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CONTENTS

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India's medtech policy reset has to match intent with implementation

India's relatively nascent medtech sector has potential, regulators are reviewing policies but will implementation live up to intent? Two policies under review seek to balance the growth aspirations of India's growing medtech manufacturing base, while incentivising global medtech investments. But good intentions on paper are only half the job. Even that is questionable, when the proposal doesn't seem to follow conventional logic.

Let's first consider the Ministry of Health & Family Welfare's proposal to further amend the Medical Devices Rules, 2017 to rationalise/shorten manufacturing licences timelines for medical devices is appreciated by both Indian and MNC medtech companies.

The proposal is to shorten approval periods—from 140 to 115 days for Class B devices (which include low to moderate risk devices such as blood pressure monitors, hypodermic needles and pulse oximeters) and from 105 to 90 days for higher-risk Class C & D devices (which include high-risk devices such as cardiac stents, hip and knee implants, and other orthopaedic implants).

Rajiv Nath, Forum Coordinator, AiMeD notes that it is "puzzling that lower-risk Class B devices take longer to clear than higher-risk Class C & D — regulatory timelines should reflect risk, not reverse it."

AiMeD's statement thus asks for "greater clarity on the rationale behind retaining longer approval timelines for lower-risk Class B devices than for higher-risk Class C & D devices, which inherently require more rigorous technical evaluation and regulatory scrutiny."

The association, which represents the Indian medtech sector, further suggests that CDSCO should consider publishing data on the actual versus prescribed licensing timelines achieved over the past two financial years across different device categories. Greater transparency on common deficiencies in applications that lead to repeated queries and delays would also help manufacturers improve submission quality and enable faster approvals, reasons Nath/AiMeD.

Summing up the next steps and the real worry, Nath/AiMed points out that policymakers' excellent intentions must now be matched by faster execution at both the Central Licensing Authority (CLA) and State Licensing Authorities (SLAs). Predictable and time-bound approvals are critical for manufacturers investing in greenfield facilities, as prolonged licensing delays result in idle capital, underutilised skilled manpower, increased financing costs, and slower commercialisation. Streamlined implementation will strengthen India's competitiveness as a global medical devices manufacturing hub, concludes the statement.

Reacting to the same proposed amendments, Pavan Choudary, Chairman, Medical Technology Association of India (MTaI) pointed out that the mandatory pre-licence Quality Management System (QMS) audit by a Notified Body establishes a critical quality checkpoint before any licence is granted, which directly strengthens patient safety and raises compliance standards across the sector.

Choudary added that another significant amendment is the introduction of defined timelines for site audits and compliance verification bringing long-overdue predictability to the licensing process. This is a meaningful ease-of-doing-business reform, which will further reduce regulatory uncertainty, enabling better planning, and lowering compliance costs, especially for MSMEs.

Two policies under review seek to balance the growth aspirations of India's growing medtech manufacturing base, while incentivising global medtech investments.

Another significant policy amendment open to comments, is the Department of Pharmaceuticals' Global Tender Enquiry (GTE) Exemption List of Medical Devices.

MTaI's Choudary explains that many MTaI members manufacture in India and strongly support the growth of domestic manufacturing. MTaI believes products that are available locally in sufficient quantities and at the required quality standards can be procured domestically. However, where advanced technologies are not manufactured in India, or domestic capacity is insufficient to meet clinical needs, continued GTE exemptions remain essential."

"While the 2024 exercise was largely comprehensive, a few advanced technologies that are not manufactured in India were missed out in the exemption list. We welcome the current review and hope it results in a complete, evidence-based framework that accurately reflects manufacturing realities and patient needs. Any exclusion of technologies that are not adequately available in India risks limiting patient access to critical medical innovations and could adversely affect healthcare outcomes," he added.

AiMeD is understandably less enthused with the proposal to expand the GTE exemption list and will be sharing detailed manufacturing capabilities and capacities with both DoP and DPIIT to ensure that products already made in India are removed from the exemption list.

Nath makes the point that for products where Indian manufacturers have already taken test licenses, committed capital expenditure, or launched production but are yet to complete the three-year market standing requirement, there must be a mechanism to earmark a share of public procurement. He suggests that this could be through fast-track market access or financial support via tariff review. Even a nominal increase in customs duty—from the current 0–7.5 per cent range to 7.5–10 per cent—would provide essential protection and encourage investment.

AiMeD's statement stresses that imports of medical devices into India continue to rise year-on-year. Last financial year alone, imports surged by 17 per cent, reaching ₹89,000 crore compared to ₹76,000 crore the previous year. This trend underscores the urgent need to strengthen domestic manufacturing.

AiMed also reasons that developing any high-technology medical equipment is inherently challenging. For Class C and D devices, obtaining drug manufacturing approval can easily take 9–15 months. During the gestation period, highly skilled staff remain underutilised while companies struggle to service capital financing and fixed costs without sales revenue. Other countries address this by offering market assurance—guaranteed sales volumes at attractive target prices—to motivate investment. India must adopt similar measures to ensure our manufacturers are not disadvantaged, suggested Nath.

As these proposed policy amendments reveal, regulators are moving in the right direction. What needs to pick up is the pace of implementation.

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INTERVIEW

The conversation is shifting from 'how many beds do we have' to 'how effectively are we using them?'

Pradeep Vadakkekhatt, Co-Founder and Director, Trackerwave, in an interview with **Neha Aathavale,** discusses how real-time location systems (RTLS) are helping hospitals improve operational visibility, optimise capacity, strengthen resource utilisation and enable AI-driven decision-making

Hospitals have invested heavily in EMRs and HIS over the last decade. Do you see RTLS becoming the missing operational layer that connects digital records with what is actually happening on the hospital floor? Can you share examples where real-time visibility has influenced management decisions rather than just improving tracking?

Indian hospitals have built impressive digital infrastructure over the past decade, including EMRs, HIS, nurse call systems, but a gap still exists: these systems focus on billing and to some extant clinical data, but not what is happening in terms of hospital operations. RTLS fills precisely that gap. It creates a live operational layer that bridges structured digital records with actual floor level reality, where a patient is located now, whether equipment is available currently, how staff are deployed at any given moment.

The impact is felt beyond mere tracking. In one deployment, real-time visibility into patient flow across OPD and IPD revealed consistent bottlenecks at admission and pre-operative areas, the real-time intelligence prompted the hospital management to restructure workflows by changing the staff deployment numbers and fixed the issue in this process.

> Government hospitals require solutions that integrate with existing infrastructure at minimal incremental cost, are operable with limited technical staff, and deliver value in high-patient-volume, resource-constrained conditions

In another instance, RTLS data showed that high-value imaging equipment was sitting idle for nearly 40 per cent of its scheduled operating window due to patient transport delays while the hospital was about to procure an additional unit for a perceived shortage, a finding that directly impacted a capital expenditure decision: instead of procuring additional equipment, the hospital addressed the transport workflow saving an uncalled for purchase.

A good metaphor can be the city corporation addressing a traffic bottle neck. A certain signal may constantly have a pile up during peak hours in the day time and evening – the answer is not necessarily building a flyover, but it could be merely balancing the time given per signal – increasing the time for the choked signal in proportion to the relatively lesser crowded signal to ensure lesser jams is a much simpler solution that solves the problem rather than spending crores on a flyover.

What distinguishes RTLS-driven decisions is that they are grounded in observed behavior based on real-time data, not reported behavior. Management teams are increasingly using live dashboards and historical flow data not just in operational reviews, but in board-level capacity planning discussions. The conversation is shifting from "how many beds do we have" to "how effectively are we using them" and RTLS is what makes that shift possible.

India's leading hospital chains are expanding capacity, but many continue to face challenges around staff productivity, bed turnover and equipment utilisation. In your view, what percentage of operational inefficiencies today stem from visibility gaps, and where are hospitals seeing the quickest ROI from

RTLS deployments?
Based on our engagements across Indian hospital chains, we estimate that 40–60 per cent of operational inefficiencies in mid-to-large hospitals are directly attributable to visibility gaps. These are not structural or staffing failures, they are information failures. Nurses spend time locating equipment. Beds remain blocked longer than necessary because discharge signals don't propagate in real time. Staff deployment doesn't adjust dynamically to patient load. A lot of customer dissatisfaction leading to diminished brand reputation.

Hospitals that are expanding capacity, adding wings, opening new floors frequently discover that the underlying operational patterns simply scale up along with the physical infrastructure. The inefficiencies travel with the expansion and to some extent become amplified after a certain stage.

Where are hospitals seeing ROI fastest? Three areas stand out consistently.

First is a tie between, asset utilisation and staff placement: On asset utilisation, hospitals typically discover that 20–30 per cent of critical equipment inventory is either idle, misplaced, or over-concentrated in one zone. Optimising this reduces unnecessary procurement and rental costs quickly.

With regard to staff placement – hospitals tend to have a surplus of 40-45 per cent additional headcount in comparison to the workload present with respect to patient transport and non clinical tasks. Optmising this has given all of our customers a 30 per cent minimum gain allowing them ample flexibility to redeploy resources where real necessity exists.

Second, bed management: real-time occupancy and discharge tracking reduces average bed turnaround time significantly, which compounds across a busy facility.

Third, patient throughput in health checks and OPD clinics, where visibility into wait times and bottlenecks enables scheduling adjustments within weeks of deployment.

These are not long-horizon benefits, hospitals begin seeing measurable operational shifts within the first quarter of a Trackerwave deployment. For CFOs and COOs, this makes the business case for RTLS considerably more straightforward than many other digital health investments.

As hospitals increasingly adopt AI and predictive analytics, are you seeing healthcare providers move from descriptive use cases such as asset tracking to predictive use cases such as forecasting patient flow, equipment demand or workforce allocation?
The evolution is certainly happening, when hospitals begin an RTLS deployment, the initial value is largely descriptive, knowing where assets are, seeing real-time bed status, understanding patient location. But the moment that data begins to accumulate, hospital leadership starts asking a different set of questions: not "where is this equipment right now" but "What is the predicted utilisation of our OT's and is there a need for increasing our capacity to plan better? (The OT being the most expensive resource in a hospital)"

We are actively working with hospital partners on predictive visibility built on RTLS data streams. Patient flow forecasting, anticipating surges in emergency admissions or OPD load based on historical patterns and seasonal indicators is one area where the data foundation RTLS provides is very valuable.

Equipment demand forecasting, particularly for shared resources like infusion pumps and portable monitors, is another use case gaining traction.

Workforce allocation is perhaps the most consequential frontier. Real-time data on staff location, patient acuity, and zone congestion, combined with predictive models, allows shift supervisors to proactively redistribute staff before bottlenecks form rather than reacting after they do.

The hospitals making this transition most effectively are those that treat RTLS not as a tracking tool but as an operational decision support platform, one that feeds AI and analytics layers. The infrastructure is the same; the ambition is different. And increasingly, Indian hospital CIOs are arriving with that ambition from day one.

Much of the conversation around healthcare infrastructure focuses on adding beds and building new facilities. However, can technologies like RTLS help hospitals extract more capacity from existing infrastructure before they invest in expansion? How are boards and CXOs evaluating that trade-off today?
As I had mentioned in my earlier answers, this is one of the most important conversations happening in Indian healthcare today, and RTLS is increasingly at its centre. The instinct to solve capacity constraints by building more ... more beds, more floors, more facilities ... is understandable but often not required. Our experience suggests that most hospitals operating at 80 per cent+ occupancy have significant latent capacity that remains untapped due to operational inefficiencies rather than physical constraints.

Consider what happens when average bed turnaround time drops by 30–40 minutes across a 500-bed hospital. Or when equipment availability improves so surgical lists don't get pushed due to missing instruments. Or when staff are deployed in real time based on where patient load is highest rather than on a static shift plan. Each of these improvements can yield an effective equivalent of additional capacity without capital expenditure.

Boards and CXOs are increasingly receptive to this framing, particularly in an environment of rising construction costs and compressed operating margins. We are seeing hospital groups use RTLS data in pre-investment analyses, essentially asking: "Have we fully used what we have before we commit to building more?" In several cases, this exercise has deferred or downsized expansion plans by 12–18 months while operational improvements are implemented.

The trade-off is shifting from a binary "build or don't build" decision to a sequenced strategy: optimise first, then scale from a higher baseline. RTLS is the evidence base that makes that sequencing possible.

Government hospitals have traditionally faced challenges around resource constraints and operational complexity. Through your recent engagements with Maharashtra and SCB Cuttack, what operational gaps are public healthcare providers looking to solve through RTLS, and how does the implementation approach differ from private hospitals?
Public healthcare institutions face challenges that are fundamentally different from private hospitals, and our engagements with Maharashtra's government health system and SCB Medical College and Hospital in Cuttack have reinforced this clearly.

The operational gaps in government hospitals are not primarily about efficiency optimisation, safety and they are about basic visibility. In large public facilities handling thousands of patients daily with constrained staff-to-patient ratios, the core problem is that administrators and clinical leads often lack reliable, real-time information on what is happening across the hospital at any given moment.

With regards to Patient and Asset Tracking - Equipment disappears between departments without warnings. Patient movements are not tracked systematically. Bottlenecks in casualty and OPD go unaddressed because they aren't measured. All of these things lead to significant stress on care providers and administrators.

With regards to safety of infants, abduction is very much prevalent. Every other day the media reports cases across the nation and there are several that go unreported.

In these contexts, RTLS addresses foundational visibility and safety first, reliable asset tracking, patient flow mapping, infant safety and tracking and staff deployment intelligence before any layer of predictive analytics.

The implementation approach also differs significantly. Government hospitals require solutions that integrate with existing infrastructure at minimal incremental cost, are operable with limited technical staff, and deliver value in high-patient-volume, resource-constrained conditions. Procurement and deployment timelines involve multiple institutional stakeholders.

Trackerwave's approach in these engagements has been to co-design with department heads and administrative leadership, ensuring the solution maps to their operational reality rather than imposing a private-sector framework. The results demonstrate that RTLS delivers meaningful impact in public healthcare, but the pathway looks different.

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INTERVIEW

Why healthcare's future lies in connected ecosystems

Healthcare's biggest disruption isn't AI, it's integration. As medical devices, cloud platforms, digital health and life sciences converge into a single connected ecosystem, the industry is moving from episodic treatment to continuous, data-driven care. **Atul Kurani,** VP, Global Head Medical Practice & IOT, Capgemini Engineering in an interview with **Lakshmipriya Nair** outlines how this transformation is unfolding, why ecosystem-led innovation will define the next decade, and what it means for healthcare leaders preparing for 2030

We often hear about the convergence of medtech, digital health and life sciences. What does this convergence look like in practice?

The convergence of medtech, digital health, and life sciences in practice is creating real-time, holistic, and personalised healthcare solutions. This transformation extends care beyond hospitals through IoT-enabled devices such as home dialysis systems, connected infusion pumps, remote monitoring platforms, and wearable sensors.

At the same time, advanced digital surgical platforms including robotics, image guided systems, and intraoperative analytics are transforming care within hospitals by enhancing precision, standardisation, and outcomes during procedures. Together, these innovations create a continuum of care across pre-operative, intra-operative, and post-operative settings.

Data from these diverse sources, home-based devices, wearables, hospitals, and surgical platforms, are securely aggregated and stored in scalable cloud infrastructures. Cloud-based platforms enable seamless interoperability, longitudinal patient records, and real-time data access across stakeholders, allowing the integrated ecosystem to leverage advanced analytics, AI, and clinical insights for patient-specific outcomes, early risk detection, and personalised interventions. For instance, home-based therapies such as dialysis can be monitored remotely for safety and adherence, while digital platforms help surgical teams optimise techniques and recovery pathways.

In drug development and clinical research, this convergence enables faster, data-driven decisions through simulation, digital twins, and real-world evidence.

Overall, this integrated ecosystem is shifting healthcare from a reactive model to a more proactive, continuous, and patient-centric approach.

Which healthcare technologies are currently overhyped, and which are still underestimated?

In the broader healthcare technology landscape, certain areas receive significant attention, particularly advance solutions such as AI driven diagnostics and decision-making systems that are designed to augment and support clinicians in delivering more effective care. While promising, these technologies are still some distance from widespread, reliable adoption considering the challenges in terms of trust, regulation, and real-world validation need with so much variability.

This is especially critical given variations in patient populations, disease patterns, and healthcare practices across different regions, making it challenging for AI models to generalise consistently. This highlights the need for clinical evidence and localised validation before deployment at scale. Similarly, fragmented digital health apps often overstate their clinical impact without deep integration into care pathways.

In contrast, several technologies remain underestimated. Interoperability platforms that connect data across systems are critical to enabling data-driven real time, holistic, personalised solutions but still face challenges of adoption. Remote patient monitoring, when integrated into clinical workflows, can enable real-time patient tracking, reduce rehospitalisations, and lower healthcare costs. Additionally, simulation, digital twins, and model-based approaches in medtech can accelerate innovation and improve clinical outcomes. The true transformation lies in building integrated, ecosystem driven technologies, though progress is often hindered by fragmented data landscapes and limited information sharing across institutions.

Remote patient monitoring has moved from a niche concept to a mainstream healthcare strategy. What lessons have we learned so far?

Remote patient monitoring (RPM) has evolved into a mainstream healthcare strategy across specialties, offering several important lessons. First, its true value is realised only when it is tightly integrated into clinical workflows and delivers measurable clinical outcomes. Second, real time data is powerful, but without actionable insights and clinician engagement, it adds limited value RPM solutions are now enabling targeted, personalised diagnostics and treatments. Third, patient empowerment and engagement require technologies that are simple, reliable, and personalised to drive sustained use. Fourth, interoperability and data sharing remain key challenges, often limiting scalability. Finally, RPM has demonstrated clear benefits in reducing hospital readmissions, improving chronic disease management, and lowering healthcare costs. Overall, the shift has highlighted that success lies not just in technology deployment, but in aligning people, processes, and data to deliver meaningful, patient-centric outcomes.

What are the biggest cybersecurity challenges facing connected healthcare ecosystems today?

The growing connectivity across medical devices, particularly as care expands into homes, ambulatory care, and remote clinics, creates a broader digital ecosystem, bringing with it an increased need for robust cybersecurity measures to safeguard against potential breaches and ransomware attacks. Many

legacy systems lack built-in security controls and are difficult to update, making them easy targets. Data interoperability, while essential, introduces risks around secure data exchange, especially when institutions hesitate to adopt standardised protocols. Additionally, protecting sensitive patient data across cloud platforms and third-party vendors add complexity. Real-time data flows further amplify the need for continuous monitoring and rapid threat detection. Finally, balancing usability with strong security measures remains a challenge, as overly complex controls can hinder clinical efficiency. Addressing these issues requires a comprehensive approach that integrates robust security frameworks, regulatory compliance, and a culture of cybersecurity awareness across the healthcare ecosystem.

How do you see smart implants, wearables and implantable IoT devices reshaping patient care over the next decade?

Smart implants, wearables, and implantable IoT devices are set to transform patient care by enabling continuous, real-time, and personalised monitoring and intervention. For example, smart orthopedic implants like Zimmer Biomet's connected knee provide data on mobility and recovery, allowing clinicians to adjust rehabilitation remotely and enable clinical insights for future surgeries. Capgemini has been instrumental in building the connected ecosystem around Advanced pacemakers and implantable cardioverter defibrillators (ICDs) which enable continuous monitoring of cardiac rhythms and alert the clinicians when devices detect abnormal arrhythmia or deliver necessary therapeutic shocks during critical arrhythmia event. Furthermore, Capgemini collaborated on development of a wearable continuous glucose monitoring device, which enables efficient, ongoing management of glucose levels. Together, these advancements represent a shift from reactive to a more continuous, proactive care model. In neurology, implantable devices supporting remote programming for neurostimulation allow clinicians to fine tune therapy without requiring hospital visits, which is another area where Capgemini has closely worked with customers to deliver solutions. Wearables further extend this ecosystem by capturing daily health data and supporting early intervention. Together, these technologies help reduce hospitalisations, support data-driven treatment, advance more value-based, patient-centered care.

How is GenAI changing the way medical devices are designed, tested, and approved?

GenAI is reshaping medical device development across the entire lifecycle, from concept to approval, by enabling faster, more intelligent, and simulation-driven processes. In early stages, it supports ideation through virtual design exploration and realistic simulations, helping engineers evaluate multiple design options efficiently. During development, GenAI assists in code generation, model refinement, and automated documentation aligned with standards. In verification and validation, it enables rapid test case creation including test suites, synthetic test data generation, and intelligent test automation, significantly improving coverage and speed. For regulatory approval, GenAI is being leveraged to streamline documentation, automate traceability, and generate evidence aligned with regulatory standards requirements, improving submission quality and speed.

However, despite these advances, a human in the loop remains critical to ensure clinical relevance, validate outputs, address edge cases, and maintain accountability, especially given patient variability, safety requirements, and stringent regulatory expectations.

How can India become a global hub for healthcare innovation? What advantages do Global Capability Centres (GCCs) in India offer to healthcare and MedTech companies today?

India can emerge as a global hub for healthcare innovation by combining its clinical depth, strong engineering talent, and an evolving ecosystem that supports rapid prototyping and scalable manufacturing. The country has a vast pool of highly skilled doctors and clinicians who bring strong diagnostic expertise and exposure to diverse disease profiles, enabling robust real-world validation. Increasing collaboration between clinicians, academia, industry, and government could further accelerate innovation through applied research and policy support.

Global Capability Centres (GCCs) in India play a strategic role by bringing together medtech engineering, digital health, AI, and regulatory expertise under one roof. Alongside a rapidly growing startup ecosystem, they are fostering an integrated innovation environment. Government initiatives and digital health infrastructure are strengthening interoperability and access. Together, these elements are creating a vibrant ecosystem that supports scalable, cost-effective, and globally relevant healthcare solutions.

Looking ahead to 2030, what will be the defining characteristics of a truly intelligent healthcare ecosystem?

By 2030, a truly intelligent healthcare ecosystem will be connected, predictive, and patient centric, delivering real-time, holistic, and personalised care from the comfort of homes. Seamless interoperability will enable secure data flow across devices, providers, and platforms, overcoming today's data silos. GenAI, combined with clinical intelligence, will enable a shift from reactive to preventive care by predicting risks, enabling early interventions, and supporting targeted therapies, strengthened by breakthroughs in genomics and proteomics.

Smart implants, wearables, and remote monitoring systems will generate actionable insights, while digital twins and simulation models will guide precision treatment. Humans in the loop frameworks will remain critical to ensure trust, safety, and ethical decision making.

Additionally, strong collaboration across clinicians, academia, industry, and regulators will drive innovation and faster adoption. Ultimately, the ecosystem will be outcome driven, leveraging integrated technologies to improve care quality, reduce costs, and enhance patient engagement at scale.

If you had to place one bet on a technology that will fundamentally change healthcare outcomes over the next five years, what would it be and why?

AI-driven drug discovery and development platforms could fundamentally transform healthcare outcomes over the next five years. By combining AI/GenAI with biological data, genomics, and proteomics, these platforms can rapidly identify drug targets, design molecules, and predict efficacy, significantly reducing the time and cost of bringing new therapies to market.

This will be particularly impactful for complex and challenging diseases such as specific cancer solutions, Alzheimer's disease, Parkinson's disease, rare genetic disorders, and autoimmune conditions, where traditional approaches have been struggling. AI-driven approaches can uncover hidden biological patterns and enable more targeted, personalised therapies.

While clinical validation remains a bottleneck, the acceleration in early-stage discovery and precision targeting makes this a high impact, near term transformation area with the potential to address unmet medical needs at scale.

Healthcare leaders today are dealing with rising costs, workforce shortages, regulatory complexity, and growing patient expectations. What would be your advice to CEOs trying to future-proof their organisations in this environment?

Healthcare leaders across MedTech and BioPharma must adopt an ecosystem-driven mindset to navigate rising costs, workforce shortages, regulatory complexity, and evolving patient expectations. The focus should shift from standalone innovations to integrated, data driven platforms that connect devices, therapies, and patient data, enabling real-time, holistic, personalised care.

Leaders need to invest in AI and automation to accelerate drug discovery, enhance clinical decision-making, augment workforce productivity, and drive manufacturing optimisation through improved efficiency, quality, and supply chain resilience. Embedding quality, safety, and regulatory compliance by design across both device and drug lifecycles is essential to manage growing complexity.

Co-innovation across clinicians, academia, industry, and government will be essential to ensure healthcare innovations remain relevant, scalable, and impactful. Finally, aligning strategies toward value-based, outcome-driven care models will be key. Organisations that integrate therapeutic innovation, technology, and manufacturing excellence will be best positioned for sustainable, patient-centric growth.

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THE MISSING LINKS IN ANIMAL HEALTH

As India strengthens its healthcare ecosystem, animal healthcare infrastructure is emerging as one of its most important and most overlooked, foundations

By Lakshmipriya Nair


ANIMAL HOSPITAL
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Not too long ago, a virus that most likely jumped from animals to humans brought the whole world to its knees. The COVID-19 pandemic shut down factories, grounded flights, emptied cities and cost economies trillions of dollars. It delivered a powerful lesson that animal health and human health cannot be seen in isolation. They are two sides of the same coin.

Yet, animal health remains one of the least discussed, and most underestimated determinants of India's economy despite its huge implications for some of the country's biggest growth industries, i.e. dairy, poultry, livestock. A single disease outbreak can erase years of progress, cripple production, disrupt exports, slash yields and wipe out incomes within weeks. The economic damage extends far beyond the farm, affecting processors, pharma companies, vaccine manufacturers, exporters, retailers and ultimately, consumers. Meanwhile, the country's rapidly growing companion animal sector is also increasing demand for better veterinary services, diagnostics and preventive healthcare.

For India, therefore, investing in animal health is no longer a welfare decision. It is an economic strategy that protects productivity, safeguards supply chains, preserves export competitiveness and strengthens national food security.

But intent alone won't cut it, we need an ecosystem that is robust. And, veterinary hospitals, diagnostic laboratories, disease surveillance networks, vaccine manufacturing facilities, cold chains, digital monitoring systems and a skilled veterinary workforce are the foundation of that ecosystem.

So, how prepared is India's animal health infrastructure?

Taking the pulse

According to a 2024 report by Action for Animal Health, India has over 13,000 veterinary hospitals, nearly 23,000 veterinary dispensaries and more than 33,000 veterinary aid centres. The ecosystem is supported by a network of central, regional and state disease diagnostic laboratories, animal quarantine stations and the Chaudhary Charan Singh National Institute of Animal Health, the nodal institute for veterinary vaccine licensing. To improve last-mile access, the government is also supporting the rollout of Mobile Veterinary Units, with the ambitious goal of one unit for every one lakh livestock.

India's animal health market is growing at a CAGR of 7.11 per cent, indicating steady progress in scale and investment. Policy support through initiatives such as the Animal Husbandry Infrastructure Development Fund and the National Livestock Mission is strengthening capacity and encouraging investment across the value chain

Divya Kumar Gulati
Chairman, CLFMA of India

The more fundamental crisis is an 'infrastructure gap.' Even when qualified doctors are present, they are often hamstrung by a lack of basic clinical infrastructure and equipment

Dr Vivek Desai
Founder & MD,
HOSMAC

The shift we need is from waiting for disease to appear, to building systems that help us prevent disease and detect risk earlier

Stephanie Armstrong
Regional President,
Asia Pacific and Africa,
Zoetis

A prevailing misconception is that nutraceuticals are supplementary. In reality, they are integral to animal health and long-term productivity

Dr Arun Atrey
MD,
Zenex Animal Health

On paper, this is one of the world's largest publicly funded animal healthcare networks. Yet access to quality veterinary care remains uneven. The challenge is clear when viewed against the scale it is expected to serve. India is home to 536 million livestock and around 850 million poultry, while more than 20.5 million people depend on livestock for their livelihoods. So, an ecosystem of this size cannot afford weak links. Every delayed diagnosis, missed vaccination or disease outbreak carries significant economic consequences.

Even so, there are signs of steady progress. "India's animal health market is growing at a CAGR of 7.11 per cent, indicating steady progress in scale and investment. Policy support through initiatives such as the Animal Husbandry Infrastructure Development Fund and the National Livestock Mission is strengthening capacity and encouraging investment across the value chain," says Divya Kumar Gulati, Chairman, CLFMA of India. He adds that India has made notable progress in expanding disease surveillance, strengthening vaccine manufacturing and embracing digital technologies.

At the same time, the private sector has been steadily expanding its footprint through veterinary clinics, diagnostic laboratories, NGOs and technology-enabled herd health management services. The trend is visible across both livestock and companion animal healthcare.

To cite a few examples:

DCC Animal Hospital, backed by South Korea's A'alda, entered the Indian market in 2019, followed by the launch of its flagship multi-speciality hospital in Gurugram in 2021. Today, it has six centres spread across Delhi, Haryana and Rajasthan.

In December 2024, Mars Veterinary Health acquired a

minority stake in Crown Vet, marking one of the first major investments by a global veterinary healthcare company in India's veterinary services market.

Tata Trusts Small Animal Hospital in Mumbai opened in 2024 for advanced companion animal care with speciality services, modern diagnostics and clinical infrastructure.

Vetic, a pet healthcare organisation with a network of 40 pet hospitals and clinics across 11 cities, announced its expansion plans in Jan 2025, with seven 24/7 multi-speciality hospitals equipped with advanced diagnostics, intensive care units and surgical facilities

The elephant in the barn

Yet, these advances coexist with deep gaps. Large parts of the country lack adequate veterinary infrastructure, and face challenges of limited diagnostic capacity, workforce shortages and uneven access to quality care. As India's livestock economy expands and its companion animal market matures, these gaps become more than healthcare challenges.

The shortage of veterinarians is one of the most visible challenges. India has roughly one veterinarian for every 5,000 animals, against a recommended ratio of one per 500.

But according to Dr Vivek Desai, Founder & MD, HOSMAC, the shortage of vets isn't even the real story. "The more fundamental crisis is an 'infrastructure gap.' Even when qualified doctors are present, they are often hamstrung by a lack of basic clinical infrastructure and equipment," he says.

Take Uttar Pradesh for instance. Dr Desai points out that more than 40 per cent of government facilities in the state operate without a qualified veterinarian on-site. But even those that are staffed struggle to provide comprehensive care. Only 15 per cent of the state's veterinary hospitals have working surgical facilities, and less than 10 per cent have functioning diagnostic labs.

As he puts it, "for the vast majority of cases, care is purely symptomatic." A dairy farmer whose cow falls sick isn't just dealing with a vet shortage. He is dealing with a system where there may be no way to actually diagnose what's wrong without an X-ray machine, an ultrasound, or even basic blood work available locally. The consequence is delayed diagnosis, delayed treatment and, often, preventable losses. As Dr Desai explains, "The challenge, therefore, is not just about producing more doctors, but about a substantial ecosystem where they can actually provide lifesaving care."

For India, therefore, investing in animal health is no longer a welfare decision. It is an economic strategy that protects productivity, safeguards supply chains, preserves export competitiveness and strengthens national food security

The cost of failing to do so is significant. The report by Action for Animal Health notes that animal diseases and zoonoses account for 35 per cent of all trade concerns raised before the World Trade Organization's (WTO) Sanitary and Phytosanitary Committee. Closer home, news reports estimate that pests and diseases account for nearly 35 per cent of economic losses in India's livestock sector.

This goes to the heart of India's animal health challenge. It is about the ecosystem that supports them. Without diagnostics, clinical infrastructure and modern equipment, even the best-trained professionals can do only so much. While metropolitan cities are witnessing investments in advanced veterinary hospitals, rapidly growing Tier II cities continue to lack 24/7 emergency care and advanced diagnostics.

Bridging this infrastructure gap is critical for India to build a resilient healthcare system.

Designed for healing

It's tempting to think the fix is simple, build more hospitals, clicnics and diagnostic centres, on the same blueprint as human ones. But, Dr Desai says that's a mistake. "Designing a hospital for animals is fundamentally different from human hospital architecture because it must account for species specific stress, physical handling needs, and extreme biohazard risks," he explains.

A modern veterinary hospital requires separate waiting areas and wards for cats and dogs, sometimes even pheromone calming systems to minimise stress. It must also cater to vastly different species. "A veterinary facility in a region like Lucknow must accommodate everything from 3 kg cats to 500 kg cattle," highlights Dr Desai. That means planning for shaded crush yards for livestock, equine surgical theatres with recovery stalls and carefully designed movement from triage to diagnostics to surgery. Design and build not just for convenience, but also to minimise the spread of diseases such as rabies and brucellosis between animals and the humans treating them.

HOSMAC is currently designing two advanced animal hospitals for Shrimad Rajchandra Mission in Dharampur and Mumbai. Conceptualised from the animal's perspective, the facilities incorporate specialised spatial design, species-appropriate materials, lighting and recovery-focused layouts, informs Dr Desai.

But, the challenge extends well beyond hospital design.

According to the Action for Animal Health report, many of the experts it surveyed highlighted poorly equipped public laboratories, limited biosafety practices, particularly at the district level, and an "inadequate dynamic system to get an accurate picture of the disease situation at any time."

More than bricks and mortar

In other words, the gap is not just infrastructure, but capability. Buildings alone cannot deliver better animal healthcare. It increasingly needs connected systems like modern diagnostics, robust laboratory networks, strong biosafety systems and real-time disease surveillance that can predict, detect and respond to disease outbreaks. Without them, even the best-designed facilities will struggle to deliver timely and effective care.

Stephanie Armstrong, Regional President, Asia Pacific and Africa, Zoetis, believes the focus needs to shift from

reacting to disease to building systems that prevent it. "The shift we need is from waiting for disease to appear, to building systems that help us prevent disease and detect risk earlier," she says.

That requires much more than veterinary hospitals alone. As Armstrong explains, "Science only delivers when the systems around it are strong. That means robust biosecurity, surveillance, rapid diagnostics, transparent reporting and collaboration across government, industry and the veterinary community."

India has already begun building many of these systems. The Action for Animal Health report traces the evolution of the country's disease-reporting architecture, from the National Animal Disease Reporting System launched in 2013, to the Information Network for Animal Productivity and Health (INAPH), to the Bharat Pashudhan application under the National Digital Livestock Mission (NDLM), which is meant to eventually replace INAPH altogether.

The ambition is real but the execution remains a work in progress. According to Armstrong, "The real opportunity is to make those systems more connected. If something is detected at farm level, that information should move quickly through veterinary, public health and government systems so that risk can be assessed and action taken earlier."

There is growing recognition of this reality and it is reflected in the investments flowing into the sector. Funding under the G20 Pandemic Fund to strengthen animal health security, the World Bank's Animal Health System Support for One Health Program and the Asian Development Bank's investment in Zenex Animal Health. Collectively, these investments signal that animal health is increasingly being viewed as critical infrastructure.

Policy in India is also evolving to support this transition. To strengthen the veterinary ecosystem, the government has proposed a credit-linked capital subsidy scheme for the establishment of private-sector veterinary and para-veterinary colleges, animal hospitals, diagnostic laboratories and breeding facilities. The initiative aims to increase the number of veterinary professionals to over 20,000, while also facilitating collaborations between Indian and foreign institutions.

PAWS AND EFFECT

- India has one of the world's largest public animal healthcare networks, but access to quality veterinary care remains uneven.
- More than 536 million livestock, 850 million poultry and 20.5 million livelihoods depend on a resilient animal health ecosystem.
- The biggest challenge isn't just a shortage of veterinarians, it's an infrastructure gap, with limited diagnostics, surgical facilities and modern equipment.
- Private investment is accelerating, with players such as DCC Animal Hospital, Mars Veterinary Health, Tata Trusts and Vetic expanding advanced veterinary care.
- Global agencies and policy focus are strengthening India's disease surveillance and laboratory networks, recognising animal health as critical to pandemic preparedness.
- India's next leap will depend on stronger infrastructure, specialist talent, modern regulation and connected digital health systems

Prevention is the best medicine

India has made significant progress in strengthening its animal health ecosystem. The next challenge is making it future-ready.

For Dr Desai, that requires action on three fronts, i.e. building specialist talent, creating a more enabling regulatory framework for veterinary medicines and diagnostics, and accelerating digital integration. As he puts it, "The current 'generalist' model is failing."

Likewise, nutrition is emerging as an equally important pillar.

According to Dr Arun Atrey, MD of Zenex Animal Health, "A prevailing misconception is that nutraceuticals are supplementary. In reality, they are integral to animal health and long-term productivity." For livestock, nutraceuticals "offer a powerful lever to enhance productivity, improve animal health, and enable more predictable earnings" for farmers. In the companion animal segment, they are shifting "from optional choice to essential components of overall pet wellness."

However, wider adoption will require greater awareness and a stronger regulatory framework.

Together, these priorities, skills, regulation, digital integration and preventive nutrition, will shape the next phase of India's animal health ecosystem.

One health, one future

Animal healthcare is no longer simply about treating sick animals. It is about protecting public health, strengthening food systems, securing livelihoods and building resilience against future disease threats.

Armstrong captures this broader shift wel, "As livestock systems become more complex, the most effective approach will be a connected One Health system: good farm practices, strong veterinary capacity, science-led surveillance and prevention, and close collaboration across industry, government and public health authorities."

India has already shown what such an approach can achieve. Kerala's coordinated response to the Nipah virus outbreaks demonstrated how collaboration between animal health, public health and government agencies can contain disease before it escalates. It is a reminder that One Health is not simply a policy aspiration but a practical framework for managing future risks.

The question, then, is no longer whether India should invest in animal healthcare infrastructure. It is whether it can afford not to. As emerging infectious diseases, antimicrobial resistance and climate-related health risks continue to grow, investments in veterinary care, diagnostics, surveillance and preventive healthcare become investments in public health itself. The healthcare systems that succeed in the future will not be those that respond fastest to outbreaks, but those that prevent them.

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INTERVIEW

Our long-term vision is to ensure that innovation does not remain limited to a small section of the population

As Trivitron Healthcare nears its 30 year milestone in 2027, **Chandra Ganjoo,** Group CEO, Trivitron Healthcare reviews the company's evolution, the company's bet on non-metros to make a meaningful impact in the initial phase, building a diversified portfolio across segments and geographies. In a candid conversation with **Viveka Roychowdhury**, she talks about the policy support needed to expand the Make In India efforts and why the company's next phase of growth will be not just about revenue expansion, but equally about expanding access and increasing impact. Edited excerpts...

You have been a day-one employee of Trivitron Healthcare and have seen its transition from trading to manufacturing, setting up hospitals, etc. What is next in the journey? What have been the recent milestones leading up to the future vision for the company?

Having been with Trivitron for over 25 years, I have witnessed a remarkable journey of reinvention. We began as a distribution company in 1997, partnering with leading multinational healthcare brands and building a strong presence across India. While distribution helped us scale, we recognised that long-term sustainability and value creation required us to move up the value chain.

That realisation led us to manufacturing—a transition that was both challenging and transformative. We started with OEM partnerships, moved into assembly, and gradually built deeper manufacturing capabilities. Throughout this evolution, our commitment remained unchanged: to stay focused on healthcare and create solutions that address real healthcare needs.

One of the defining aspects of our journey has been our early and deliberate focus on Tier 2 and Tier 3 markets. At a time when most global players concentrated on metros, we identified an opportunity to improve healthcare access in underserved regions. This strategy, envisioned by Dr GSK Velu from the outset, enabled us to build a strong foundation and create meaningful impact where it was needed most.

> International markets have emerged as one of Trivitron's strongest growth drivers. In the financial year just concluded, we crossed approximately $100 million in revenue, with nearly 60 per cent of our profits coming from our international businesses

Over the years, we expanded from manufacturing consumables such as biochemistry and haematology reagents into medical devices, diagnostics, imaging, and critical care technologies. Today, Trivitron is among the few Indian med-tech companies with a truly diversified portfolio spanning radiology, diagnostics, in-vitro and in-vivo solutions, consumables, and advanced medical equipment. This diversification has been a key driver of our resilience and growth across different market cycles.

More recently, our focus has been on strengthening our global footprint and developing market-specific solutions. Recognising that healthcare needs vary across geographies, we have expanded manufacturing capabilities in regions such as Europe and the US, while exploring opportunities in other strategic markets. This allows us to serve local healthcare ecosystems more effectively while maintaining global quality standards.

Looking ahead, the next phase of Trivitron's journey is not just about scaling revenues or expanding our product portfolio. It is about deepening our impact—through innovation, localisation, and greater access to quality healthcare. Our vision is to strengthen India's position as a global med-tech manufacturing hub while continuing to deliver affordable, relevant, and accessible healthcare solutions across the world.

What are Trivitron's revenues today? What are the growth drivers?

International markets have emerged as one of Trivitron's strongest growth drivers. In the financial year just concluded, we crossed approximately $100 million in revenue, with nearly 60 per cent of our profits coming from our international businesses. This reflects not only the scale of our global operations but also the strength of our specialised product portfolio across key markets.

What differentiates our international business is that it is built around highly specialised and market-specific solutions. For example, through our wholly owned subsidiary, Labsystems Diagnostics, we have established a strong global presence in newborn screening—a niche but

critical area of preventive healthcare. This business is particularly strong in Europe, where newborn screening programmes are mature and widely adopted. In India, the segment is still in its early stages, but we see significant long-term potential as awareness and policy support continue to grow.

The US is another important growth market for us. We have built strong capabilities in the manufacturing of radiation protection products used by surgeons, radiologists and healthcare professionals working in X-ray environments. Recognising the strategic importance of radiation-shielding core materials, we invested in manufacturing facilities in the US nearly six years ago. This has enabled us to strengthen our position in the global supply chain and serve customers more effectively, particularly at a time when the industry has been looking to diversify beyond traditional sourcing hubs.

We are also expanding into new geographies with high-growth potential. Russia, for instance, represents a significant opportunity for our newborn screening business. As the market currently has limited domestic manufacturing capabilities in this segment, we are actively pursuing regulatory approvals and registrations to establish a local presence.

Going forward, our growth strategy will continue to be driven by a combination of specialised healthcare technologies, deeper localisation, and market-specific innovation. Rather than adopting a one-size-fits-all approach, we are focused on developing solutions that address the unique healthcare needs of each geography, while leveraging our manufacturing and R&D strengths to create sustainable, long-term growth.

Can you explain more about your radiation protection apron products?

Radiation protection aprons may appear to be simple products, but the technology behind them is highly specialised. The key component is the radiation-shielding core material, which is manufactured using a proprietary blend of materials such as bismuth, antimony and other shielding compounds. The effectiveness of the apron depends on multiple factors, including the composition of the material, its density, thickness and the precision of the manufacturing process.

This is a niche segment that requires significant technical expertise and stringent quality standards. The products are designed to protect individuals who are routinely exposed to radiation, including surgeons, radiologists, cath lab personnel and other healthcare professionals working with X-ray-based imaging systems. Beyond healthcare, these solutions are also used by scientists, researchers and professionals working in radiation-intensive environments, including nuclear and research institutions.

Recognising the strategic importance of this technology, we invested in developing our own radiation-shielding core material manufacturing capabilities in America. This has enabled us to strengthen our position in the global value chain, reduce dependence on external suppliers and serve international customers more effectively.

While radiation protection remains an important specialised segment for us globally, our manufacturing footprint in India spans a much broader range of medical technologies. We have built strong capabilities across diagnostic imaging, including X-ray, C-arm, CT and ultrasound systems. Today, we manufacture X-ray, C-arm, CT, Mamography equipments and ultrasound equipment at our facilities in Navi Mumbai, Patalganga, Pune, Chennai and Vishakhpatnam with each plant focused on specific product categories and technologies.

This combination of specialised global businesses and a broad-based domestic manufacturing portfolio reflects Trivitron's overall strategy—building expertise in niche, high-value segments while simultaneously addressing large-scale healthcare needs through locally manufactured medical technologies.

Since import substitution and "Make in India" has been Trivitron's strategic focus, what has been the progress so far?

Import substitution and Make in India have been central to Trivitron's strategy for many years. We have made significant progress in expanding domestic manufacturing capabilities across a range of medical technologies, including X-ray systems, C-arms, CT scanners and ultrasound equipment. Today, a substantial part of the value addition and assembly takes place within India, helping reduce import dependence and strengthen the country's med-tech manufacturing base.

However, the journey towards true self-reliance is still ongoing. While finished products are increasingly being manufactured locally, many of the critical, high-value components and core technologies continue to be sourced from global suppliers. These components remain essential to the manufacturing process and currently have limited domestic alternatives.

To accelerate the next phase of Make in India, India needs a stronger ecosystem for medical device components, raw materials and precision engineering. This will require sustained investments in local manufacturing capabilities, technology development, supplier networks and innovation. As these supporting ecosystems mature, India will be better positioned to move beyond assembly and localisation towards end-to-end indigenous manufacturing.

The opportunity is significant. With the right policy support and industry collaboration, India can not only meet its domestic healthcare technology requirements but also emerge as a globally competitive hub for medical device manufacturing and exports.

So the heart of all these medical equipment is still being imported and then assembled?

To a significant extent, yes. While India has made steady progress in local manufacturing and assembly of medical devices, many of the critical, high-technology components that form the core of advanced medical equipment are still imported. These components are often the result of decades of specialised research, technology development and supply-chain investments in global markets.

That said, the industry has come a long way. When we started in 1997, nearly 80 per cent of the medical equipment used in India was imported. Today, that figure has come down to around 70 per cent. While a 10-percentage-point shift may seem modest, it is important to view it in the context of a healthcare market that has grown several times over during the same period. In absolute terms, the increase in domestic manufacturing and value addition has been substantial.

India today represents one of the world's most attractive healthcare technology markets, and naturally, global manufacturers continue to view it as a key growth opportunity. At the same time, there is growing momentum behind domestic manufacturing, supported by government initiatives and industry investments.

Going forward, the pace of import substitution will depend on how quickly India can build a robust ecosystem for components, raw materials and advanced technologies. With stronger policy support, greater investments in R&D and a more developed supplier base, Indian manufacturers will be well-positioned to increase localisation and move further up the value chain.

When you say that industry needs policy support from the government, what exactly do you mean?

One of the key areas where the industry requires policy support is the duty structure on components and raw materials used in medical device manufacturing. In many cases, if a company wants to manufacture a CT scanner or other advanced medical equipment in India, it must import several critical components and pay customs duties on them. However, the duty on importing a fully assembled finished product can sometimes be lower than the cumulative duty paid on those components.

This creates an inverted duty structure, where local manufacturers are placed at a cost disadvantage compared to importers of finished equipment. If India is serious about building a globally competitive medical technology manufacturing ecosystem, it is important that policy frameworks incentivise local value addition rather than inadvertently favour imports.

Beyond duties, the industry would benefit from continued support for R&D, component manufacturing, technology development and the creation of a robust domestic supplier ecosystem. Building a self-reliant med-tech sector requires strengthening the entire value chain, not just final assembly.

The positive development is that policymakers are increasingly aware of these challenges and there is growing recognition of the strategic importance of medical technology manufacturing. We are optimistic that, over time, policy measures will continue to evolve in a direction that supports greater localisation and innovation.

At the same time, the industry itself is evolving. Healthcare technology is advancing rapidly, with new players, innovations and business models emerging every year. While competition remains intense, there is also a growing appreciation for collaboration. Increasingly, companies are looking beyond traditional competitive boundaries and exploring partnerships that leverage complementary strengths. Such collaborations can accelerate innovation, strengthen domestic capabilities and ultimately deliver better outcomes for healthcare providers and patients alike.

Can you give one example of such a collaboration?

There are several examples of such collaboration models globally, particularly in diagnostics and medical technology. In many cases, multinational companies focus on developing and manufacturing instrumentation, while we specialise in reagents or consumables. When combined, these offerings create a complete end-to-end solution for the customer.

This approach is mutually beneficial. For reagent companies, it expands access to a larger installed base of equipment, enabling wider adoption of their test menus. For instrumentation companies, it enhances the value of their platforms by offering a broader range of applications and consumables, making their systems more attractive to hospitals and laboratories.

We see this model playing out across segments such as radiology, in-vitro diagnostics (IVD) and molecular diagnostics. For instance, we have a strong portfolio of molecular diagnostic kits, while other players bring deep expertise in instrumentation. By working together, both sides are able to deliver more comprehensive and clinically relevant solutions to healthcare providers.

We first adopted and refined this collaborative approach in international markets, and over time, we have successfully extended it to India as well. The response has been very positive, as it allows companies to focus on their core strengths while improving outcomes for end users through integrated solutions.

What are the new, recent or upcoming innovations that you are focusing on? Will it also impact the cost?

One of the key innovation areas we are currently focused on is next-generation radiation protection materials. Today, the industry largely relies on conventional material combinations and established manufacturing processes. Our R&D teams, in collaboration with government agencies, are working on advanced material science solutions that can significantly improve both performance and manufacturing efficiency.

These innovations are not limited to materials alone but also extend to process improvements. A key outcome we expect from this work is cost optimisation. At present, many of these specialised materials are imported. Developing and manufacturing them domestically will not only strengthen supply security but also help reduce costs and enable more efficient, high-performance radiation protection solutions.

Another important area of focus is newborn screening. Our research teams in Finland are actively working on advanced mass spectrometry-based technologies and developing new-generation screening kits. This remains a highly specialised and science-intensive field, with strong long-term growth potential as preventive healthcare gains greater importance globally.

In the imaging segment as well, we are expanding our portfolio. While we already have a strong presence in C-arm systems, we are now moving towards digital C-arm technology, with upcoming product launches that will further strengthen our position in advanced diagnostic imaging.

Overall, our innovation strategy is centred on combining material science, diagnostic advancements and imaging technologies to deliver solutions that are not only more advanced but also more accessible and cost-efficient for healthcare systems.

How are geopolitical disruptions impacting Trivitron?

So far, the impact on customers has been relatively contained, and we have not seen any major disruption in service delivery. However, geopolitical tensions are beginning to create challenges on the supply chain side, particularly in terms of logistics, availability of inputs and movement of goods across regions.

The impact is not uniform across geographies. The Middle East has seen the most significant disruptions in recent months, affecting supply routes and creating operational constraints in certain markets. The US has also experienced some level of disruption, though to a lesser extent. Europe, on the other hand, has remained comparatively stable. India has been relatively insulated, largely because a significant part of our manufacturing base is located domestically.

That said, the broader effect of geopolitical uncertainty is being felt through increased logistics costs, input price volatility and longer lead times. These factors eventually cascade through the value chain and influence overall pricing in the market.

We are closely monitoring these developments and working to ensure supply continuity for our customers. While the situation remains fluid, sustained geopolitical disruptions could have wider implications for global healthcare supply chains, making resilience and localisation even more important going forward.

You have spoken about the Make in India initiative and Trivitron's role in that. What is the vision for the next phase? What are the new areas you are going to enter?

The next phase of Trivitron's growth goes beyond revenue expansion. It is equally about widening access to healthcare and deepening the real-world impact of medical technologies. Our core objective is to ensure that advanced healthcare solutions reach a much larger population and translate into meaningful health outcomes.

However, access alone is not enough. The key question is whether these technologies are being deployed in a way that improves early detection, treatment and overall patient outcomes at scale. This is where public health systems and structured programmes play a critical role.

Government participation is therefore essential in driving large-scale adoption. While manufacturers like us can develop and supply the necessary technologies, widespread impact is achieved when these are integrated into national or state-level health programmes. Initiatives focused on screening, early diagnosis and preventive care have the ability to reach millions of people in a structured and sustained manner.

For example, in mammography, we supply systems across hospitals, diagnostic centres and healthcare providers. However, the true impact of such technology is amplified when breast cancer screening becomes part of an organised public health programme rather than an individual, discretionary choice. The same principle applies to other areas such as cancer screening and preventive diagnostics.

We see a strong need for deeper collaboration between governments and private healthcare providers to build large-scale screening and early detection ecosystems, similar to successful public health programmes such as polio eradication and tuberculosis control.

Newborn screening is another important example. In many developed countries, it is a mandatory and well-established programme covering a wide range of conditions. In India, it is still evolving and largely optional. That said, progress is underway, and we have supported pilot initiatives in states such as Kerala and Goa, where newborn screening has been introduced in government hospitals for selected parameters.

These early initiatives demonstrate the potential of scalable, population-level healthcare programmes. Our ambition is to support and expand such models across India, as well as in other emerging markets such as Africa and the Middle East, by working closely with governments, healthcare providers and ecosystem partners. Ultimately, our vision is to ensure that innovation is not confined to a limited segment of the population. Technology delivers its true value only when it is accessible, affordable and capable of improving health outcomes at scale.

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INTERVIEW

The future of diagnostics lies in precision, data, and responsible innovation

Surendran Chemmenkotil, Managing Director, Metropolis Healthcare shares his views with **Kalyani Sharma** on the opportunities and challenges shaping precision medicine and the future of diagnostics in India

India has seen growing interest in genomics and precision medicine in recent years. From an industry perspective, what policy and ecosystem changes are still needed to make advanced diagnostics more widely accessible and integrated into mainstream healthcare?
India is at an important stage where genomics is gradually moving into mainstream clinical care. At Metropolis, we are seeing this transition accelerate, particularly through next-generation sequencing (NGS)-based applications in oncology, reproductive health and rare diseases. To support this shift responsibly, we recently launched our Centre of Genomics with CAP-accredited genomics referral laboratories and advanced multi-platform NGS capabilities.

However, for advanced diagnostics to become widely accessible, stronger ecosystem support is needed. One of the immediate priorities is standardisation and quality governance across genomics and molecular testing laboratories. As these tests directly influence treatment decisions, there must be greater consistency in validation, reporting standards, accreditation and clinical interpretation.

Genomic testing must also become better integrated into routine clinical pathways rather than being viewed as a standalone or niche offering. This will require stronger collaboration between clinicians, laboratories, policymakers and insurers. Affordability and accessibility are equally important. Wider insurance coverage, public-private partnerships, and investments in skilled manpower, bioinformatics and India-specific genomic databases will be critical to scaling precision medicine responsibly in the country.

> India has the scientific talent, patient scale and genetic diversity to emerge as a major force in genomics and precision healthcare. However, building long-term global competitiveness will require India to move beyond being seen only as a cost-efficient market and instead strengthen its scientific and innovation ecosystem

As genomic and molecular testing become more relevant to clinical care, how do you see the diagnostics industry balancing innovation with concerns around affordability, infrastructure gaps, data privacy, and ethical governance?
The diagnostics industry will need to balance rapid innovation with long-term clinical trust. While genomic testing is advancing quickly, the focus cannot only be on expanding technology; it must also remain clinically meaningful, affordable and ethically governed.

Technologies such as NGS are significantly improving the speed and depth of genomic analysis, but adoption cannot be driven by technology alone. Strong scientific validation, accurate interpretation and robust quality systems are equally important, especially when these tests directly influence treatment decisions.

At Metropolis, our approach has been focused on building high-quality genomics capabilities supported by specialised expertise, advanced infrastructure and meaningful clinical reporting rather than pursuing scale alone. As testing volumes increase, affordability will improve over time, but maintaining quality and accuracy will remain critical.

Data privacy is another area the industry must address proactively. Since genomic data is deeply personal, stronger consent frameworks, secure digital systems and clear ethical safeguards will be essential to building long-term patient trust.

India is often seen as having the scale and scientific talent to emerge as a major player in genomics and precision healthcare. What structural challenges must the industry and policymakers address to build long-term global competitiveness in this space?
India has the scientific talent, patient scale and genetic diversity to emerge as a major force in genomics and precision healthcare. However, building long-term global competitiveness will require India to move beyond being seen only as a cost-efficient market and instead

strengthen its scientific and innovation ecosystem.

One of the biggest priorities is building robust India-specific genomic datasets. Given the country's enormous genetic diversity, relying primarily on Western reference databases can limit the accuracy and clinical relevance of genomic interpretation in Indian populations.

India will also need deeper investment in specialised talent, particularly molecular pathologists, bioinformaticians and genetic counsellors, as these capabilities will become increasingly important as genomics scales.

At the same time, stronger collaboration between healthcare providers, academia, research institutions and industry will be essential to accelerate translational research and innovation. The opportunity for India is not only to participate in global genomics, but to contribute meaningfully to the development of more affordable, scalable and population-relevant precision healthcare solutions.

Precision medicine is gaining visibility across oncology, reproductive health, and rare diseases. In practical terms, where are you currently seeing the strongest clinical adoption and impact in India?

The strongest clinical adoption of precision medicine in India today is clearly in oncology, where NGS-based tumour profiling is increasingly guiding targeted therapies, immunotherapy selection and resistance monitoring, particularly in cancers such as lung cancer. Molecular testing is helping clinicians identify actionable mutations and make more informed and targeted treatment decisions.

At Metropolis, we are seeing growing clinician adoption of genomic panels across oncology, reproductive genomics and rare disease diagnostics as turnaround times improve and genomic reporting becomes more closely integrated into clinical practice. Through our Centre of Genomics and advanced NGS capabilities, our focus has been on combining genomics with pathology, molecular diagnostics and specialist interpretation to support more comprehensive patient care.

In reproductive health, prenatal screening, carrier screening and fertility-related genetic testing are enabling families to make earlier and more informed decisions during the care journey. Rare diseases are another area where genomic testing is creating significant impact by enabling faster and more accurate diagnosis, particularly in cases where patients previously remained undiagnosed for years.

As awareness and clinician confidence continue to grow, genomics is steadily becoming a more important part of mainstream clinical care in India.

As healthcare shifts towards predictive and preventive care, how are clinicians and patients responding to increased use of genomic and molecular testing in routine healthcare decision-making?

There is growing acceptance among both clinicians and patients towards the use of genomic and molecular testing, particularly in areas such as oncology, reproductive health and inherited disorders. Clinicians increasingly recognise that genomic testing can support more personalised treatment decisions, targeted therapies and earlier risk assessment. Patients, too, are becoming more proactive about preventive and predictive healthcare.

At Metropolis, we have seen clinician adoption increase significantly over the last few years, with our genomics business growing nearly three times faster than the broader diagnostics portfolio, both quarter-on-quarter and year-on-year. This reflects increasing confidence in the clinical value of genomic testing, particularly when supported by strong interpretation, molecular pathology expertise and genetic counselling.

This support ecosystem is important because genomic testing can often feel complex for both patients and treating teams without specialised guidance. The focus, therefore, must remain on ensuring that these technologies are adopted responsibly and backed by strong scientific rigor, evidence-led applications and meaningful clinical reporting.

When patients understand how genomic insights can support earlier intervention, reduce diagnostic uncertainty or improve treatment decisions, trust and acceptance in these technologies improve significantly.

AI, bioinformatics, and data-driven diagnostics are increasingly shaping laboratory medicine globally. How do you see these technologies influencing the future of diagnostics and treatment outcomes in India over the next few years?

AI, bioinformatics and data-driven diagnostics will significantly transform laboratory medicine in India over the next few years. As diagnostic data becomes more complex, these technologies will help improve interpretation, workflow efficiency, accuracy and turnaround time. As NGS generates increasingly large and complex datasets, bioinformatics and AI will become central to genomic interpretation, variant classification and clinical decision support.

In genomics especially, bioinformatics plays a critical role in analysing large sequencing datasets and identifying clinically relevant insights. AI can further support clinicians by enabling faster pattern recognition, improving quality checks and supporting more personalised treatment decisions.

At Metropolis, we are strengthening advanced analytics and bioinformatics capabilities to improve interpretation accuracy, reporting efficiency and clinically relevant insights from genomic data. We believe these technologies will play an important role in making genomics more scalable, clinically actionable and accessible in routine healthcare settings.

Over time, AI-driven and data-enabled diagnostics will help healthcare move from being largely reactive to becoming more predictive and preventive, ultimately improving treatment outcomes and enabling more personalised healthcare delivery.

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INTERVIEW

Why today's CEOs must balance innovation, compassion and access

Dr Manisha Karmarkar, CEO, Apollo Hospitals, Pune in an interview with **Kalyani Sharma** shares how hospital leadership is evolving, the challenges of delivering equitable healthcare, the responsible use of technology, and what India must do to strengthen its position as a trusted global healthcare destination

How has the role of hospital leadership evolved over the years, particularly large healthcare institutions?
Over the years, I have seen hospital leadership evolve significantly. Earlier, leadership in healthcare was largely focused on administration, infrastructure, and ensuring smooth day-to-day operations. Today, the role has become far more dynamic and multidimensional. Healthcare leaders are now expected to balance clinical excellence, patient experience, technology adoption, financial sustainability, talent management, and crisis preparedness simultaneously.

The pandemic especially changed the way healthcare institution's function. It reinforced the importance of agility, collaboration, and compassionate leadership. Patients today are also more aware and informed, which means hospitals must focus not only on treatment outcomes but also on transparency, trust, and continuity of care.

In large healthcare institutions, leadership is no longer about working in silos. It involves bringing together clinicians, nursing teams, operations, technology experts, and support staff under one common vision of patient-centric care. In my experience, leaders with clinical understanding are often able to appreciate both the emotional and operational realities of healthcare delivery, which is becoming increasingly important in today's healthcare environment.

> I also strongly believe that institutional culture starts from leadership behaviour. When leaders prioritise ethics, patient safety, accountability, and teamwork, it naturally reflects across the organisation. At large hospitals, systems and protocols are important, but culture is what ultimately sustains quality care

As hospitals grow larger and more system-driven, managing alignment across clinical, administrative, and operational teams becomes critical. What leadership qualities do you believe are most important in ensuring consistency in care and institutional culture?
I believe the most important quality in healthcare leadership today is the ability to build trust and alignment across teams. Hospitals function through the collective efforts of clinicians, nurses, administrative teams, technicians, and operational staff. Unless everyone works with a shared purpose, consistency in care becomes difficult to achieve.

In my experience, communication and empathy are extremely important leadership qualities in healthcare. Clinical teams and operational teams often work under immense pressure, so leaders must remain accessible, transparent, and solution oriented. Listening to people and understanding ground realities is equally important as making strategic decisions.

I also strongly believe that institutional culture starts from leadership behaviour. When leaders prioritise ethics, patient safety, accountability, and teamwork, it naturally reflects across the organisation. At large hospitals, systems and protocols are important, but culture is what ultimately sustains quality care.

Another critical aspect is adaptability. Healthcare is evolving rapidly with technology, changing patient expectations, and growing complexities in treatment. Leaders must be open to continuous learning while ensuring that patient welfare remains at the centre of every decision.

Pune's healthcare infrastructure has expanded rapidly over the past decade, particularly through the growth of large private hospital networks. In your view, has this growth translated into better access and outcomes across patient segments, or is quality healthcare still concentrated within a limited urban demographic?
Pune's healthcare landscape has transformed remarkably over the last decade. The city has witnessed substantial growth in advanced medical infrastructure, specialty care, diagnostics, critical care services, and minimally

invasive treatment options. This has certainly improved access to high-quality healthcare for many patients not only from Pune but also from nearby districts and regions across Maharashtra.

In my view, this growth has positively impacted clinical outcomes because patients now have access to timely diagnosis, specialised expertise, and advanced treatment modalities closer to home. Earlier, many patients had to travel to larger metros for complex procedures, which is gradually changing.

However, at the same time, we must acknowledge that quality healthcare access is still uneven in many areas. Affordability, awareness, insurance penetration, and geographical accessibility continue to remain challenges, especially for patients from semi-urban and rural backgrounds.

I believe the next phase of healthcare growth in India should focus not only on expanding infrastructure but also on improving accessibility and preventive healthcare. Technology, telemedicine, outreach programs, and integrated healthcare networks can play a significant role in bridging these gaps more effectively.

The healthcare sector has adapted technology at an accelerated pace. In practical terms, how much of this transformation is genuinely improving patient outcomes, and how much is being driven by competitive positioning among hospitals?

Technology has undoubtedly transformed healthcare in meaningful ways over the last few years. In practical terms, many advancements are genuinely improving patient outcomes through early diagnosis, precision-based treatment, minimally invasive procedures, better monitoring systems, and faster clinical decision-making.

For example, advancements in critical care monitoring, AI-assisted diagnostics, robotic-assisted surgeries, and digital health records have improved efficiency as well as patient safety in many areas. Technology has also helped enhance coordination between departments and improve continuity of care.

At the same time, healthcare has become highly competitive, especially in urban markets, and there is naturally a strong push among hospitals to showcase advanced capabilities. However, I strongly believe technology should never become a mere branding exercise. Its true value lies in whether it improves clinical outcomes, patient experience, accessibility, and long-term quality of care.

In my experience, the most successful healthcare institutions are those that adopt technology responsibly and integrate it meaningfully into patient care pathways rather than using it only as a differentiator. Ultimately, healthcare innovation must remain patient-centric and evidence-driven.

How can healthcare providers balance innovation with equitable care delivery in India?

Balancing innovation with equitable healthcare delivery is one of the most important responsibilities for healthcare providers in India today. While advanced technologies and modern treatment approaches are essential for improving outcomes, it is equally important that these benefits reach a wider patient population and do not remain limited to a few urban centres.

I believe innovation in healthcare should not only be defined by high-end technology. Innovation can also mean improving accessibility, strengthening preventive healthcare, simplifying patient journeys, and creating more efficient systems of care delivery.

Digital health platforms, telemedicine, remote consultations, and AI-based screening tools have the potential to bridge healthcare gaps, especially in semi-urban and underserved regions. At the same time, affordability remains a key concern. Healthcare providers must continuously work towards making quality treatment more accessible through insurance integration, outreach programs, and standardised clinical pathways.

In my view, equitable healthcare can only be achieved when innovation is guided by patient needs rather than market trends alone. The focus should always remain on delivering safe, ethical, and quality care to every patient irrespective of geography or economic background.

India's medical tourism industry is often positioned around affordability and clinical expertise. However, concerns around post-treatment continuity, regulatory consistency, and patient trust still persist. What gaps does the sector need to address to sustain long-term global credibility?

India has built a strong reputation globally for clinical expertise, advanced treatment capabilities, and cost-effective healthcare. Patients from many countries increasingly choose India for complex procedures across cardiology, oncology, organ transplantation, orthopaedics, and several other specialties.

However, sustaining long-term credibility in medical tourism requires going beyond affordability alone. In my opinion, continuity of care is one of the most important areas that needs stronger attention. International patients require structured follow-up systems, digital consultation support, rehabilitation guidance, and long-term care coordination even after returning to their home countries.

Another important aspect is standardization and transparency. Global patients today expect internationally benchmarked protocols, clear communication, ethical practices, infection control standards, and predictable patient experiences throughout their treatment journey.

Trust plays a very significant role in healthcare decisions, particularly for international patients travelling away from their families and support systems. Therefore, hospitals must focus equally on clinical excellence, patient communication, cultural sensitivity, and coordinated care management.

India has tremendous potential in medical tourism, but long-term global credibility will depend on consistently delivering safe, transparent, and patient-centric healthcare experiences.

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OLD MACHINES, NEW HOPE

Can refurbished radiology bridge India's imaging gap?

Refurbished MRI and CT scanners are helping smaller hospitals offer big-city diagnostics at a fraction of the cost

By Kalyani Sharma

India's healthcare story has always been one of contrasts. Metro hospitals run 3T MRIs and multi-slice CT scanners that match the best in the world. Step outside these cities, and the picture changes sharply. “A new 3.0T MRI system costs Rs 15-25 crore; a 128-slice CT scanner, Rs 8-15 crore. For most regional healthcare providers, these price points are simply unrealistic”, says Brijesh Suneja, Director, Phantom Healthcare.

This gap is not just a number on a balance sheet. It decides whether a patient in a small town gets diagnosed on time or has to travel hundreds of kilometres for a scan. As the industry looks for answers, refurbished radiology equipment has emerged as one of the most debated solutions. Can pre-owned, restored imaging systems genuinely close India's diagnostic divide, without compromising on safety or trust?

The scale of the gap

The numbers tell a stark story. "India has roughly 2 to 3.5 MRI machines per million people, depending on the data source. But even that number is misleading, because majority of these machines are concentrated in metros and Tier I cities. In a typical Tier II or Tier III district, you are fortunate to find even one functional MRI unit”, explains Dr Arunkumar Govindarajan, Executive Director and Radiologist, Aarthi Scans and Labs.

Dr Pranav Mahadeokar, Consultant Radiologist and HOD, Ruby Hall Clinic, calls this a structural delay with real clinical consequences, "Rural and semi-urban populations frequently face structural delays, often traveling hundreds of kilometers just to access basic cross-sectional imaging. This geographic barrier directly impacts clinical outcomes in time-critical domains like stroke, trauma triage, and oncology staging."

Dr Kamlesh Kumar, Associate Consultant-MD, Radiodiagnosis, Regency Hospital, Gorakhpur, sees this delay play out at the patient level every day. "In certain medical conditions like stroke, trauma, cancer, cardiac related emergencies and complex infections, delay in imaging can delay medical diagnosis, treatment related decisions and referrals, directly impacting patient related outcomes”. For him, refurbished equipment is a way to bring "quicker clinical decisions, reduce burden of travel, lower out of pocket expenses and better continuity of medical treatment" to smaller cities.

According to Dr Prem Kumar Ganesan, Senior Director and HOD, Radiology and Imaging, BLK Max Hospital, refurbished units act "as a bridge, allowing smaller healthcare centers to acquire Tier I-grade diagnostic capabilities such as 1.5T MRIs or 16-to-64-slice CT scanners at a fraction of the cost."

The economic case

The cost advantage is the single biggest reason refurbished imaging is gaining ground. Abhishek Mudafale, Investment Principal, Somerset Indus Capital Partners, breaks it down clearly: "Refurbished equipment can significantly bridge this gap by reducing upfront equipment costs by 30 per cent to 70 per cent, making advanced diagnostics commercially viable for smaller healthcare providers. In many cases, facilities upgrading through refurbished systems also report operational cost efficiencies of up to 50 per cent to 80 per cent."

Suneja mentions that the economic case for refurbished versus new equipment is quite compelling. “A new equipment

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Director,
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Executive Director and Radiologist,
Aarthi Scans and Labs

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Ruby Hall Clinic

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Dr Prem Kumar Ganesan
Senior Director and HOD, Radiology and Imaging,
BLK Max Hospital

investment typically involves a capital cost of Rs 8–25 crores, depending on the system type, along with Rs 1–3 crores for installation and infrastructure."

"Annual maintenance and support amount to 8–12 per cent of the capital cost, the lead time to operation is 12–18 months, the working lifespan is around 8–10 years before technological obsolescence, and the total cost of ownership over 10 years ranges between Rs 12–35 crores."

He explains, "In comparison, refurbished equipment requires a capital investment of Rs 3.5–12 crores, representing a 40–60 per cent discount. Installation and infrastructure costs are generally lower at Rs 0.5–1.5 crores, while annual maintenance and support account for 6–10 per cent of the capital cost, provided OEM-grade parts and service are expansion rather than multi-year fundraising delays."

Dr Mahadeokar adds that "By significantly lowering the entry barriers for standalone diagnostic centers and district-level multi-specialty hospitals, high-end modalities become financially viable in markets characterised by lower per-capita healthcare spending."

Dr Indiresh Desai, Lead Consultant-Radiology, SPARSH Hospital, RR Nagar, Bangalore, agrees the model works best when hospitals treat it as more than a bargain buy: "The correct approach in the same is to evaluate refurbished equipment as a very long term clinical investment, not merely as a very low cost alternative."

Dr Govindarajan describes an interesting pattern many hospitals now follow. "A new hospital or diagnostic centre installs a refurbished MRI to ing before clinical use is equally important. Involving qualified professionals, including medical physicists where required, helps validate image quality, equipment performance and radiation safety compliance", says Mudafale.

Suneja highlights that refurbished equipment can deliver clinical performance equivalent to new systems, provided the refurbishment process is rigorous and transparent.

He explains, "A responsible refurbishment pathway includes source verification, with equipment sourced from reputable OEM facilities, verified lease-return programs, or certified trade-in channels—never from unknown secondary markets or salvage operations. It also includes a comprehensive technical audit comprising full system diagnostics (hardware,

"Quality assurance and documentation include comprehensive test reports with before/after performance metrics, full traceability of all components replaced, certification against international standards (IEC 60601, FDA equivalency where applicable), and documented maintenance history. Clinical validation involves pilot imaging studies on known phantoms to verify diagnostic accuracy, comparison against reference systems to ensure image quality, and documentation of clinical performance metrics. When these steps are executed with discipline, refurbished systems can match new equipment performance—often with superior reliability because every component has been individually tested and validated, whereas new systems rely on statistical quality control."

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available. The lead time to operation is significantly shorter at 6–10 weeks, the working lifespan is typically 5–7 years with proper lifecycle management, and the total cost of ownership over seven years ranges between Rs 5–15 crores."

Talking about the economic advantage, Suneja mentions, "Refurbished systems reduce upfront capital burden by 50–60 per cent, accelerate revenue generation through faster deployment, and lower annual operational costs. For a diagnostic centre with limited capital, refurbished equipment allows immediate service become operational without overleveraging its balance sheet. Once the business stabilises, usually within three to four years, they upgrade to a new OEM system that offers stronger service coverage and long-term parts availability. This is actually a rational capital allocation strategy, not a compromise."

Keeping quality and safety front and centre

Cost savings mean little if patients cannot trust the results. Every expert agrees that quality assurance is non-negotiable. "Independent acceptance test-

electronics, calibration), component-level testing and performance validation, imaging quality assessment against OEM baseline specifications, and verification that no structural damage, recalls, or safety issues exist. This is followed by a certified refurbishment process involving replacement of worn components (bearings, cooling systems, electronics), full alignment and calibration by certified biomedical engineers, replacement of consumables and safety-critical parts, and clean-room assembly standards to prevent contamination."

Dr Gaurav Malhotra, Director-Radiology, Sri Balaji Action Medical Institute, Delhi, believes documentation is what builds confidence, "Every refurbished system should also come with clear documentation of its past usage, process of refurbishment, parts which are replaced, calibration status, radiation safety related checks, performance of image validation and schedule of preventive maintenance."

Not everyone is equally certain, and that honesty matters too. "There is no foolproof way to guarantee the long-term reliability of refurbished imaging systems," says Dr Shehzia Lakhani, Consultant, Radiology Department, Saifee Hospital. "Hospitals can minimise risk by purchasing equipment from reputable vendors, verifying service histories where available, ensuring proper installation and calibration, and opting for comprehensive maintenance support. However, despite these precautions, some degree of unpredictability remains unavoidable."

Maintenance and lifecycle: The real test

Buying the machine is the easy part. Keeping it running is where the real challenges begin. "The biggest challenge with refurbished systems is not acquisition; it is ensuring long-term uptime, service continuity and predictable lifecycle performance. As original equipment manufacturers prioritise newer product lines, sourcing replacement parts for older systems can become more difficult, time-consuming and expensive", says Mudafale. Dr Ganesan echoes this concern from a service-network angle, "The refurbished imaging market in India is growing, but it remains fragmented. There are too many small vendors operating without the scale required to provide consistent, reliable service over the long term."

Dr Lakhani stresses, "Since refurbished systems often come with little or no manufacturer warranty, investing in them involves a certain level of risk. In India, post-sales service can sometimes be challenging even for brand-new equipment."

Dr Mahadeokar adds that in remote locations, "The mobilisation time for a qualified engineer can lengthen repair windows," making strong maintenance contracts essential from day one.

Regulation: Closing the gaps

On regulation, experts broadly agree that India's framework is a good foundation but needs sharper definition for refurbished equipment specifically. "India has an established regulatory framework for medical devices, led by the Central

Drugs Standard Control Organization and the Atomic Energy Regulatory Board," notes Mudafale.
"However, the current framework does not fully differentiate between refurbished and secondary-market equipment. This creates gaps in standardisation and oversight."

Dr Mahadeokar offers the most detailed picture of the compliance journey, from CDSCO import licensing to the Ministry of Environment's No-Objection Certificate requirements, which call for "a certified minimum residual life of 7 years, direct factory refurbishment by the OEM, a 1-year warranty paired with a 3-year CMC, guaranteed spare parts availability, and strict Extended Producer Responsibility e-waste registration."

Dr Govindarajan flags a specific blind spot: MRI. "Because MRI operates on non-ionising radiation, it falls outside AERB's primary jurisdiction. India currently has no dedicated regulatory body governing MRI safety standards." Dr. Malhotra sums up what the industry wants to see next: "clear certification, periodic audits, accountability of vendors, and complete adherence to radiation safety norms."

The road ahead: Sustainability and scale

Looking to the next five years, the outlook is largely optimistic. Mudafale believes refurbished imaging will move "from being a budget alternative to a mainstream enabler of healthcare expansion."

Sustainability is emerging as an unexpected strength of the refurbished model.

“Beyond economics, refurbished equipment aligns with broader sustainability commitments. Medical device manufacturing is resource-intensive; the electronics, rare metals, and manufacturing energy embedded in a system represent significant embodied carbon. When a system is refurbished and used for another 5-7 years instead of being discarded, that embodied impact is amortised across a longer service life—reducing per-year carbon footprint by 40-50 per cent.

Suneja also adds, "Refurbished radiology equipment is not a temporary workaround for India's imaging access gap. It is a strategic infrastructure solution that can systematically improve diagnostic accessibility, reduce healthcare disparities, and support sustainable growth.”

Dr Govindarajan sees consolidation as the next big shift: "Three or four well capitalised refurbished equipment companies with national service infrastructure, trained engineering teams, and credible annual maintenance commitments would fundamentally change the reliability profile of this segment."

And Dr Lakhani, though more cautious throughout, ends on a hopeful note: "If managed responsibly, refurbished imaging equipment can contribute meaningfully to both healthcare sustainability and equitable access to diagnostics, ensuring that more patients receive timely and accurate medical care."

The consensus across metros, Tier II cities and boardrooms is clear: refurbished radiology equipment is not a shortcut, but it can be a serious strategy.

As Dr Malhotra puts it, the goal is a system where "affordability and safety move together."

If India gets the quality checks, service networks and regulations right, refurbished imaging could well become one of the country's most practical tools for taking advanced diagnostics beyond the metros.

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Why universal health coverage must be an economic priority

Dr Prof. Sudha Chandrashekar, CEO, Swasti, explains why India must rethink health financing, strengthen primary healthcare, and foster multi-sector collaboration to build a sustainable and inclusive healthcare system that benefits both people and the economy

Every rupee invested in health returns many more through higher productivity, longer working lives, and stronger economic resilience. Yet health continues to be treated as consumption rather than investment in public finance debates. As India aspires to Viksit Bharat by 2047, changing this mindset may be one of the country's most important economic reforms. As countries confront widening inequalities, ageing populations, climate shocks, and emerging disease threats. Universal Health Coverage (UHC), which is one of the most important Sustainable Development Goals (SDG 3.8), is no longer merely a public health aspiration...it is a prerequisite for the development and economic growth of a country.

Universal Health Coverage aims to ensure that everyone can access quality health services without suffering financial hardship. Yet globally, billions of people still lack access to essential healthcare, while millions are pushed into poverty because of out-of-pocket health expenditure. Achieving UHC therefore is not simply about expanding healthcare services; it is about building financing systems that are equitable, sustainable, and resilient.

For India, this challenge carries particular significance. Investments in human capital will be as important as investments in infrastructure. A healthy population is fundamental to productivity, workforce participation, and long-term economic competitiveness.

India has made important strides in recent years. Flagship initiatives such as Ayushman Bharat-Pradhan Mantri Jan Arogya Yojana (AB PM-JAY), the expansion of Ayushman Arogya Mandirs, and the development of digital public infrastructure through the Ayushman Bharat Digital Mission have strengthened access and expanded financial protection for millions. These reforms demonstrate that political commitment, combined with institutional innovation, can significantly expand access to healthcare. Yet India's journey towards Universal Health Coverage remains unfinished. Despite improvements, out-of-pocket expenditure reduced from 64.2 per cent (2014) to 43.4 per cent (National Health Account) continues to place a significant burden on Indian households.

India spends around 1.9 per cent of GDP on public health, which remains low compared to other developing economies.

This highlights a broader lesson for health financing globally: financing illness is not the same as financing health. Medicines, diagnostics, outpatient consultations, and long-term management of chronic illnesses continue to account for substantial healthcare spending by families. Hospital insurance protects families when disease strikes, but Universal Health Coverage requires investments that prevent disease, detect it early, and manage chronic conditions before they become costly. Sustainable health financing must therefore extend beyond hospital care.

The next phase of reform must prioritise strong primary healthcare systems that focus on prevention, early diagnosis, and continuity of care across different levels of care for people enabled by technology. In that effort, the Ayushman Bharat Digital Mission (ABDM) linkages at every contact with health care play a significant role. Investments in frontline health workers, community-based services, digital technologies, and integrated care models are not only more equitable but also more cost-effective over the long term.

Three priorities deserve urgent attention

First, progressively raising public expenditure towards 2.5–3 per cent of GDP. Countries with strong publicly financed systems are better equipped to protect vulnerable populations and withstand future health emergencies. Expanding fiscal space alone will not be sufficient. Better reforms in strategic purchasing of health services, stronger fraud detection, digital claims management, evidence-based provider payment mechanisms, and improved governance and performance-based financing, especially for public facilities, are essential to ensure every public rupee delivers maximum value. This means moving away from volume-based care to value-based care.

Second, financing mechanisms must evolve to meet changing health needs. As India faces a growing burden of non-communicable diseases, especially mental health and an ageing population, health financing models must extend beyond episodic hospital care and support preventive, promotive, and outpatient services.

Third, partnerships across sectors will be essential. One entity alone cannot achieve Universal Health Coverage. Collaboration among the public sector, private providers, civil society, philanthropic institutions, and communities can help address persistent gaps in access, innovation, and accountability.

The COVID-19 pandemic offered a powerful reminder that health security and economic security are inseparable. Countries with resilient health systems were better able to protect lives, sustain livelihoods, preserve economic activity, and recover more quickly from the crisis. The lesson is clear: investing in health before crises emerge is far less costly than responding after they occur.

India today has a unique opportunity to shape a model of Universal Health Coverage that is both inclusive and scalable. As fiscal pressures intensify and health challenges become increasingly complex, the question is no longer whether countries can afford Universal Health Coverage. The more pressing question is whether they can afford the consequences of failing to achieve it. It is about investing in human dignity, economic resilience, and shared prosperity. For India, Universal Health Coverage is not just a health agenda; it is a nation-building agenda. Its experience in combining digital innovation, public financing, and community-based approaches offers valuable lessons for other low- and middle-income countries.

Dr Rahul G. Warke receives “Best Aqua Healthcare Diagnostic Solution Provider Award 2026” at Aquaculture Expo 2026

The Aquaculture Expo 2026, organised by Aqua International, is one of India's most prestigious events for the aquaculture industry, bringing together leading aquaculture farmers, scientists, researchers, and industry experts to drive innovation and sustainable growth

HiMedia Laboratories Pvt. Ltd. is proud to announce that Dr Rahul G. Warke, Director – R&D Microbiology, has been honored with the prestigious "Best Aqua Healthcare Diagnostic Solution Provider Award 2026" at the 44th Aquaculture Expo 2026 and Aqua International Excellence Awards Event held in Bhimavaram, Andhra Pradesh. Representing HiMedia at the event, Dr. Girish B. Mahajan, Senior Vice President, received the award from Smt. Dr. T. Suguna, Officer on Special Duty, Andhra Pradesh Fisheries University, Vijayawada, and Sri Kanumuri Raghu Ramakrishna Raju, Hon'ble Deputy Speaker of the Andhra Pradesh Legislative Assembly.

The Aquaculture Expo 2026, organised by Aqua International, is one of India's most prestigious events for the aquaculture industry, bringing together leading aquaculture farmers, scientists, researchers, and industry experts to drive innovation and sustainable growth. As a part of the event, the Aqua International Excellence Awards honor individuals and organisations that have made exceptional contributions to the sector.

Dr Rahul G. Warke's recognition with the “Best Aqua Healthcare Diagnostic Solution Provider Award 2026” reflects his significant contribution to advancing aquatic disease diagnostics and promoting sustainable aquaculture in India. Under his scientific leadership, HiMedia Laboratories has developed and delivered innovative microbiological diagnostic solutions that help aquaculture professionals detect and monitor diseases affecting shrimp and fish farming with greater accuracy and speed.

HiMedia's specialised culture media, pathogen detection systems, and quality control products have become trusted tools for aquaculture farms, diagnostic laboratories, and research institutions. By enabling early disease detection and effective biosecurity measures, these solutions play a critical role in improving aquatic animal health, reducing disease outbreaks, enhancing farm productivity, and supporting the long-term sustainability of the aquaculture industry.

With over 50 years of excellence in microbiology and life sciences, HiMedia Laboratories have been at the forefront of scientific innovation, delivering high-quality solutions to healthcare, pharmaceuticals, food and water testing, environmental monitoring, biotechnology, and aquaculture industries in over 150 countries. This prestigious recognition at Aquaculture Expo 2026 reaffirms HiMedia's commitment to advancing diagnostic innovation and supporting the aquaculture sector with reliable, world-class solutions that enhance aquatic health, strengthen food security, and promote sustainable industry growth.

HiMedia's specialised culture media, pathogen detection systems, and quality control products have become trusted tools for aquaculture farms, diagnostic laboratories, and research institutions

Truevis Technologies targets Rs 5,000 crore revenue by building India's advanced medical imaging ecosystem

Rather than functioning as a conventional medical equipment supplier, Truevis has developed an end-to-end model that combines technology deployment, installation, clinical application training, preventive maintenance, and long-term service management

India's healthcare sector stands at a defining moment. The demand for advanced diagnostic imaging such as CT, MRI, PET-CT, DSA, and Linear Accelerators is growing rapidly, driven by the rising burden of cancer, cardiovascular diseases, neurological disorders, and other complex medical conditions. Yet, access to these technologies remains concentrated in large metropolitan hospitals, while much of Tier-II and Tier-III India continues to face significant gaps due to high capital costs, import dependency, complex installation requirements, and limited lifecycle service support.

Truevis Technologies Pvt. Ltd., a Mumbai-based MedTech company, is addressing this challenge by building an integrated ecosystem for advanced medical imaging. The company has set an ambitious target of achieving Rs 5,000 crore in annual revenue over the next five to six years, driven by localised manufacturing, strategic global technology collaborations, and comprehensive lifecycle support that extends far beyond the traditional equipment supply model.

Building an integrated imaging ecosystem

Rather than functioning as a conventional medical equipment supplier, Truevis has developed an end-to-end model that combines technology deployment, installation, clinical application training, preventive maintenance, and long-term service management. This integrated approach enables hospitals to adopt advanced imaging technologies with greater confidence while ensuring reliable performance throughout the equipment lifecycle.

Its portfolio spans the complete spectrum of high-end medical imaging, including CT scanners, MRI systems, PET-CT, Digital Subtraction Angiography (DSA), and Linear Accelerators (LINAC). By combining these technologies with strong technical and clinical support, Truevis aims to simplify the adoption of sophisticated imaging solutions for healthcare institutions across the country.

Expanding access Beyond Metropolitan India

A key pillar of the company's strategy is expanding advanced diagnostic infrastructure into Tier-II and Tier-III cities, where demand for quality imaging services is increasing rapidly but access remains limited.

Among its focus areas, PET-CT represents one of the fastest-growing segments in modern healthcare. Globally, nearly 65 per cent of PET-CT scans are performed for oncology applications, highlighting the technology's critical role in early cancer detection, precise disease staging, treatment planning, and therapy monitoring. As cancer incidence continues to rise across India, hospitals are increasingly investing in advanced molecular imaging to strengthen oncology care and improve patient outcomes.

Advancing India's medtech manufacturing capabilities

As part of its long-term growth strategy, Truevis established manufacturing and system integration operations at the Andhra Pradesh MedTech Zone (AMTZ) in Visakhapatnam. This initiative aligns with India's broader vision of strengthening domestic medical technology manufacturing while reducing dependence on imported medical equipment.

By manufacturing and integrating imaging systems within India, the company seeks to improve supply chain resilience, reduce deployment timelines, lower the total cost of ownership for healthcare providers, and deliver solutions that are better aligned with Indian clinical and operational requirements. This localised manufacturing approach also supports the Government of India's "Make in India" initiative while contributing to the country's growing MedTech ecosystem.

Global technology with local expertise

Truevis has partnered with Neusoft Medical Systems to bring globally proven imaging technologies to India through technology transfer, platform localization, and structured clinical training. The collaboration extends beyond product supply, enabling the adaptation of advanced imaging systems to Indian healthcare workflows while strengthening domestic technical capabilities.

This model allows Truevis to combine international innovation with localized engineering, manufacturing, installation, and service expertise, ensuring that hospitals receive not only advanced technology but also the operational support required for long-term success.

Service excellence as a core differentiator

Recognising that equipment performance depends as much on service as on technology, Truevis has invested in multidisciplinary teams specialising in engineering, installation, clinical applications, technical support, and preventive maintenance. These teams remain engaged throughout the lifecycle of every installation, supporting hospitals from site planning and commissioning to workflow optimisation, user training, and ongoing service.

This emphasis on lifecycle support minimises equipment downtime, enhances operational efficiency, and enables healthcare providers to maximise the clinical value of their imaging infrastructure.

Building the future of diagnostic healthcare in India

India's healthcare infrastructure is entering a period of unprecedented expansion, driven by increasing investments in diagnostics, rising disease burden, and growing demand for high-quality medical imaging. Meeting this demand requires more than importing advanced equipment—it requires an integrated ecosystem capable of manufacturing, deploying, servicing, and continuously supporting these technologies at scale.

With its expanding manufacturing capabilities, strategic technology partnerships, nationwide service network, and commitment to localisation, Truevis Technologies is positioning itself to play a significant role in transforming India's advanced medical imaging landscape.

As the company works toward its vision of achieving Rs 5,000 crore in annual revenue within the next five to six years, it is building more than a MedTech business. It is laying the foundation for a stronger, more self-reliant healthcare ecosystem that brings world-class diagnostic technologies closer to hospitals and patients across India.

Revolutionize Blood Product Verification with Innovative Irradiation Confirmation Method

RADTAG

Process Verification for Blood Irradiation
PRODUCT INFORMATION SHEET

RTG25 Gamma Irradiation Indicator (RTG15 also available)

RTX25 X-Ray Irradiation Indicator (RTX15 also available)

KEY FEATURES:

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

Sample Interpretation

Negative

Minimum

Mid-Range

Maximum

ROSALINA INSTRUMENTS

No. 127, Bussa Udyog Bhavan, Tokershivraj Road, Sewri West, Mumbai-400015, Maharashtra,
Landline: +91 022-24166630 / Mobile: +91 9833286615 / Email: support@rosalina.in / Website: www.rosalina.in

Why technology matters as much as clinical expertise in an anaesthesia workstation

As surgical practice continues to evolve, hospitals should evaluate anaesthesiaworkstations not only by their feature lists but also by the integrity of their engineering, the robustness of their safety systems, and their ability to integrate seamlessly into the broader perioperative ecosystem

Anaesthesia has always relied on clinical judgement, vigilance and experience. Yet the modern operating theatre demands a level of precision that cannot be achieved through expertise alone. Today's anaesthesia workstation is an integrated life-support platform in which engineering, software, and safety architecture directly influence patient care. Technology has become an essential clinical partner.

An experienced anaesthesiologist interprets physiology and responds to changing patient conditions. The workstation must translate those decisions into accurate gas delivery, dependable ventilation and continuous monitoring without introducing variability. Achieving this requires sophisticated control systems that maintain accurate fresh gas flow, compensate for circuit compliance, regulate pressure, and support consistent tidal volume delivery across diverse patient populations.

Safety engineering has evolved well beyond basic alarms. Contemporary workstations incorporate automated pre-use system checks, electronic leak testing, hypoxic guard mechanisms, oxygen-failure protection, integrated oxygen monitoring, and agent-delivery safeguards. These functions reduce the risk of equipment-related errors and improve confidence before induction. They also support standardised workflows across operating rooms where multiple clinical teams interact with the same equipment.

Digital integration has become equally important. Modern operating theatres increasingly depend on interoperability between anaesthesia workstations, patient monitors and hospital information systems. Standardised communication protocols enable accurate documentation, support data-driven quality improvement initiatives, and reduce the administrative burden associated with manual record-keeping. Reliable data exchange also strengthens traceability and post-procedure analysis.

The quality of engineering extends beyond visible features. Gas pathway design, breathing circuit dynamics, absorber configuration, electronic flow control, ventilator performance and software validation all contribute to system reliability. Equipment must perform consistently under varying environmental conditions while maintaining compliance with recognised international standards for electrical safety, essential performance and risk management. These engineering principles form the foundation upon which clinical confidence is built.

Technology does not replace clinical expertise. It amplifies it by providing accuracy, consistency and dependable system performance during routine and complex procedures alike. As surgical practice continues to evolve, hospitals should evaluate anaesthesia workstations not only by their feature lists but also by the integrity of their engineering, the robustness of their safety systems, and their ability to integrate seamlessly into the broader perioperative ecosystem. Clinical excellence and technological excellence are no longer separate considerations. Together, they define the standard of modern anaesthesia care.

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PICC Ports: Advancing long-term vascular access for better patient care

Dr Bharat Gupta, Consultant, Interventional Radiology, Rajiv Gandhi Cancer Institute & Research Centre, discusses how PICC Ports combine the advantages of both devices, offering a minimally invasive, patient-friendly option that can improve comfort, reduce complications, and support long-term treatment across a range of clinical conditions

As the complexity of modern medicine grows, so does the need for reliable long-term vascular access. Patients undergoing chemotherapy, extended antibiotic therapy, parenteral nutrition, or chronic disease management often require weeks or months of intravenous treatment far beyond what peripheral veins can safely sustain. PICC Ports have emerged as a significant advancement in this space, offering a minimally invasive, patient-friendly solution for central venous access.

What is a PICC Port?

A PICC Port (Peripherally Inserted Central Catheter Port) combines the insertion approach of a standard PICC line with the subcutaneous design of a traditional implanted port. A small port reservoir is implanted beneath the skin of the upper arm, connected to a flexible catheter threaded through a peripheral vein - typically the basilic or brachial - with its tip resting in the superior vena cava. Access is achieved via a non-coring Huber needle through the skin, when not in use, the device remains entirely subcutaneous with no external components.

Unlike a conventional PICC line, there is no external catheter requiring daily dressing changes. Unlike a chest-placed port, the PICC Port avoids major central vessels at the chest wall, significantly reducing procedural risk during insertion.

Clinical applications

PICC Ports are suited to a wide range of therapy types:

- **Chemotherapy:** Reliable central access for multi-cycle infusions and vesicant agents, protecting peripheral veins.
- **Long-term antibiotics:** Supports outpatient IV antibiotic programmes for conditions such as osteomyelitis or endocarditis.
- **Parenteral nutrition:** Central tip placement ensures safe delivery of hypertonic TPN solutions.
- **Frequent blood sampling:** A consistent, low-trauma access point for regular laboratory monitoring.
- **Chronic disease management:** Ideal for patients with sickle cell disease, cystic fibrosis, or haematological conditions requiring periodic infusions.

Benefits over conventional ports

Compared to traditionally chest-placed implanted ports, PICC Ports offer several clinical advantages:

- **Minimally invasive:** Placement requires no general anaesthesia or chest wall incision, reducing procedural complexity and recovery time.
- **Lower complication risk:** Avoidance of subclavian and jugular vessels eliminates risk of pneumothorax or arterial injury.
- **Improved cosmetics and comfort:** The upper arm location is discreet, easily covered, and allows greater freedom of movement.
- **Faster therapy initiation:** Reduced procedural burden means treatment can typically begin sooner after device placement.
- **Potential cost advantages:** Reduced need for operating room time and anaesthetic support may offer resource savings for healthcare facilities.

Benefits for healthcare professionals

PICC Ports can be placed by trained vascular access specialists or interventional radiologists broadening access to the procedure. The absence of external catheter components reduces the nursing burden of daily dressing changes and line management. In oncology and infusion settings, a dependable access point minimises delays, reduces failed cannulation attempts, and supports smoother treatment workflows.

Patient-centric advantages

For patients, the impact is tangible. The fully subcutaneous design allows showering, most physical activities, and greater participation in daily life - none of which is as straightforward with an external PICC line. Reduced exposure to repeated peripheral needle sticks is among the most valued benefits, particularly during lengthy treatment programmes. Greater comfort and convenience have been associated with improved treatment adherence, a critical factor in oncology and chronic disease care where incomplete courses carry serious clinical consequences.

Safety and Clinical considerations

As with all central venous access devices, vigilance around catheter-related bloodstream infection (CRBSI) is essential. Strict aseptic technique during insertion and access, chlorhexidine antisepsis, and regular review of access necessity are foundational to safe use. Catheter-associated upper extremity thrombosis should be monitored for, with prompt evaluation of new arm swelling or pain. Patient education - recognising signs of infection, thrombosis, or device malfunction - is equally critical.

Device selection must always be guided by individual patient assessment. Vein quality, therapy duration, body habitus, and patient preference all inform the most appropriate choice. PICC Ports are not suitable for every patient, and decisions should be made collaboratively between the patient and their clinical team.

Conclusion

PICC Ports represent a meaningful step forward in vascular access care. By combining the minimally invasive insertion of a PICC with the durability and subcutaneous convenience of an implanted port, they offer measurable benefits for patients, clinicians, and healthcare systems alike. When supported by appropriate patient selection, skilled insertion, and diligent maintenance, PICC Ports are well positioned to improve comfort, safety, and treatment outcomes for patients who depend on long-term intravenous therapy.

Redefining the diagnostics workflow with the Sysmex UN-Series

Shobhit Jain, Senior Manager - Product Management, Clinical Chemistry & Urinalysis, Sysmex India Pvt Ltd, explains how fully automated urinalysis systems are helping laboratories improve efficiency, standardise results, and deliver more reliable diagnostic insights

Urinalysis is one of the oldest and most frequently ordered diagnostic procedures in clinical medicine. Despite its ubiquity, the discipline has historically lagged behind hematology and clinical chemistry in terms of total automation. For decades, the standard workflow relied heavily on manual or semi-automated reagent strip reading, followed by manual microscopic evaluation of urine sediment for samples flagged with abnormalities.

This traditional framework introduces significant clinical liabilities:

- **Inter-operator variability:** Manual microscopy is inherently subjective, leading to inconsistent cell and particle quantification.
- **Labor inefficiencies:** Preparing slides, centrifuging samples, and performing manual counts consume vast amounts of skilled laboratory labor.
- **Delayed turnaround:** Manual intervention creates operational bottlenecks, delaying critical patient data.

To resolve these challenges, modern pathology laboratories are shifting toward fully automated, closed-loop urinalysis systems. Standing at the forefront of this technological evolution is the Sysmex UN-Series, a scalable, modular platform designed to automate urinalysis from sample entry to final digital confirmation.

The core philosophy of the Sysmex UN-Series is modularity and scalability. Recognising that no two clinical laboratories have identical workloads, the UN-Series allows institutions to combine distinct analytical modules into a single, automated, track-linked workstation

The architecture of full automation: The Sysmex UN-Series

The core philosophy of the Sysmex UN-Series is modularity and scalability. Recognising that no two clinical laboratories have identical workloads, the UN-Series allows institutions to combine distinct analytical modules into a single, automated, track-linked workstation (such as the UN-2000 or UN-3000 configurations).

The platform seamlessly bridges three critical analytical domains:

1. Urine chemistry (physical and biochemical screening)
2. Urine particle analysis (quantitative sediment screening)
3. Digital particle imaging (morphological confirmation)

1. Advanced urine chemistry: The UC-3500

The diagnostic workflow typically begins with automated biochemical analysis. The UC-3500 module is a fully automated urine chemistry analyzer capable of high-throughput processing (up to 276 samples per hour).

Rather than relying on basic colorimetric sensors, the module incorporates a Color CMOS sensor image analyzer. This technology photometrically reads reagent strips using multi wavelength technology. The advanced sensor automatically detects the precise positioning of the test strip pads, adjusts for highly colored or turbid urine matrices to prevent false positives, and differentiates between intact RBCs and free hemoglobin.

Crucially, the module expands standard screening profiles by incorporating microalbumin and creatinine testing on-board, allowing for the automatic calculation of the albumin-to-creatinine ratio (ACR) and protein-to-creatinine ratio (PCR)—essential parameters for early chronic kidney disease (CKD) surveillance.

2. Fluorescence flow cytometry: The UF-5000/ UF-4000

Samples requiring microscopic evaluation—determined automatically via user-defined, rule-based reflex criteria—are transferred without manual intervention to the UF-5000 Urine Particle Analyser. The UF-5000 represents a major leap forward from traditional impedance or basic image-recognition counters by utilising Fluorescent Flow Cytometry.

In the UF-5000, particles are hydrodynamic-focused and interrogated by a short-wavelength (488 nm) blue solid-state laser. The system captures four distinct optical signals per particle:

- **Forward Scattered Light (FSC):** Gauges particle size.
- **Side Scattered Light (SSC):** Determines internal complexity and structure.
- **Side Fluorescent Light (SFL):** Measures nucleic acid content via specialised fluorochrome dyes.
- **Depolarised Side Scattered Light (DSS):** Specifically discriminates between birefringent structures.

This multi-parametric optical profiling enables the UF-5000 to generate highly detailed multi-dimensional scattergrams, providing a completely automated 5-part differential of formed elements: RBCs, White Blood Cells (WBCs), Epithelial Cells (EC), Casts, and Bacteria (BACT).

Furthermore, the DSS channel is highly effective at distinguishing RBCs from similar-sized calcium oxalate or amorphous crystals, reducing false elevations in cell counts.

3. Confirmatory digital imaging: The UD-10 module

For samples presenting highly complex or pathologic cellular profiles (e.g., pathologic casts, yeast-like cells, or atypical epithelial cells), the UN-Series integrates the UD-10 Urine Particle Digital Imaging Device.

Rather than forcing a technician to manually prepare a wet mount slide, the UD-10 automatically captures high-definition, microscope-quality digital images of sediment particles using a high-performance CCD camera and stage scanning technology. To protect fragile elements like hyaline or cellular casts, the device utilises a gentle sedimentation-by-gravity mechanism rather than harsh centrifugation.

The images are automatically sorted into eight distinct morphological classes based on size and luminance contrast against the background. Technicians can review whole-field or isolated particle images on a centralised workstation screen, verifying or reclassifying elements with a few clicks.

Clinical and operational impact

Impact on Labor and Turnaround Time (TAT)

By pairing these three analytical modules with the Urinalysis Data Manager or Urine Work Area Management (U-WAM) software, a lab can establish a hands-free, walkaway workflow. The software applies intelligent cross-checking algorithms: if the chemistry strip is negative for leukocyte esterase and nitrite, and the UF-5000 detects no significant bacterial or WBC populations, the sample is automatically validated and archived. Manual slide preparation drops dramatically—often by 80 per cent to 90 per cent—freeing scarce laboratory staff to focus on highly pathologic samples.

Parameter / Feature	Traditional Manual Workflow	Sysmex UN-Series Automated Workflow
Throughput	Variable; highly bottlenecked by manual microscopy	High; up to 105–276 samples/hour depending on configuration
Objectivity	Low; dependent on technician experience and visual fatigue	High; standardised algorithms, laser optics, and scattergrams
Reflex Logic	Manual checking of logs and manual selection of tubes	Automated via centralised U-WAM rule engines
UTI Screening	Qualitative (Nitrite/LE pads)	Quantitative bacterial and WBC counting with Gram-info flags
Sample Integrity	Vulnerable to centrifugation artifacts	Preserved via automated fluidics and gravity sedimentation

Enhanced diagnostic precision

The clinical value of automated flow cytometry extends far beyond throughput. The bacterial quantification channel on the UF series features exceptionally high sensitivity, allowing laboratories to rapidly rule out Urinary Tract Infections (UTIs) within minutes rather than waiting 24 to 48 hours for a urine culture. Additionally, the system provides information on RBC morphology (isomorphic vs. dysmorphic), assisting clinicians in differentiating between glomerular hematuria (e.g., glomerulonephritis) and non-glomerular urological bleeding.

The integration of automation into the urinalysis workspace is no longer a luxury; it is a clinical necessity driven by escalating sample volumes and a shrinking laboratory workforce. The Sysmex UN-Series demonstrates how combining advanced dry-pad chemistry, multi-parametric fluorescent flow cytometry, and automated digital imaging can revolutionise the discipline. By standardising results, minimising manual touchpoints, and providing deep diagnostic parameters such as quantitative bacteriology and RBC morphology, automated solutions are leading the way toward a more precise, efficient, and reproducible future in laboratory medicine.

Why OEMs are turning to silicone breathing circuits to strengthen critical care devices

As global demand for ventilators and respiratory care equipment continues to rise, OEM manufacturers are under increasing pressure to deliver devices that meet stringent standards for performance, safety, and regulatory compliance. In this evolving landscape, the choice of breathing circuit has become a critical design consideration

SECTION 1 · THE OEM CASE

Why the Breathing Circuit Defines Your Product's Clinical Reputation

In mechanical ventilation, the breathing circuit is the sole physical interface between a life-support system and the patient's airway. Every pressure waveform, every tidal volume, every breath cycle passes through it. For OEM manufacturers of ventilators and anesthesia machines, this component carries outsized responsibility — and outsized commercial significance. The global ventilator breathing circuit market is projected to grow from USD 1.5 billion in 2023 to USD 2.6 billion by 2032, with Asia Pacific accelerating fastest at 7.3% CAGR. OEM manufacturers who lock in a reliable, compliant, customizable component supply partner today are building a structural competitive moat in a market that is structurally growing.

"Silicone's resistance to halogenated anesthetic agents tripled circuit lifespan versus PVC in documented OEM case studies — turning a consumable cost line into a durability differentiator."

Ami Polymer Pvt. Ltd.'s ImaBreath™ range — manufactured in a 250,000 sq. ft. facility including 60,000 sq. ft. of clean room space in Dadra Nagar Haveli, India — is built precisely for this OEM role: technically superior, fully compliant, and commercially flexible.

SECTION 2 · PRODUCT RANGE

Five Circuit Configurations for Every OEM Use Case

Each ImaBreath™ variant is manufactured in 100% medical-grade silicone and available for private labelling, custom branding, and OEM specification adjustment.

STANDARD: Silicone Breathing Tube with Connector

● Single-limb foundational product. Ideal for basic ventilation integration into existing OEM circuits. Standard 15mm ISO connector. Corrugated, flexible, kink-resistant.

DUAL-LIMB: Silicone Breathing Tube Circuit (Dual Limb)

● Dual-limb circuit with Y-connector separating inspiratory and expiratory gas flows. Standard topology for ICU ventilators. Improves CO2 clearance and reduces re-breathing risk.

SINGLE WT: Circuit with Single Watertrap

● Adds moisture collection for use with heated humidification systems. Prevents circuit flooding and pressure sensing artifacts. Essential for ICU settings with active humidification.

DOUBLE WT: Circuit with Double Watertrap

● Superior moisture management for prolonged ICU ventilation. Both limbs protected. Preferred by OEMs for premium ICU ventilator product lines targeting EU and North American hospitals.

OEM BULK: Running Length Tube — OEM Bulk Supply

● Continuous bulk lengths for in-house cutting, crimping, and assembly. Designed for system integrators building complex ventilator assemblies, heated wire circuits, and anesthesia workstations.

SECTION 3 · SIZING & SPECIFICATIONS

Built Across the Full Patient Size Spectrum

OEMs supplying to neonatal ICUs, pediatric wards, and adult critical care simultaneously require a single component partner that covers all patient categories with precision manufacturing — not approximate sizing.

● **Adult:** 22mm – 16mm internal diameter
● **Pediatric:** 15mm – 12mm internal diameter
● **Neonatal:** 10mm – 8mm internal diameter
● **Tube Lengths:** Fully customizable per OEM specification
● **Connectors:** Standard 15mm ISO · Custom formats available
● **Material:** 100% Medical-Grade Platinum-Cured Silicone
● **Sterilization:** Autoclave compatible · EO sterilizable
● **Packaging:** Sterile individual sealed · Custom OEM label

SECTION 4 · MATERIAL SCIENCE

Why Silicone is the OEM Specification Standard

The choice between silicone and PVC in a breathing circuit has direct consequences for product durability, regulatory positioning, and your OEM brand's clinical reputation. Documented OEM experience shows that PVC circuits stiffen and crack when repeatedly exposed to halogenated anesthetic agents such as Sevoflurane and Desflurane. Switching to platinum-cured medical silicone tripled reusable circuit lifespan in documented case studies.

● **Biocompatibility (ISO 10993):** Non-toxic, non-irritating to airway mucosa. Pre-validated against cytotoxicity, sensitization, and irritation standards — reducing finished device testing scope for OEMs.
● **Autoclave Compatible:** Withstands high-temperature, high-pressure sterilization cycles. Critical for reusable circuit segments and a commercial differentiator in tender specifications.
● **Chemical Resistance:** Resistant to halogenated anesthetic agents, disinfectants, and cleaning solutions — where PVC degrades, silicone maintains dimensional and mechanical integrity.
● **Phthalate-Free & BPA-Free:** Directly addresses European hospital procurement criteria and emerging regulatory requirements globally.

● Silicone vs. PVC - Material Comparison for OEM Specification

Property	PVC	Medical Silicone (ImaBreath™)
Autoclave sterilizable	✗ No	✓ Yes
Anesthetic gas resistance	✗ Degrades	✓ Fully resistant
Phthalate-free	✗ Contains plasticizers	✓ Certified free
BPA-free	✗ Varies	✓ Certified free
USP Class VI certified	✗ Not standard	✓ Certified
Kink resistance	⚠ Moderate	✓ Superior
Yellowing / brittleness	⚠ Common over time	✓ None — stable
Reusable circuit lifespan	1× baseline	✓ Up to 3× longer
EU procurement eco-score	Low	✓ High

● **Kink Resistance:** Maintains flexibility across temperature ranges, resisting kinking even when repositioned around a supine ICU patient — a patient safety parameter, not merely a comfort feature.

Where OEM Products Are Used — Four Core Settings

Understanding where breathing circuits end up in clinical practice helps OEM manufacturers align product specifications with actual use conditions.

1. ICU & Critical Care Ventilation

Multi-day ventilation of patients in respiratory failure. Double watertrap configuration recommended for prolonged use. 40–50% of ICU admissions globally require mechanical ventilation (SCCM). Over 5 million ICU admissions per year in the United States alone.

2. Surgical & Anesthesia Procedures

Delivers anesthetic gases alongside oxygen. Silicone's chemical resistance to Sevoflurane, Desflurane, and Isoflurane is a critical OEM specification requirement. Flexible design accommodates repositioning around draped surgical fields without kinking.

3. Mechanical Ventilation — Long-Term

Chronic respiratory failure, neuromuscular disease, post-operative support. Autoclave compatibility and durability over hundreds of sterilization cycles are defining requirements for this patient segment.

4. Emergency Airway Management

Trauma, cardiac arrest, severe respiratory distress. Circuit connectors must seat securely under pressure. Soft silicone flexibility ensures circuit manipulation does not dislodge airway connections during resuscitation.

SECTION 6 · REGULATORY COMPLIANCE

A Compliance Profile Built for OEM Regulatory Teams

For medical device OEMs, a breathing circuit supplier's regulatory documentation is a direct input to your own regulatory submissions. Ami Polymer's certification stack is designed to reduce your qualification cost and submission timeline.

Raw material certifications — critical for OEM component qualification files

✓ **USP Class VI**

Most stringent USP biological reactivity standard. Commonly specified in hospital procurement globally.

✓ ISO 10993-10 & ISO 10993-23

Sensitization and skin irritation testing. Required for CE MDR technical file in Europe.

✓ RoHS Compliant

Restriction of Hazardous Substances - required for European market supply.

✓ TSE / BSE Free

Critical for patient airway contact. Required by EU and North American hospital procurement bodies.

✓ REACH Compliant · BPA Free · Phthalate Free

Addresses EU chemical regulations and increasingly strin-

gent hospital purchasing criteria worldwide.

Quality management and regulatory approvals — for OEM supplier qualification

✓ ISO 13485:2016

Medical Device QMS. Documented design controls, production validation, CAPA systems, full traceability — directly compatible with your own QMS obligations.

✓ CDSCO Approved

India Central Drugs Standard Control Organisation approval — baseline requirement for medical device manufacturing in India.

✓ ISO 9001 · ISO 14001 · ISO 45001

General QMS, Environmental Management, and Occupational Health & Safety — signals a professionally managed, low-operational-risk manufacturing partner.

✓ ISO 27001

Information Security Management — relevant when sharing proprietary OEM design drawings and technical specifications with the manufacturer.

● Important Note for OEM Regulatory Teams

Product certifications listed are held on the raw material. OEM customers remain responsible for finished device regulatory submissions (e.g. FDA 510(k), CE MDR technical file). However, Ami Polymer's material-level certifications and ISO 13485 QMS provide the documented supplier qualification foundation your regulatory team needs — significantly reducing qualification cost and timeline within your own QMS.

SECTION 7 · OEM PARTNERSHIP MODEL
Beyond Supply - A Strategic Manufacturing Partnership

For ventilator and respiratory equipment OEMs, the supplier relationship extends far beyond purchase orders. Ami Polymer delivers a structured OEM partnership model that supports your product design, regulatory filing, and commercial brand strategy.

□ **Design Customization**

Full support for circuit geometry, connector type, length, watertrap configuration, and wall thickness. Provide drawings or physical samples - Ami Polymer engineers develop matched prototypes for your validation process.

□ **Private Labelling**

All ImaBreath™ variants available under your brand identity, part number, and packaging design. Maintain brand consistency across your hardware-consumables product relationship.

□ **Material Flexibility**

Support for various medical-grade silicone formulations - implant and non-implant grade. Adapts to evolving product portfolio requirements as your finished device classifications change.

□ **Sterile Packaging**

Products supplied in sterile, individually-sealed packaging. Eliminates the need for OEMs to invest in their own sterilization infrastructure for this component category.

□ **Running Length Bulk Supply**

Continuous bulk format for OEM cutting, crimping, and assembly operations. Consistent dimensions and material properties across all batch lengths for reliable in-house integration.

□ **Multi-Material Support**

Broad medical-grade material portfolio to match any OEM finished device classification requirement - including implant-grade silicone for higher-classification products.

SECTION 8 · MANUFACTURING INFRASTRUCTURE
World-Class Facility - Dadra Nagar Haveli, India

Ami Polymer operates from a purpose-built medical device manufacturing facility spanning 250,000 square feet - including 60,000 square feet of dedicated clean room space - in Kala, Dadra Nagar Haveli & Daman and Diu, India. ISO 13485-compliant clean room operations at industrial medical device scale.

2,50,000 sq.ft. Total Facility Area

60,000 sq.ft. Clean Room Space

US FDA Registered Facility

CDSCO Approved Manufacturer

India's government has actively incentivized domestic ventilator and respiratory device assembly through Production Linked Incentive (PLI) schemes. For OEM customers in Europe, North America, or other regulated markets, sourcing from a CDSCO-approved, ISO 13485-certified Indian manufacturer offers a compelling combination of cost competitiveness, quality assurance, and geopolitical supply chain diversification.

SECTION 9 · MARKET INTELLIGENCE
The Macro Tailwinds Driving OEM Demand

Four converging trends are structurally expanding the breathing circuit market and raising the bar on what OEM supply partners must deliver:

$2.6B

Global Market by 2032

The ventilator breathing circuit market grows at 6.2% CAGR from $1.5B in 2023. ICU expansion in Asia, aging populations in Europe, and structural critical care investment in the US are the primary drivers.

Source: DataIntelo, 2024

4×

China's ICU Bed Expansion (2019-2024)

China quadrupled its ICU bed count between 2019 and 2024. India's government incentives for domestic ventilator assembly are stimulating demand for breathing circuit components from compliant Indian suppliers.

Source: Mordor Intelligence, 2025

♻

Sustainability & Reusability Mandates

European procurement frameworks increasingly award eco-credits to reusable circuit systems. Silicone's autoclave compatibility positions it as the material of choice for the growing reusable segment - a direct commercial benefit for OEMs specifying ImaBreath™.

Source: Mordor Intelligence, 2025

6.85%

Asia-Pacific Ventilator Market CAGR

Asia-Pacific leads global mechanical ventilator market growth. High respiratory disease burden, urbanization, and government healthcare infrastructure investment are sustaining demand above global average growth rates.

Source: Straits Research, 2026

5M+

Annual US ICU Admissions Requiring Ventilation

The Society of Critical Care Medicine reports over 5 million ICU admissions per year in the United States, with 40-50% requiring mechanical ventilation - a massive, recurring volume anchor for breathing circuit OEMs.

Source: SCCM Critical Care Statistics

□

Neonatal ICU Specialization

Global neonatal ICU capacity is expanding, creating precision demand for 8-10mm internal diameter circuits. Not all manufacturers can reliably supply this size range - Ami Polymer's neonatal specification is a genuine differentiator for OEMs in this segment.

Source: Ami Polymer Product Catalogue, 2025

— CONCLUSION
The Strategic Case for ImaBreath™ as Your OEM Breathing Circuit Partner

For medical device OEM manufacturers, a breathing circuit supplier must deliver on four non-negotiable dimensions: clinical performance (biocompatibility, flexibility, reliability), regulatory compliance (material certifications, QMS, traceability), commercial flexibility (customization, private labelling, scalable volume), and manufacturing credibility (certified facility, clean room infrastructure, quality systems).

Ami Polymer's ImaBreath™ Silicone Breathing Circuit addresses all four dimensions from a single, vertically integrated source. The combination of 100% medical-grade silicone, a comprehensive ISO 13485 quality system, CDSCO approval, and 250,000 sq. ft. of manufacturing capacity including clean room operations makes Ami Polymer a compelling OEM partner for ventilator, anesthesia machine, and critical care equipment manufacturers operating in global regulated markets.

In a market growing at 6.2% CAGR toward USD 2.6 billion by 2032 - with Asia Pacific accelerating fastest - the OEM manufacturers who establish reliable, compliant, and flexible component supply chains today will have a structural competitive advantage in capturing the next wave of ICU and respiratory equipment demand.

Ready to Build Your OEM Supply Chain on ImaBreath™?

Contact Ami Polymer's OEM team for product samples, regulatory documentation, customization briefs, and pricing.

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