immersion in healthcare environments
- Exposure to digital healthcare systems

The recent recognition of degree apprenticeships under the Apprenticeship (Amendment) Rules, 2025 creates an important policy foundation for scaling these models further.

The Budget's proposal for Regional Medical Hubs that combine healthcare, education, and research infrastructure also creates an opportunity to integrate apprenticeship-led workforce development directly into healthcare expansion strategies.

The road ahead

India's healthcare growth story will ultimately depend on the strength of its workforce pipeline.

Hospitals, diagnostics networks, and healthcare providers can expand infrastructure rapidly, but long-term healthcare quality depends on the availability of skilled and job-ready professionals.

Tier II and III cities represent the next frontier of healthcare growth. Building sustainable healthcare ecosystems in these regions requires workforce models that are scalable, locally embedded, and aligned closely with real service delivery.

Degree apprenticeships offer exactly that pathway.

They connect education to employment, reduce the gap between learning and practice, and allow healthcare institutions to build talent continuously rather than reactively.

As healthcare delivery becomes more distributed, technology-driven, and patient-centric, work-integrated learning models will become increasingly important.

The future of healthcare workforce development will not depend only on how many students enter classrooms. It will depend on how effectively learning is embedded into the workplace itself.

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Beyond CBC: CBC-Plus - The future of haematology testing

Pravin Gundewar, Sr. Product Manager- Haematology, Sysmex India Pvt Ltd discusses how the Sysmex XR-Series is helping redefine haematology diagnostics through advanced fluorescence flow cytometry, intelligent automation, and integrated workflow solutions designed to support improved efficiency, diagnostic confidence, and patient care

Haematology diagnostics has undergone a remarkable transformation over the years, evolving from basic blood counting to sophisticated cellular analysis capable of delivering valuable clinical insights. Today's laboratories are expected to provide faster turnaround times, improved accuracy, enhanced workflow efficiency, and clinically actionable information, all while managing increasing workloads and operational challenges. In this rapidly changing healthcare environment, the Sysmex XR-Series has emerged as a next-generation haematology solution designed to meet the evolving needs of modern laboratories and clinicians.

Sysmex has long been recognised globally for innovation, reliability, and quality in laboratory diagnostics. Its continuous focus on technological advancement has helped redefine haematology testing by introducing clinically relevant parameters that extend beyond conventional Complete Blood Count (CBC) analysis. The XR-Series builds upon this legacy by combining advanced analytical technologies, intelligent automation, and workflow optimisation into a compact and scalable platform suitable for laboratories of varying sizes.

Sysmex has long been recognised globally for innovation, reliability, and quality in laboratory diagnostics. Its continuous focus on technological advancement has helped redefine haematology testing by introducing clinically relevant parameters that extend beyond conventional Complete Blood Count (CBC) analysis

Sysmex core technologies

Fluorescence Flow Cytometry (FFC)

The XR-Series utilises Sysmex's proven fluorescence flow cytometry technology for advanced white blood cell analysis and cellular characterisation. During analysis, cells pass individually through a narrow flow cell and are exposed to a semiconductor laser beam.

The analyser measures Forward Scatter Light (FSC), Side Scatter Light (SSC), and Side Fluorescent Light (SFL) generated from each cell.

These optical signals provide detailed information regarding cell size, internal complexity, nucleic acid content, and functional activity. Using advanced digital algorithms and signal processing, the system accurately differentiates white blood cells into a 6-part differential and identifies abnormal or immature cell populations with high sensitivity and specificity.

This technology enables the XR-Series to provide advanced clinical parameters such as:

- Immature Granulocytes (IG)
- Reticulocyte Count (RET)
- Reticulocyte Haemoglobin Equivalent (RET-He)
- Immature Platelet Fraction (IPF)
- Nucleated Red Blood Cells (NRBC)
- Extended Inflammation Parameters (EIPs)

These parameters offer clinicians deeper insights into infection, inflammation, anaemia management, thrombopoiesis, and bone marrow activity.

Hydrodynamic DC sheath flow detection

For red blood cell and platelet counting, the XR-Series employs hydrodynamic DC sheath flow technology. This method ensures cells pass centrally through the aperture, minimising coincidence and interference errors that may occur with conventional impedance methods.

The result is improved precision and reproducibility, especially in low platelet count samples and challenging pathological conditions.

The advanced platelet counting technology also supports better discrimination between platelets and fragmented red blood cells, improving confidence in thrombocytopenia evaluation and monitoring.

Enhanced clinical value beyond routine CBC

One of the key strengths of the XR-Series is its ability to provide clinically actionable information beyond conventional haematology testing. Modern clinicians increasingly seek early indicators that can support faster diagnosis and treatment decisions, particularly in critical conditions such as sepsis, anaemia, inflammation, and haematological disorders.

The XR-Series supports this need through several advanced parameters:

- RET-He assists in early assessment of functional iron deficiency and anaemia therapy monitoring
- IPF helps evaluate platelet production and recovery in thrombocytopenic patients
- IG count provides early indication of bacterial infection and systemic inflammation
- NRBC measurement supports critical care and neonatal patient assessment
- Extended Inflammation Parameters (EIPs), NEUT-RI and NEUT-GI, AS-LYMP, RE-LYMP offer valuable information related to neutrophil activation and inflammatory response
- CBC-Plus, a comprehensive algorithm to calculate the EIP score for assisting differentiation between infection and inflammation

These advanced parameters can be generated from a routine blood sample without additional sample collection, helping laboratories improve diagnostic efficiency and clinical value.

Workflow efficiency and laboratory automation

Laboratories today are under constant pressure to improve productivity while maintaining high-quality standards. The XR-Series addresses these requirements through intelligent automation features and user-friendly workflow enhancements.

The system offers:

- High throughput performance suitable for medium-to high-volume laboratories
- Continuous sample loading for improved operational efficiency
- STAT sample priority handling for emergency testing
- Automated rerun and reflex testing functionality
- Intuitive software interface with customizable reporting
- Reduced reagent consumption and optimized operational costs
- Compact footprint suitable for space-constrained laboratories

The analyser also supports advanced flagging technology, helping laboratories reduce unnecessary manual smear reviews while improving detection of abnormal samples requiring microscopic evaluation.

Sysmex XR-1500: Integrated smart haematology solution

The Sysmex XR-1500 further enhances laboratory workflow by integrating automated cell counting with slide preparation and staining capabilities into a single compact platform.

This integrated approach helps laboratories streamline operations, reduce manual intervention, and improve overall efficiency.

The XR-1500 combines CBC analysis, reflex testing, slide preparation, and staining within one automated workflow. Based on customisable laboratory rules and abnormal findings, the system can automatically trigger smear preparation and staining only when clinically required. This selective reflex functionality helps reduce unnecessary slide preparation while ensuring that clinically important abnormal samples receive appropriate microscopic review.

Key features of XR-1500

- Integrated haematology analyser with automated slide maker and stainer
- Fully automated 6-part differential analysis
- Direct NRBC measurement for every CBC analysis
- Advanced parameters including IG, RET, RET-He, IPF, and EIP
- Auto rerun and reflex testing capability
- Intelligent smear preparation based on laboratory-defined rules
- Consistent monolayer smear quality for improved microscopy
- Throughput optimization with reduced hands-on time
- Compact and scalable design for modern laboratories

The XR-1500 also helps standardize slide quality, improving consistency in microscopic review and reducing operator-dependent variability. Integration with digital morphology systems can further enhance automation and support remote review capabilities.

Supporting the future of haematology diagnostics

As healthcare systems continue to focus on faster diagnosis, operational efficiency, and better patient outcomes, haematology laboratories are expected to deliver more value from routine testing. The Sysmex XR-Series and XR-1500 address these evolving demands by combining advanced analytical technologies with intelligent workflow automation and clinically relevant parameters.

By enabling laboratories to extract deeper insights from routine CBC testing, these solutions support earlier clinical intervention, improved workflow efficiency, and enhanced diagnostic confidence. With its strong focus on innovation, automation, and clinical relevance, the XR-Series represents the next step in smart haematology diagnostics for modern healthcare laboratories.

Ditch the old:Embrace the liquid

Atharwa Mishra, Marketing Executive, Ami Polymer Pvt. Ltd explains why to chose LSR injection molding over compression and HCR molding

Introduction: The silicone molding crossroads

In the world of advanced manufacturing, the materials you choose and the processes you employ are not just operational decisions — they are strategic differentiators. For silicone component manufacturers, the pivotal choice lies between two fundamentally different technologies: Liquid Silicone Rubber (LSR) Injection Molding and the traditional methods of High Consistency Rubber (HCR) and Compression Molding.

Ami Polymer has made a clear, deliberate, and data-backed choice — LSR injection molding. This article presents a thorough, transparent analysis of why LSR is not merely an upgrade but a transformational leap in precision, efficiency, and product reliability.

Whether you are an engineer evaluating manufacturing partners, a procurement manager assessing total cost of ownership, or a product designer seeking maximum design freedom — this article will equip you with the technical depth and business clarity to make the right decision.

Understanding the technologies

What Is Liquid Silicone Rubber (LSR) Injection Molding?

LSR injection molding is a high-precision, two-component manufacturing process that uses a low-viscosity, platinum-catalysed silicone system. The two components — a base silicone polymer and a platinum catalyst are metered in precise ratios, mixed under controlled conditions, and injected into a temperature-controlled mold where they cure rapidly into an elastomeric part.

Key distinguishing technical characteristics include:

- **Viscosity range:** 50,000 to 1,000,000 mPa·s, enabling flow into intricate geometries
- **Cure mechanism:** Platinum-catalysed addition curing — no byproducts, no shrinkage volatiles
- **Processing temperature:** Mold at 170–200°C; material stays cold in feed system
- **Automation compatibility:** Fully integrated with robotic demolding, inspection, and assembly

What is HCR / Compression Molding?

High Consistency Rubber (HCR) — sometimes called solid silicone — is a high-viscosity, peroxide or platinum-cured material processed through compression or transfer molding. Operators manually weigh, cut, and place uncured silicone into open molds, which are then pressed closed and heated.

Its defining limitations include:

- High viscosity makes flow into thin sections nearly impossible
- Manual material handling increases variability and contamination risk
- Flash (excess material) is common and requires secondary trimming
- Automation is difficult — most operations remain labor-dependent

1. Viscosity and material flow: The foundation of quality

The single most defining difference between LSR and HCR begins at the molecular level — viscosity. This seemingly simple property has profound cascading effects on every downstream aspect of manufacturing.

LSR Advantage

LSR's low viscosity allows it to flow under injection pressure into the most demanding geometries — walls as thin as 0.3 mm, blind undercuts, complex internal channels, and optical-grade surfaces. The material fills every corner of the mold with zero air entrapment.

HCR/Compression: The high viscosity of HCR means material must be manually forced into shape, resulting in incomplete fill, surface defects, and limited geometric complexity. Thin walls are simply not achievable.

The practical impact: product designers working with LSR face virtually no geometry constraints. Features that would require secondary assembly in HCR — undercuts, integrated seals, multi-durometer sections — can all be molded in a single shot with LSR.

2. Production speed and automation: Rewriting the rules of output

In modern manufacturing, time is cost. Cycle time directly determines your production capacity, labor bill, and ability to respond to demand surges. The gap between LSR and HCR here is not incremental — it is an order of magnitude.

Metric	LSR Injection Molding	Compression / HCR
Cycle Time	10–90 seconds	3–10 minutes
Labor per Shift	1–2 operators (monitoring)	4–8 operators (hands-on)
24/7 Operation	Yes — lights-out capable	No — requires constant staffing
Post-Cure Needed	Rarely required	Often required
Annual Output (1 machine)	Up to 2 million+ parts	Under 200,000 parts

The automation advantage is structural, not superficial. LSR machines integrate seamlessly with robotic pick-and-place systems, inline vision inspection, and conveyor-based assembly — enabling factories to run unattended through nights and weekends. For HCR, the inherent manual nature of the process puts a ceiling on output that no amount of staffing can break through efficiently.

3. Part quality and precision: When tolerances are non-negotiable

For industries like medical devices, optics, and automotive electronics, quality is not a differentiator — it is the minimum entry requirement. LSR delivers at a level that compression/HCR simply cannot match consistently.

Dimensional accuracy

LSR injection molding routinely achieves tolerances of ff0.02 mm, enabled by closed-mold injection, consistent cavity fill pressure, and zero reliance on operator judgment. Cold-runner systems eliminate gate vestige, reducing post-processing to near zero. HCR compression, by contrast, sees dimensional variation from batch to batch as material placement and press closure introduce variability at every cycle.

Flash control

Flash — the thin film of excess material that bleeds into mold parting lines — is a persistent quality and cost problem in compression molding. With HCR, flash removal is a dedicated secondary operation, adding labor, time, and the risk of dimensional damage. LSR cold-runner injection systems produce parts with virtually zero flash, enabling direct shipment without trimming in most applications.

Surface integrity

LSR's low-viscosity flow faithfully replicates mold surface textures, enabling optical-grade clarity, micro-textured grips, and logo details at sub-0.1 mm resolution. For HCR, achieving similar surface quality requires post-mold polishing or additional tooling modifications.

LSR Contamination Control Advantages

Sealed drum delivery: Material is never exposed to ambient air or operator contact during transfer.

Closed metering & mixing: The A/B components flow through sealed tubing directly into the injection unit — no open containers, no risk of airborne particles.

Automated demolding: Robotic arms extract parts without skin contact, eliminating perspiration, oils, and particulate transfer.

Cleanroom integration: LSR machines can operate within ISO Class 5–7 cleanrooms — mandatory for medical implants, pharmaceutical components, and infant care products.

4. Cleanliness & Contamination Control: Protecting the Product

In sectors where product contamination can mean patient harm, regulatory failure, or brand destruction, the manufacturing environment is as critical as the material itself. LSR and HCR differ fundamentally in their contamination exposure profiles.

HCR compression molding's open-handling workflow — where operators weigh, cut, and place uncured rubber manually — introduces contamination at every step. This is not merely a hygiene concern; for medical devices requiring ISO 10993 biocompatibility or food contact components requiring FDA/EU compliance, HCR's contamination risk profile can be disqualifying.

5. Design Freedom: Engineering Without Boundaries

LSR does not merely replicate what was possible before — it enables product architectures that were previously impossible. This design freedom is one of the most compelling, yet underappreciated, advantages of the technology.

LSR Design Capabilities	HCR/Compression Limitations
Overmolding onto rigid plastics or metals in the same mold cycle	Requires manual bonding — adhesives, primers, secondary assembly
Undercuts and re-entrant geometries molded directly	Undercuts require complex pull actions or are avoided entirely
Inline pigment mixing for multi-color or gradient parts	Color-matching is manual and inconsistent across batches
Optical-clarity lenses, light pipes, diffusers	Surface quality insufficient for optical applications
Wall thicknesses as thin as 0.3 mm	Minimum practical wall thickness 1.5–2 mm
Integrated seals, ribs, and living hinges in one shot	Multi-part assemblies with bonded joints — failure-prone

6. Total cost analysis: The true economics of LSR

The most common objection to LSR is its higher upfront tooling cost. This objection, while factually accurate in isolation, ignores the complete economic picture. A rigorous lifecycle cost analysis consistently favors LSR at any meaningful production volume.

Cost component breakdown

Tooling cost: LSR molds — precision-machined to accommodate cold-runner systems and tight tolerances — cost 2–4× more than equivalent HCR compression tools. For an annual volume of 100,000 parts, this premium amortizes to less than Rs 5–10 per unit.

Labor cost: HCR compression requires 4–8 operators per shift for material preparation, press loading, demolding, and flash trimming. LSR requires 1–2 operators for machine monitoring and quality sampling. At Rs 400/hour per operator, this difference alone can represent Rs 50–80 per part at modest volumes.

Scrap and rework: HCR flash trimming operations carry 3–8 per cent scrap rates and introduce secondary damage risk. LSR flash-free output reduces scrap to under 0.5 per cent in well-tuned processes.

Break-even point: Across most product categories, LSR reaches economic parity with HCR/compression at 5,000–10,000 parts. Beyond that threshold, every additional part produced by LSR carries a meaningfully lower unit cost. At 1 million parts, the LSR cost advantage is overwhelming.

7. Material performance and durability: Built to last

Both LSR and HCR are silicone-based, but the addition cure mechanism of LSR produces a purer, more uniform polymer network with measurably superior properties in critical performance dimensions.

Property	LSR Performance	HCR Performance
Temperature Range	–50°C to +250°C continuous	–40°C to +200°C (variable)
UV & Ozone Resistance	Excellent — inherent to addition cure	Good — may need stabilizer additives
Elongation at Break	400–800% (highly consistent)	300–600% (batch variation common)
Tear Strength	High; consistent part-to-part	Moderate; influenced by cure variability
Chemical Resistance	Broad: acids, alkalis, oils, solvents	Moderate — similar but less consistent
Electrical Insulation	Outstanding — stable across temperature	Good — adequate for general use
Biocompatibility	ISO 10993 / USP Class VI capable	Achievable, but process-dependent

8. Master comparison: LSR vs compression/HCR at a glance

Feature / Aspect	LSR Injection Molding	Compression & HCR Molding
Cycle Time	10–90 seconds (automated)	3–10 minutes (manual)
Automation Potential	Fully automated (24/7 lights-out)	Primarily manual; labor-intensive
Precision & Tolerances	±0.02 mm, minimal flash	Larger tolerances; high flash risk
Part Complexity	Complex, thin walls, undercuts, optics	Simple, thick parts
Cleanroom Compatibility	Excellent — no manual handling	Limited — manual contact required
Contamination Risk	Minimal; sealed drum system	Higher; open handling
Material Handling	Pump-fed from sealed drums	Manually mixed and loaded
Yield & Scrap Rate	High yield, low scrap	Higher scrap due to flash & defects
Post-Processing	Minimal — almost no flash trimming	Extensive — trimming, curing
Volume Suitability	Ideal for medium-high volume (5k+)	Cost-effective only at low volumes
Industries Used	Medical, automotive, optics, electronics	General industrial, basic components
Lifecycle Cost	Lower at scale — automation saves labor	Higher due to manual processes

Medical Industry: Neonatal Silicone Breathing Mask

Challenge

Wall sections thinner than 0.5 mm were required for safe, leak-free neonatal respiratory support. The part required ISO 10993 biocompatibility certification and zero surface defects — flash or surface contamination could cause direct patient harm.

Compression / HCR Outcome

Compression/HCR produced inconsistent wall thickness across the thin sections, resulting in a scrap rate exceeding 18%. Flash present on sealing surfaces failed inspection. ISO 10993 biocompatibility could not be consistently met due to manual handling contamination. The project was untenable at scale.

LSR Outcome

A fully automated LSR process eliminated manual handling. Flash-free parts with wall consistency within ±0.03 mm were produced every cycle. Biocompatibility testing passed first submission. Production scaled to 500,000 parts per year with a defect rate below 0.1%.

Automotive Industry: Electrical Connector Seal (Weatherproof)

Challenge

Integrated sealing lips with ±0.05 mm dimensional tolerance were required for weatherproofing in engine bay environments. UV exposure, vibration, and thermal cycling across –40°C to +150°C demanded long-term elastic performance. Minimum annual volume: 1,000,000+ parts.

Compression / HCR Outcome

Compression/HCR produced uneven sealing lips with manual post-curing required for each batch. Repeatability was insufficient for precision fitment — field rejection rates during assembly exceeded 4%. Scaling beyond 200,000 parts/year was cost-prohibitive without prohibitive labor costs.

LSR Outcome

A 32-cavity LSR mold with 28-second cycle time achieved the required volume with 2 operators per shift. Sealing lip dimensions were consistent to ±0.02 mm across all cavities. Parts were specified for and adopted in BMW and Audi vehicles. After 3 years in production: zero field failure reports attributed to the seal component.

9. Real-world case studies: LSR in action

Abstract comparisons tell part of the story. Real-world production outcomes tell the rest. Below are two documented case studies where the choice of process technology directly determined product success or failure.

10. Ami Polymer Pvt. Ltd.: Our commitment to LSR excellence

OFFICIAL DECLARATION — AMI POLYMER PVT. LTD.

At Ami Polymer Pvt. Ltd., we are unequivocally committed to advancing the quality, reliability, and precision of silicone components for India's most demanding industries — and for our global customers.

Our investment in state-of-the-art LSR Injection Molding Machines is not a tactical response to market trends. It is a foundational strategic choice — one grounded in engineering evidence, customer outcomes, and a long-term commitment to manufacturing excellence.

Why we choose LSR: Every time it is technically appropriate

- Superior precision and surface finish for complex geometries that other processes cannot achieve
- Fully automated production with minimal human handling — essential for cleanroom, medical-grade, and infant-safe components
- Fast cycle times and scalable production — enabling us to serve both prototype development and million-part annual programs
- Consistent, traceable quality with reduced post-processing waste and lower total cost of ownership for our customers
- Compliance readiness — our LSR processes are designed to support ISO 10993, FDA, EU MDR, and food-contact regulatory pathways

Our promise to you

Ami Polymer Pvt. Ltd. will recommend LSR wherever it delivers a measurable technical or commercial advantage — and we will be transparent when a different process better serves your application. Our goal is not to sell a process; it is to solve your engineering challenge with the best available solution.

We are fully equipped, experienced, and proud to be at the forefront of LSR processing in India. Our team of silicone engineering specialists is ready to collaborate from concept to high-volume production — providing faster delivery, lower total cost, and components that perform.

Conclusion: The future of silicone manufacturing is liquid

The evidence is decisive. Across every dimension that matters to modern manufacturing — speed, quality, cleanliness, design freedom, scalability, and lifecycle economics — Liquid Silicone Rubber injection molding outperforms traditional compression and HCR molding.

This is not a technology of the future. It is the technology of now — and Ami Polymer Pvt. Ltd. has made the choice to lead with it. For our customers, that means access to components that push the boundaries of what silicone can do, with the reliability and consistency that advanced applications demand.

If you are evaluating your silicone manufacturing strategy — whether for a new product launch, a quality improvement initiative, or a supply chain optimization — we invite you to start a conversation with us. The transition to LSR may be the single highest-return manufacturing decision you make this year.

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