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OVERVIEW OF MEDICAL ROBOT

Introduction of Medical Robot

Medical robots are intelligent robotic systems used in healthcare settings to support healthcare professionals and enhance patient care. Compared with conventional medical equipment, medical robots are capable of sustained and stable performance in high-intensity, high-precision and long-duration tasks, and can provide precise, standardized, and repeatable technical support across multiple scenarios, including minimally invasive surgery, organ transfer, rehabilitation training, patient-assistive care and intra-hospital logistics. Typically comprising mechanical actuation modules, sensing/imaging modules and decision-making or control modules, medical robots enable the visualization, refinement and digitization of clinical operations, thereby reducing dependence on individual operators and enhancing safety and consistency. Based on application settings, medical robots can be classified into five main categories:

Classification of medical robots

Category	Definition
Surgical Robots	• Integrated systems comprising actuators, imaging and navigation modules, and control and planning system, used under physician supervision or fully automated **for minimally invasive procedures**, with the aim of improving instrument stability, spatial localization accuracy, and intra-operative visualization.
Organ Preservation Robots	• Maintain transplant organs **through ex vivo perfusion and environmental control** that continuously monitor and adjust temperature, oxygenation, nutrient delivery, and preservation parameters during transport between medical facilities.
Rehabilitation Robots	• Robots built around wearable exoskeletons or upper/lower limb training platforms that deliver standardized, repeatable, and personalized gait and limb-function.
Medical Assistant Robots	• Designed for direct patient interaction and clinical support, and automated testing, medical assistant robots are intelligent robotic systems that comprehensively enhance care quality, operating under the supervision of healthcare professionals.
Hospital Service Robots	• Manage healthcare facility operations and logistics through automated medication delivery and supply distribution, environmental services including UV disinfection and room sanitization, and administrative support for pharmacy automation, inventory management, and workflow optimization.
Other Specialized Medical Robots	• Emergency response robots, and other specialized systems for various medical demands, in enhancing safety, throughput, efficiency, and quality in hospitals.

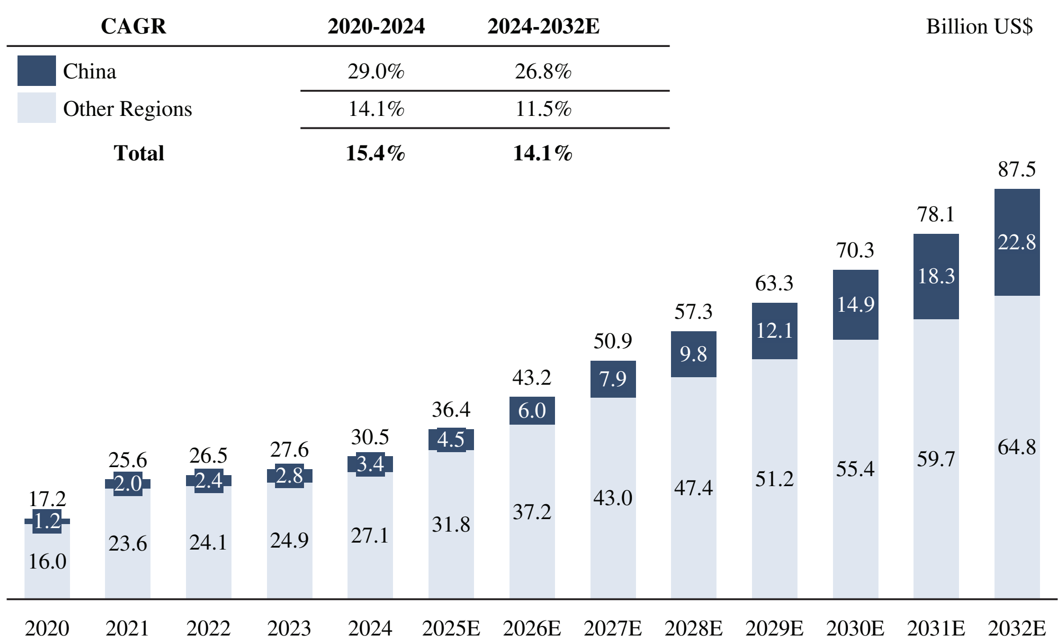
Source: CIC

Global Medical Robot Market Size

The development of the global medical robot market is supported by sustained technological innovation, rising clinical demand for precision and standardized care, and digital transformation across healthcare systems. Progress in sensing and imaging, real-time navigation, AI-assisted control, and interoperable hospital IT has expanded use cases from operating rooms to hospital logistics and bedside assistance, while providers adopt automation to improve efficiency, safety and traceability.

The global medical robot market was valued at approximately US$30.5 billion in 2024 and is projected to reach US$87.5 billion by 2032, representing a compound annual growth rate of 14.1%. Meanwhile, China is expected to be a major contributor, with market size growing from US$3.4 billion in 2024 to US$22.8 billion by 2032, implying a CAGR of 26.8%, underpinned by policy support, accelerating hospital automation, local manufacturing capacity, and cost advantages.

Global medical robot market size, 2020-2032E



Source: CRSA, FDA, NMPA, Expert Interview, Annual Report, CIC

OVERVIEW OF SURGICAL ROBOT

Introduction of Surgical Robot

A surgical robot is a multidisciplinary medical device that integrate mechanical engineering, biomechanics and computer science, and are used under physician supervision to perform or assist minimally invasive surgical procedures. Their typical configuration comprises a surgeon console, a procedure platform equipped with actuators, and imaging/visualization systems. By employing high-degree-of-freedom, end-effectors and stabilized control, these systems filter hand tremor and enable more stable and refined maneuvers within narrow and complex anatomical spaces. Compared with open surgery and conventional non-robotic minimally invasive techniques, surgical robots offer combined advantages in hand-eye coordination, operational dexterity, 3D visualization and procedural consistency.

Surgical robots mainly include percutaneous puncture robots, percutaneous ablation robots, laparoscopic robots, orthopedic robots, neurosurgery robots, natural orifice robots, pan-vascular robots and other surgical robots, covering urology, general surgery, gynecology, thoracic surgery and orthopedic/spine surgery, among others. Among these, laparoscopic robots and orthopedic robots represent the most mature commercial segments, while percutaneous puncture surgical robots feature the broadest coverage across clinical specialties. In particular, percutaneous puncture surgical robots can be applied in respiratory, oncology, interventional radiology, general surgery and gastroenterology, among other departments.

Application departments and indications of surgical robots

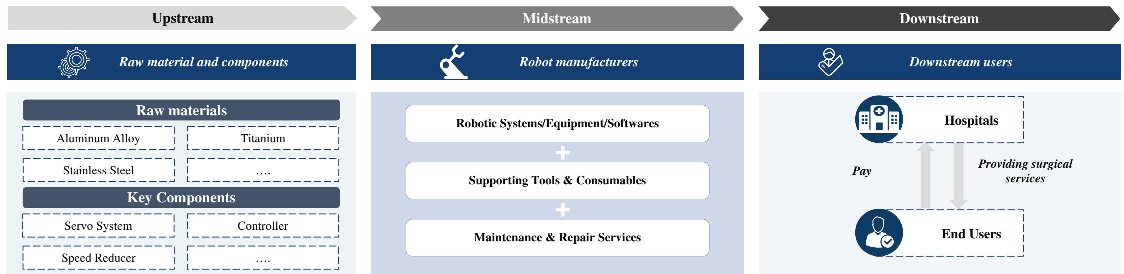
	Oncology	General Surgery	Respiratory	Gastroenterology	Urology	Cardiac	Thoracoabdominal	Neurosurgery	Interventional	Gynecology	Orthopedics	Imaging
Percutaneous Puncture Robots	✔	✔	✔	✔	✔		✔	✔	✔			✔
Percutaneous Ablation Robots	✔	✔	✔	✔	✔		✔		✔			
Laparoscopic Robots	✔	✔			✔					✔		
Natural Orifice Robots	✔		✔	✔	✔							
Pan-vascular Robots	✔					✔		✔	✔			
Orthopedic Robots											✔	
Neurosurgery Robots								✔				

Source: Expert Interview, CIC

Industry Chain of Surgical Robot Market

The value chain of surgical robots spans upstream, midstream and downstream segments. Upstream, suppliers provide raw materials such as aluminum alloys, titanium and stainless steel, as well as core components including servo systems, controllers and speed reducers, which underpin product reliability and precision. The midstream segment undertakes overall system design, integration, assembly and the development of key functional modules such as imaging, navigation and control systems, transforming technological innovation into clinically compliant products. Downstream, hospitals and other medical institutions purchase and deploy surgical robots in minimally invasive procedures, integrating them into clinical workflows to deliver high-quality surgical services to patients.

Industrial chain of surgical robots



Source: CIC

Evolution of Surgical Robot

The evolution of surgical robots has proceeded in distinct phases. In the late 20th century, early systems were primarily positioning tools that relied on static preoperative imaging and offered limited or no real-time adjustment. In the early 21st century, platforms integrated with minimally invasive surgery and introduced multi-degree-of-freedom teleoperation, surgeon consoles and enhanced visualization. Across modalities and specialties, robots incorporated haptic feedback, intelligent control algorithms and adaptive learning to improve intraoperative stability, consistency and safety, as illustrated by the Da Vinci robotic surgical system and the Mako orthopedic platform. Since 2020, the field has moved toward highly integrated and increasingly automated surgical platforms that embed AI and machine learning to enable more capable intraoperative guidance, and intelligent surgical operations.

Comparison of Development Status between the Surgical Robot Market in China and US/EU Market

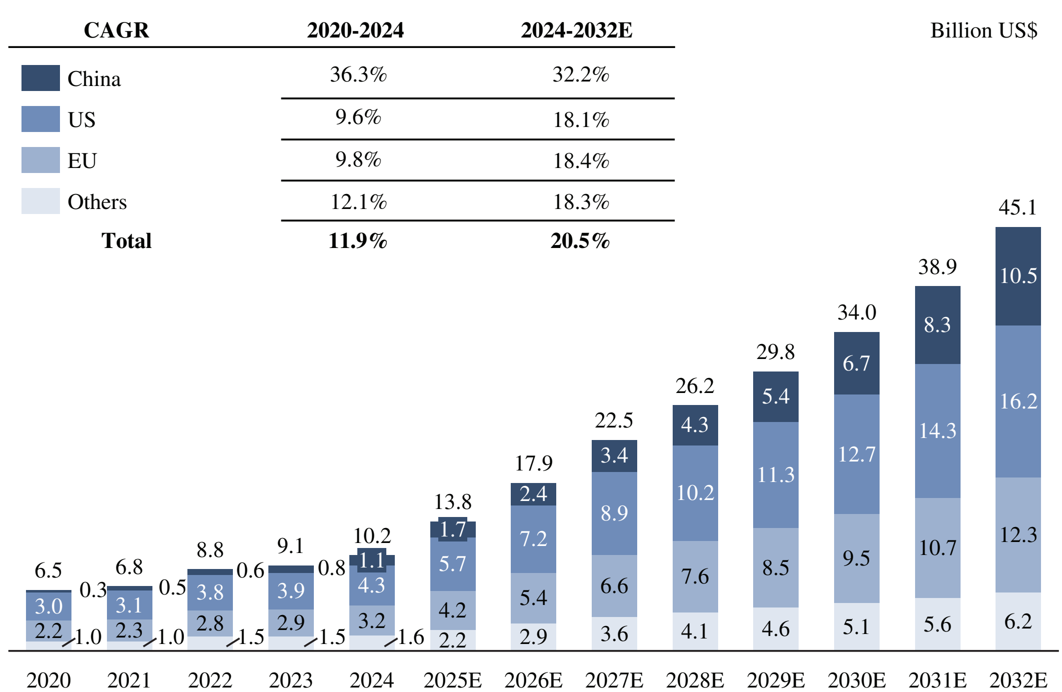
Compared with mature western market, China remains at an early exploratory stage in the commercial clinical application of surgical robots, with penetration rates and standardized application systems noticeably behind leading global levels. The US and EU markets have undergone more than two decades of commercialization and clinical validation, resulting in a relatively mature business model, reimbursement and training frameworks. Revenue structures among leading companies feature an instaled-base model in which system placements drive recurring consumables revenue. As hospital installations and the penetration of robot-assisted procedures increase, economies of scale in consumables and services and rising customer stickiness reinforce sustainable and stable compound growth momentum and competitive barriers. By contrast, China's adoption is currently led by tertiary hospitals and key departments, with overall penetration still low and clinical pathways and scalable operations continuing to be refined.

In the medium to long term, as regulatory pathways become clearer and reimbursement and training systems are progressively established, together with the accumulation of high-quality local evidence, the China market has the potential to transition from low penetration to rapid growth and to move toward large-scale adoption. Since 2020, China's surgical robot market has entered a phase of accelerated commercialization, with faster product approvals, ongoing expansion of approved indications, and a steady increase in hospital tenders and installations. Policy support for high-end medical equipment, together with pilots in medical insurance and DRG payment, has enhanced hospitals' adoption visibility. Domestic manufacturers have continued to advance in core components and system integration and have demonstrated more responsive service.

Global Surgical Robot Market Size

Driven by the rising penetration of minimally invasive procedures, continued advances in technologies, and growing hospital adoption, the surgical robot market has expanded rapidly. The global market grew from US$6.5 billion in 2020 to US$10.2 billion in 2024, representing a CAGR of 11.9%. The China market increased from US$0.3 billion in 2020 to US$1.1 billion in 2024, reflecting a CAGR of 36.3%. Looking ahead, the global and China surgical robot markets are expected to reach US$45.1 billion and US$10.5 billion by 2032, respectively, implying CAGRs of 20.5% and 32.2% from 2024 to 2032. The chart below illustrates the historical and forecast sizes of the global and China surgical robot markets for the periods indicated.

Global surgical robot market size, 2020-2032E



Source: CRSA, OECD, FDA, NMPA, Expert Interview, Annual Report, CIC

Business Model of Surgical Robot

The business model for surgical robots generally comprises equipment sales, consumables supply, and services such as after sales. Equipment sales are the primary revenue source during the installation phase and cover the initial purchase of the main console and functional modules as well as installation and commissioning. Consumables supply provides recurring revenue after installation and includes all replaceable components and accessories used in conjunction with the surgical robot, with stable repurchase driven by procedure volume growth. After-sales and other services encompass maintenance, calibration and upgrades, spare-parts replacement, clinical and engineering training, intraoperative technical support, software licensing and updates, extended warranties and full life-cycle services, which are generally settled under annual service contracts or on a per-case basis. As the instaled base expands, the revenue contribution from consumables and services typically increases, forming a recurring revenue structure that correlates with surgical volumes, and subject to compliance and hospital policies, some companies are also exploring supplemental fee models such as software or algorithm subscriptions, including subscription-based fees for AI modules, to enhance customer accessibility and the economics over the system life cycle.

Growth Drivers and Future Trends of Surgical Robot Market

The growth of the surgical robot market is expected to be driven and shaped by the following factors:

- ***Rising clinical demand***: Demand for surgical robots continues to grow as patients and clinicians increasingly favor minimally invasive procedures that offer less trauma, lower complication risk and faster recovery. Aging populations, rising cancer and chronic disease burden, and expanding surgical volumes are putting pressure on hospitals to improve operating room efficiency and standardize surgical quality across different surgeons and institutions. Together, these factors are driving steady growth in case volumes and supporting the broader clinical adoption of surgical robots.

- ***Physician resource constraints***: By standardizing complex steps through console-and-arm collaboration, surgical robots can shorten training cycles and help younger surgeons achieve higher consistency and repeatability within defined procedures, alleviating reliance on a limited number of highly experienced operators for difficult minimally invasive surgeries. Robotic assistance may also improve intraoperative targeting accuracy and operational stability, shorten procedure time and enhance operating room turnover, enabling hospitals to perform more cases with existing staffing.

- ***Improving affordability***: As pilot reimbursement programmes and other enabling policies reduce system costs and establish clearer, acceptable payment models for robotic-assisted procedures, the economic burden on hospitals and patients is gradually easing. For example, since 2021, Shanghai and Beijing have gradually included surgical robots within the scope of public medical insurance reimbursement, while the Hunan Healthcare Security Administration has standardized charging practices by issuing specific add-on fee schedules for surgical robot consumables, instrument kits and related services. These measures encourage more hospitals to introduce and routinely use surgical robots, thereby expanding patient access to advanced minimally invasive care.

- ***Policy and regulatory support***: In China, surgical robots have been encouraged at the national level as part of high-end medical equipment and intelligent manufacturing initiatives, including the "Robotics+" application program (《"機器人+"應用行動實施方案》) and the NMPA announcement on Measures to Optimize Full-Lifecycle Supervision to Support the Innovative Development of High-End Medical Devices (國家藥監局《關於發布優化全生命週期監管支持高端醫療器械創新發展有關舉措的公告》), which expressly support adoption of high-precision, minimally invasive robotic systems by medical institutions. Local governments, including Shanghai and Beijing, have also introduced dedicated programs to advance R&D, industrialization and hospital deployment, providing a policy foundation and practical incentives for clinical application and commercialization.

- ***Technology advancement and AI integration***: Surgical robots are evolving from mechanical assist devices into intelligent surgical platforms. Enhanced arm dexterity and imaging broaden their use in complex, confined and delicate anatomical areas. At the same time, AI is being applied to pre-operative image analysis, path planning and intraoperative navigation prompts, improving standardization and reproducibility and laying the groundwork for remote collaboration and assistance models.

OVERVIEW OF PERCUTANEOUS PUNCTURE SURGICAL ROBOT

Introduction of Percutaneous Puncture Surgical Robot

Percutaneous puncture surgical robots are designed for percutaneous procedures and are primarily intended to assist in obtaining tissue samples for diagnostic purposes. As high-precision medical devices for minimally invasive biopsy and therapeutic scenarios, these systems rely on MRI, CT and ultrasound imaging to localize target anatomy and to plan access trajectories. Under surgeon console commands, the robotic arm guides the needle to the pre-set position, forming a closed loop of identification, planning, guidance and placement to enhance needle-path accuracy and support percutaneous operations. The system typically comprises a visual perception system, an algorithm and decision-making system and a robotic arm execution system.

Architecture of percutaneous puncture surgical robots

Source: CIC

Development History and Representative Products of Percutaneous Puncture Surgical Robot

- ***Initiation and validation phase—early 2000s***: Early work was led by joint clinical-engineering teams and focused on image-guided localization prototypes whose core tasks were needle-path planning and mechanical alignment based on CT and other imaging, with feasibility, safety and accuracy verified through controlled studies.

- ***Engineering and early commercialization phase—2010s***: Products began to be engineered for specific departments and procedures, forming a commercial architecture that combined image fusion, path planning and alignment execution, and obtaining regulatory clearance for clinical use.

- ***Multidisciplinary expansion and indication deepening—around 2020 to the present***: The field has evolved toward highly integrated platform systems that strengthen the closed loop between imaging navigation and mechanical execution, and explore AI-assisted planning, intraoperative adaptive correction and multidisciplinary collaboration. Installations and procedure volumes have increased in percutaneous biopsy, accelerating commercialization, while indications have extended to the lung and other organs.

Application of Percutaneous Puncture Surgical Robot

Percutaneous puncture surgical robots are primarily used to assist image-guided biopsy and lesion localization, with key applications in pulmonary nodules, abdominal tumors, prostate disease and retroperitoneal lesions.

Applications of percutaneous puncture surgical robots

Indication	Description	Pain Point	Advantage
Pulmonary nodules	A puncture needle is inserted through the skin and chest wall into the pulmonary lesion	• Movement due to respiratory motion • Multiple CT scans • Frequent needle adjustments • Complications such as pneumothorax and hemoptysis	• Plans the optimal puncture path • Improves puncture success rate • Reduces the risk of complications • Minimizes radiation exposure for both doctors and patients
Abdominal tumor: Liver tumors; Kidney lesions; Pancreatic cysts; Other masses	A puncture needle is inserted through the upper abdominal cortex into the lesion for biopsy	• Technically challenging and carries a high risk due to the dense distribution of adjacent organs and blood vessels • Steep learning curves • Frequent needle adjustments • Increased radiation exposure	• Accurately locates lesions • Protects important structures such as blood vessels and nerves • Shortens operation time • Reduces bleeding and unnecessary damage
Prostate cancer	A puncture needle is inserted through the rectal wall or perineum into the prostate to collect tissue samples	• Requires the cooperation of two or more physicians • Uneven puncture • Higher rate complications • Certain rate of missed diagnoses	• Reduces puncture complexity • Enhances doctors' puncture accuracy • Increases the positive detection rate in patients • Lowers missed and incorrect diagnoses • Alleviate patient suffering
Retroperitoneal lesions	A percutaneous needle is advanced via a posterior paraspinal or flank retroperitoneal approach to biopsy or ablate deep lesions	• Deep target, narrow window • Close to major vessels, ureter, nerves • Motion causes target shift and re-aiming	• 3D preplanning of safe corridor and entry • Motion compensation and stable guidance • Higher success and diagnostic yield • Fewer complications, less time and radiation

Source: Literature review, CIC

The epidemiological burden of indications addressed by percutaneous puncture surgical robots remains high globally and in China. In 2024, the global prevalent population with pulmonary nodules was approximately 1.6 billion, including about 303.0 million in China, and is expected to increase to approximately 337.3 million in China by 2032. Over the same period, the incidence of lung cancer in China is projected to rise from approximately 1.1 million new cases in 2024 to about 1.5 million in 2032. Combined new cases of liver, kidney and pancreatic cancers totaled about 1.8 million globally in 2024 and are projected to rise to about 2.3 million by 2032, with China accounting for roughly 0.6 million cases, representing more than one quarter of global incidence. Prostate cancer, one of the more common malignancies among men in China, is estimated at 158.6 thousand people in 2024 and is expected to reach 267.9 thousand people by 2032. In addition, retroperitoneal diseases, a category encompassing neoplastic and non-neoplastic conditions arising in the retroperitoneal space and its structures, are estimated to affect about 24.4 thousand people in 2024, increasing to 25.5 thousand by 2032. This sizeable prevalent base and ongoing incidence collectively underpin a durable and predictable clinical need for image-guided percutaneous biopsy and lesion localization.

Comparison of Between Percutaneous Puncture Surgical Robots and Conventional Percutaneous Puncture Procedures

Compared with conventional percutaneous puncture procedures, percutaneous puncture surgical robots deliver higher precision and trajectory stability, streamline intraoperative workflow, and offer stronger reproducibility across surgeons and centers. By integrating pre-operative planning with intraoperative navigation and motion tracking, they maintain the planned path and reduce operator-dependent variability. Guided needle insertion lowers the need for trial-and-error adjustments and repeat imaging, shortening the learning curve and reducing reliance on a small number of highly experienced operators. Fewer needle passes and more accurate targeting also help lower complication risk, support faster recovery, and enable more standardized clinical practice.

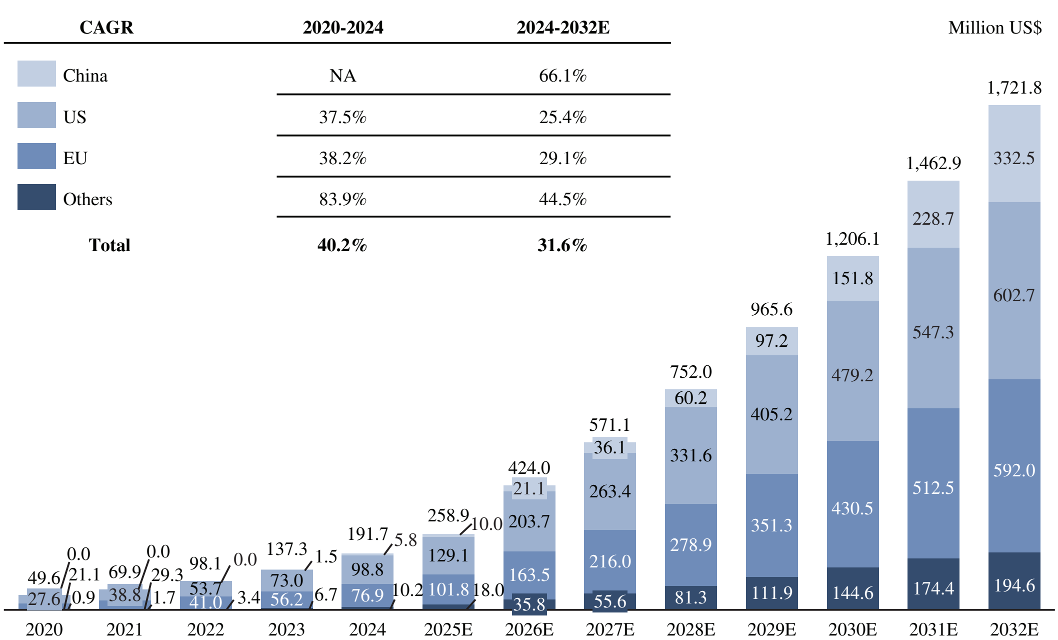
	Accuracy & Stability	Surgical Duration	Learning Curve	Postoperative Complications
Percutaneous Puncture Surgical Robot	• Mean accuracy **3~5 mm**, delivering consistent results across operators	• **Predefined needle paths** • Shortening procedure time **(10-25 min)**	• Automated needle positioning lowers the **technical threshold** and dependence on individual experience	• High first-pass success, resulting in **fewer complications and faster recovery at a severe complication rate <5%**
Traditional Puncture Surgery	• Relies heavily on **physician experience** • Accuracy **~7 mm**	• **Repeated angle adjustments and rescanning** • Prolonging surgery (**25-40 min**)	• Requires **high operator skill**	• Multiple needle attempts increase the risk of bleeding, infection and pneumothorax, and are associated with a severe complication rate of **~10%**

Source: Literature review, CIC

Global Percutaneous Puncture Surgical Robot Market Size

Global percutaneous puncture surgical robot demand is set to scale up rapidly, rising from about US$191.7 million in 2024 to roughly US$1,721.8 million by 2032, with a total 2024-2032 CAGR 31.6%. Within this expansion, China is the fastest-growing region with a CAGR of 66.1% for 2024 to 2032, moving from a negligible starting point in 2020 to US$332.5 million in 2032, reflecting rapid adoption across multiple indications and the rollout of standardized, navigation-assisted workflows that support precision, minimally invasive interventions.

Global percutaneous puncture robot market size, 2020-2032E

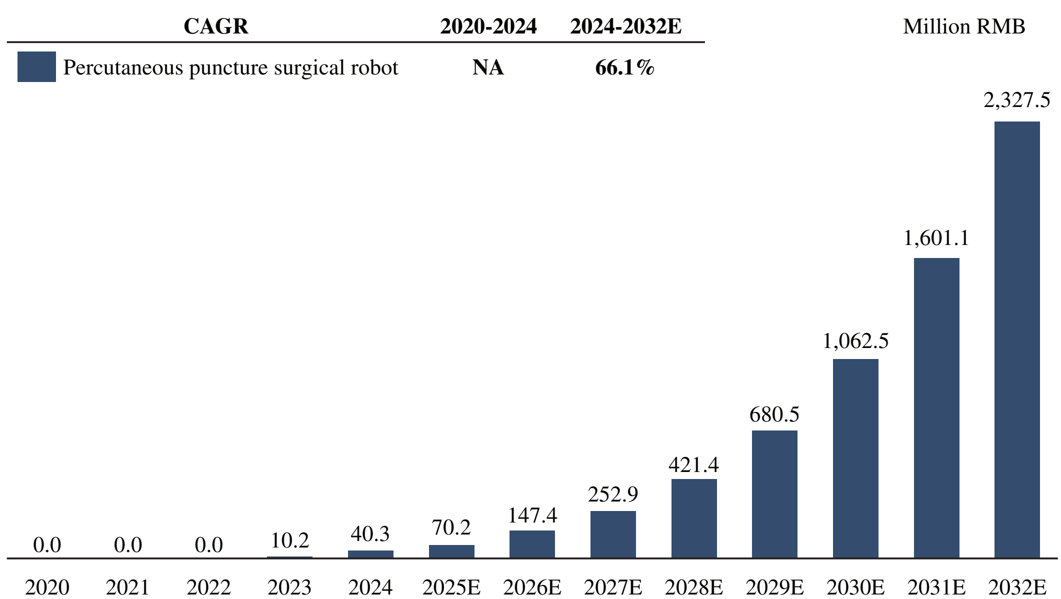


Source: WHO, FDA, NMPA, Expert Interview, Annual Report, CIC

China's Percutaneous Puncture Surgical Robot Market Size

Driven by rising volumes of image-guided biopsies, expanding use across pulmonary, abdominal, prostate and other indications, and accelerating hospital adoption of standardized, navigation-assisted workflows, China's percutaneous puncture surgical robot market has grown rapidly. The market increased from RMB0.0 million in 2020 to RMB40.3 million in 2024. Looking ahead, the market is expected to reach RMB2,327.5 million by 2032, implying a CAGR of 66.1% from 2024 to 2032. The expansion reflects the system's role as an enabling technology, supporting the shift toward precision-guided and minimally invasive interventions. The chart below illustrates the historical and forecast sizes of China's percutaneous puncture surgical robot market for the periods indicated:

Percutaneous puncture surgical robot market size in China, 2020-2032E



Source: NMPA, Expert Interview, Annual Report, CIC

Although percutaneous puncture surgical robots address key challenges in traditional percutaneous procedures, sales have been slow due to four structural factors. First, these systems target soft tissue organs in the lung and abdomen that move with respiration, making them more technically and clinically demanding than earlier orthopedic robots and requiring time for physician training and adoption. Second, because they are intended to replace freehand puncture, early commercialization depends on academic leadership, multicenter clinical use with good outcomes, and peer reviewed evidence to build hospital consensus, which can take years. Third, initial adopters are mainly top tier public hospitals with lengthy multistage procurement processes that often take about three years, especially in a weak medical device market. Fourth, China has not yet formed a unified nationwide medical service price item for robot assisted procedures, so provincial level pricing leads to fragmented charging standards and uncertainty over hospitals' ability to bill and recover device and consumable costs. For example, in Beijing robot assisted orthopedic surgery has been included as a Class A reimbursable item under the basic medical insurance catalog, whereas in Hunan the use of surgical robots is charged as a percentage add on to existing surgical price items.

Global Competitive Landscape of Percutaneous Puncture Surgical Robot Market

Globally, the market is likewise transitioning into a new phase defined by tighter convergence of imaging navigation, AI-driven planning and robotic execution. As of the Latest Practicable Date, 7 companies hold FDA 510(k) clearances covering 15 systems. Based on clinical trails search, a further 4 percutaneous platforms are in clinical evaluation or pre-market submission worldwide. Within this cohort, Quantum Surgical's Epione® was the first to expand indications beyond percutaneous biopsy to tumor-treatment procedures and is compatible with physicians' preferred ablation modalities, but is not itself an integrated ablation system.

In China, the market for percutaneous puncture surgical robots has already entered a competitive scaling phase, with leading domestic manufacturers, which has obtained approval in China, advancing toward more precise lesion localization, broader interventional indications and deeper integration of imaging navigation and AI-based decision support.

China's Competitive Landscape of Percutaneous Puncture Surgical Robot Market

China's percutaneous puncture surgical robot market is still at an early stage, with a limited pool of approved products and new entrants emerging. As of the Latest Practicable Date, a total of 17 percutaneous puncture surgical robots had obtained NMPA approval in China, comprising 15 domestic products and 2 imported products. Our company's systems have recorded the highest number of trial installation nationwide in 2024.

Top 5 Providers of Percutaneous Puncture Surgical Robot, China, 2024

Rank	Name	Number of Trial Installation in 2024
1	**Our Company**	26
2	Competitor A[(1)]	20
3	Competitor B[(2)]	8
4	Competitor C[(3)]	5
5	Competitor D[(4)]	5

Source: Expert interview, CIC

Notes:

(1) Founded in 2019, headquartered in Shanghai, the company is a medical technology company focused on independent R&D of high-performance surgical robots. Through its industry-unique CT-guided core technology and products, it assists doctors in performing surgery safely, efficiently and accurately.

(2) Founded in 2015, headquartered in Shanghai and listed in 2021 on HKEX, the company's product portfolio covers laparoscopic, orthopedic, pan-vascular, natural orifice and percutaneous puncture surgical robot.

(3) Founded in 1999, headquartered in Shenzhen, the company focuses on manufacturing and global development of interventional medical devices for cardiovascular, cerebrovascular and peripheral vascular diseases.

(4) Founded in 2019, headquartered in Shenzhen, the company engaged in the R&D of medical surgical robots. It has developed percutaneous interventional surgical robots for lung and kidney procedures.

NMPA Approval List of Percutaneous Puncture Surgical Robots, China

Since the first product was approved in 2022, percutaneous puncture surgical robots have successively obtained registration certificates, reflecting steady progress in regulatory recognition and industrialisation. As of the Latest Practicable Date, our company had obtained 4 NMPA approvals, representing both the earliest and the largest number of NMPA-approved products in this segment. According to the NMPA, our percutaneous puncture surgical robot has also been recognized as "the first of its kind in China".

Registration Certificate Number	Company	Type	Product name	Approval date	Application	Number of Approval
國械注准20223010624	**TrueHealth**	**Domestic**	**TH-S1**	**05/13/2022**	**Lung and abdomen**	**4**
國械注准20233010810			**TH-S**	**06/15/2023**		
國械注准20243012455			**TH-P Elite/ TH-P/ TH-P Plus**	**12/05/2024**		
國械注准20243012643			**TH-S Pro**	**12/30/2024**		
國械注進20233010199	Biobot Surgical Pte Ltd	Imported	iSR'obot Mona Lisa	05/12/2023	Prostate	1
國械注進20233010365	Quantum Surgical	Imported	EPIONE 30-0001	08/16/2023	Abdomen	1
國械注准20233011291	Tuodao Medical	Domestic	NP100	09/06/2023	Lung and abdomen	2
國械注准20253011264			PB100	06/27/2025	Prostate	
國械注准20243010229	Ariemedi	Domestic	ARMD-PN-201	01/31/2024	Lung and abdomen	1
國械注准20243010387	Simple Touch	Domestic	RC 120	02/21/2024	Lung	1
國械注准20243010922	Curaway Medical	Domestic	CR-NAV100	05/16/2024	Lung and abdomen	1
國械注准20243011118	WeiDe Precisely	Domestic	WD-Lung-Navi I	06/18/2024	Lung and abdomen	1
國械注准20243011560	EDDA	Domestic	IQQA-Guide SI-ROBOT	08/23/2024	Lung and abdomen	1
國械注准20253010073	Amit	Domestic	FARE-OC-P	01/10/2025	Abdomen	1
國械注准20253010487	Zoye Medical	Domestic	ZY-TU-6	03/06/2025	Lung and abdomen	1
國械注准20253010707	United Imaging	Domestic	UInterv C550-A/ C550-B/ C550-C	04/01/2025	Lung and abdomen	1
國械注准20253012369	Hanglok-Tech	Domestic	HLT-SGNIO-A	11/25/2025	Liver	1

Note: As of the Latest Practicable Date

Source: NMPA, CIC

China's Policy of Percutaneous Puncture Surgical Robot Market

China's policy environment for percutaneous puncture surgical robots is increasingly supportive across standard-setting, adoption and industry application. The Action Plan for the Implementation of the National Standardization Development Outline (2024-2025) 《貫徹實施<國家標準化發展綱要>行動計劃(2024-2025年)》promotes the formulation and improvement of standards in emerging fields such as medical robots, providing clearer technical and compliance baselines. The Guidelines for Implementing the Project on Building the Basis of Public Safety Standardization 《關於實施公共安全標準化築底工程的指導意見》include artificial-intelligence medical devices and medical robots, reinforcing coordinated standards for safety and performance. The Action Plan to Promote Large-scale Equipment Renewals and Trade-ins of Consumer Goods《推動大規模設備更新和消費品以舊換新行動計劃》encourages upgrades of high-end medical equipment and the development of a high-quality and efficient healthcare service system, which supports procurement of surgical robots. The Implementation Plan for the "Robots plus" Application Action 《"機器人+"應用行動實施方案》led by industry regulators encourages hospitals with appropriate conditions to use robots to perform minimally invasive procedures, fostering clinical adoption and scenario-based application. Collectively, these policies improve standardization, reduce adoption uncertainty and support both supply-side capability building and demand-side deployment for percutaneous puncture surgical robots. In addition, the 2024 Annual Report on Medical Device Registration 《2024年度醫療器械註冊工作報告》 identifies medical robots, AI-enabled medical devices, high-end imaging equipment and novel biomaterials as four priority areas and explores integrated, full-chain innovation support policies. The Announcement on Optimizing Full-lifecycle Supervision to Support the Innovative Development of High-end Medical Devices 《關於發布優化全生命周期監管支持高端醫療器械創新發展有關舉措的公告》 issued in July 2025 further introduces classification guidelines for medical robots such as surgical and rehabilitation robots and establishes an expert consensus on medical robot nomenclature.

Growth Drivers and Future Trends of Percutaneous Puncture Surgical Robot Market

The growth of the percutaneous puncture surgical robot market is expected to be driven and shaped by the following factors:

- ***Aging population and rising chronic disease burden***: According to National Bureau of Statistics, as of 2024, people aged 65 and above accounted for about 15.6% of China's total population, and the aging trend is expected to continue over the coming decades. Older patients generally face higher surgical risk, driving demand for safer and more efficient percutaneous puncture solutions. In parallel, the prevalence of major solid tumours, such as prostate, lung and liver cancers, is expected to increase, which is anticipated to translate into further growth in robot-assisted percutaneous procedures.

- ***Penetration increase***: In recent years, robot-assisted surgery in China has developed steadily on the back of technological progress and accumulating clinical evidence. The first percutaneous puncture surgical robot received NMPA approval in 2022, marking the start of commercialization. Although adoption remains at an early stage, percutaneous robots streamline procedural workflows by automating complex localization steps and lowering the technical threshold, which is expected to drive accelerated growth in instaled base and procedure volumes.

- ***Primary-level market demand***: As China deepens healthcare reform and rolls out a tiered diagnosis and treatment system, policy emphasises primary-care first contact, two-way referral and differentiated management of acute and chronic conditions. This requires primary institutions to strengthen capabilities in managing common diseases and postoperative rehabilitation. With their precision, minimal invasiveness and relatively tractable learning curves, percutaneous surgical robots are well placed to serve as enabling tools for primary hospitals, while ongoing trends toward system miniaturization are expected to further enhance their suitability for space- and resource-constrained primary settings, supporting standardized workflows and helping to promote a more balanced regional allocation of medical resources.

- ***Indication expansion***: China has a large and growing population eligible for percutaneous interventions, including an estimated 560.0 thousand new cases of liver, kidney and pancreatic cancers and about 1,144.9 thousand incident cases of lung cancer in 2024, as well as an increasing number of detected pulmonary nodules, thyroid and breast nodules through normalized screening and imaging-based early diagnosis. Under imaging guidance, percutaneous puncture surgical robots support standardized biopsy and local therapies by optimizing pathway planning and needle placement and reducing complication risk. As utilization deepens in other high-incidence organs, penetration is expected to progressively extend to more technically challenging sites and multi-disciplinary settings.

- ***Technology and education diffusion***: As percutaneous surgical robot technologies continue to mature, structured physician training and standardized operating protocols are expected to drive faster penetration. Looking ahead, AI is set to be the primary catalyst of the next adoption wave, with AI-assisted image segmentation and registration, automated trajectory planning and collision avoidance, adaptive control during needle insertion and outcome-prediction decision support expected to reduce learning curves and variability. In parallel, AI-powered simulators for credentialing, digital-twin rehearsal and fleet-level predictive maintenance are anticipated to accelerate clinical uptake and scaled deployment of percutaneous surgical robots.

OVERVIEW OF TUMOR ABLATION

Introduction of Tumor Ablation

Tumor ablation is a class of minimally invasive local therapies in which a chemical agent or physical energy is applied directly to the target lesion to destroy tumor cells in situ and thereby treat the local tumor focus. In clinical practice, tumor ablation is generally divided into chemical ablation and physical ablation. Chemical ablation involves injecting ablative agents such as absolute ethanol directly into the tumor to induce coagulative necrosis through chemical injury. Physical ablation uses energy modalities to generate thermal effects, cryogenic effects, high-energy electric-field effects or other physical effects within the target lesion, leading to disruption of cell membranes, protein denaturation, and cellular necrosis or apoptosis.

Tumor ablation techniques have been adopted for the treatment of multiple solid tumors and are commonly used to treat early-stage malignant tumors and biopsy-positive nodules in the lung and abdominal organs, as well as for palliative management of bone tumors in advanced stages. They are often considered when the location or extent of the lesion makes conventional surgical resection difficult or would require highly invasive surgery; in addition to their potential benefits of reduced procedural trauma and shorter recovery, ablation may also be chosen when patients prefer to avoid open surgery or major resection despite the availability of other options, or when they are deemed unsuitable for extensive surgery because of age, comorbidities or overall clinical condition.

Comparison between Different Tumor Ablation Methodologies

Clinically used tumor ablation modalities mainly include radiofrequency ablation, microwave ablation, high-intensity focused ultrasound, cryoablation, irreversible electroporation, laser ablation and chemical ablation. These modalities differ in invasiveness, controllability of energy delivery, predictability of ablation zone formation, procedural complexity, safety margins required near critical structures and anesthesia needs. In practice, selection is based on tumor location, volume and morphology, the surrounding anatomy, patient tolerance, and the availability of equipment and technologies at the treating hospital. Radiofrequency ablation and microwave ablation remain among the most widely adopted techniques in current clinical practice because the operative pathways are relatively mature, the consumable ecosystems are well established and the learning curve for physicians is comparatively manageable.

Comparison of different methodologies for tumor ablation

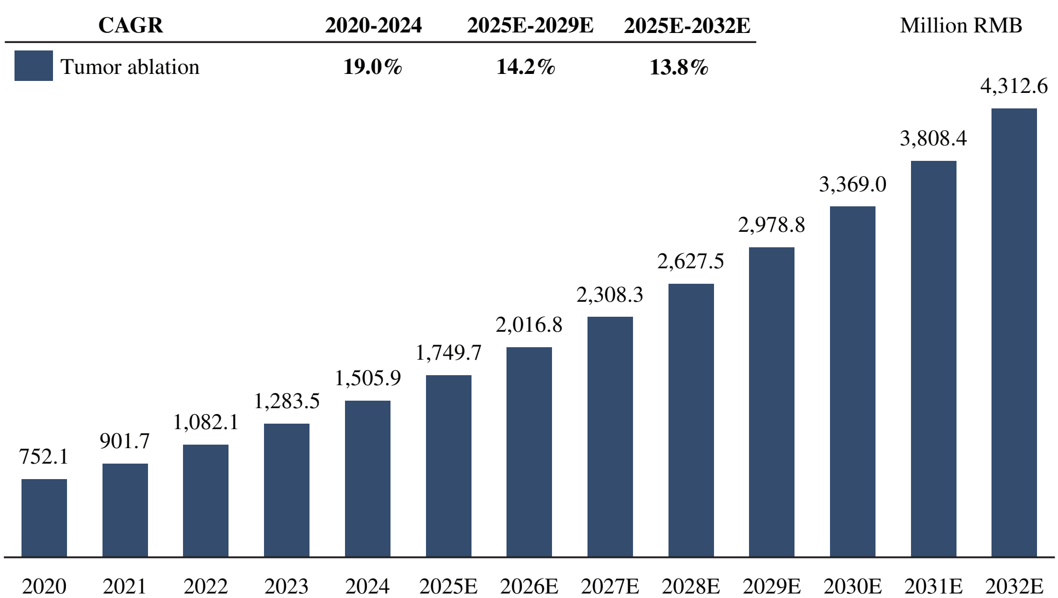
Classification	Advantages	Disadvantages
Radiofrequency	• Precise and minimally invasive, with good conformability and reduced impact on surrounding tissues, leading to improved overall safety	• Requires a grounding pad, has relatively long ablation time, and is affected by the heat-sink effect
Microwave	• Non-current conduction and therefore less affected by tissue drying/charring • **Rapid ablation, good results, wide ablation zone**	• Charring zones may affect absorption and energy deposition in the target area
Cryoablation	• No general anesthesia needed, **ablation zone clearly visible on imaging** • Adaptable to tumor shape with multi-probe use, activates anti-tumor immunity	• Risk of lethal complications (e.g., extreme hypothermia, cryoshock), postoperative bleeding and seeding metastasis
Irreversible Electroporation	• Tissue selectivity with minimal heat-based ablation restrictions, avoiding collateral damage to surrounding organs caused by heat conduction	• Difficult needle placement, muscle twitching • Requires general anesthesia
High Intensity Focused Ultrasound	• Minimally or non-invasive • Suitable for deep-seated tumors	• Long treatment time • Irregularly shaped tumors may lead to off-target ablation • Not suitable for air-containing organs
Laser	• Minimal damage to surrounding tissues, short ablation time, and small puncture injury	• Limited ablation range
Chemical	• Simple operation, low cost • Effective for liver tumors <2cm in diameter	• Requires repeated treatments • Difficult to achieve complete ablation for large tumors

Source: Literature review, CIC

China's Tumor Ablation Market Size

China's tumor ablation market, measured by treatment costs, expanded from RMB752.1 million in 2020 to RMB1,505.9 million in 2024, representing a CAGR of 19.0%. It is expected to reach RMB4,312.6 million by 2032, implying a CAGR of 14.1% from 2024 to 2032. Growth is supported by a widening eligible patient pool, normalization of screening for nodule-related diseases, broader clinical adoption of image-guided minimally invasive pathways across lung, abdomen and other indications, and improved interventional capacity at tertiary and qualified regional hospitals. Increasing procedure volumes and a shift toward standardized care are also driving higher utilization of associated consumables and services, which in turn provide greater visibility for recurring revenues. The outlook assumes continued policy support and ongoing technology advances that enhance procedural safety and effectiveness, while adoption remains centered on higher-level institutions.

China's tumor ablation market size, in terms of treatment costs, 2020-2032E



Source: WHO, NMPA, Expert Interview, CIC

Growth Drivers and Future Trends of Tumor Ablation Market

The growth of the tumor ablation market is expected to be driven and shaped by the following factors:

- ***Large patient base driving sustained and structural demand***: China records one of the highest numbers of newly diagnosed malignant tumors each year, and the need for cancer prevention and treatment continues to rise. The large patient population directly increases demand for a range of local tumor therapies. Against this backdrop, tumor ablation, by virtue of its minimally invasive or near-noninvasive nature, relatively short recovery period and ability to provide local control in defined focal tumors, is increasingly accepted by patients and clinical departments as an alternative or complement to conventional surgical resection.

- ***Rising clinical utilization***: As technologies such as radiofrequency ablation and microwave ablation have matured, operability and reproducibility in clinical departments have improved, and adoption has extended from a limited number of centers to a broader base of hospitals. These procedures are increasingly regarded as options to suppress local tumor progression and improve patient quality of life. Growing procedure volumes, in turn, encourage further investment by hospitals in equipment, consumables, and clinician training, creating a virtuous cycle.

- ***Evolution from equipment-led to consumables-driven models***: In the early stage, industry participants primarily generated revenue from one-off sales of standalone equipment, with limited involvement in downstream clinical workflows. As instaled bases have expanded and clinical applications have deepened, revenue models are increasingly pivoting toward consumables-linked income. This transition not only improves revenue visibility and profitability, but also strengthens customer stickiness and underscores significant long-term market potential.

- ***Ongoing technology advancements and clinical advantages***: Tumor ablation delivers local treatment of target lesions under imaging guidance with smaller trauma, faster recovery and more controllable costs than certain highly invasive surgical options, helping hospitals balance outcomes and resource use. At the same time, ablation systems are evolving toward intelligent, precision operation, using AI to process multimodal data in real time, delineate tumor boundaries and adjacent critical structures, and support preoperative planning and intraoperative navigation, thereby improving the predictability and standardization of ablation workflows.

- ***Integration of multi-energy and multi-modal approaches***: The technology paradigm is evolving from single-energy modalities toward synergistic and combined modes. Future ablation systems are expected to emphasize flexible use of different physical mechanisms within a single treatment plan in order to deliver more targeted local destruction and lesion control across diverse tumor types and biological characteristics. Such multimodal integration is expected to broaden applicability, particularly for complex locations or sites adjacent to critical structures, and to provide clinically meaningful local treatment alternatives.

OVERVIEW OF PERCUTANEOUS ABLATION SURGICAL ROBOT

Introduction of Percutaneous Ablation Surgical Robot

A percutaneous ablation surgical robot is an intelligent, minimally invasive interventional platform that integrate an ablation energy module with pre-operative planning software, imaging-based navigation systems, and a robotic execution system. Under imaging guidance, these systems assist clinicians in percutaneous ablation by processing CT, MRI, or ultrasound data to generate optimized puncture paths and needle-entry plans. During the procedure they provide real-time spatial localization of the target lesion and the instruments, deliver the ablation needle or probe to the planned target through automated path guidance and stable mechanical execution, and then apply energy such as thermal ablation, cryoablation, or other modalities to achieve local destruction of tissue. In clinical practice they can be used for focal lesions of solid organs including the liver, kidney, lung, breast, thyroid, prostate, bone and other organs.

Classification of Percutaneous Ablation Surgical Robot

Percutaneous ablation surgical robots are typically classified by the energy source integrated into the system and primarily include radiofrequency ablation surgical robots, microwave ablation surgical robots, cryoablation surgical robots, irreversible electroporation ablation surgical robots, and laser ablation surgical robots.

	Radiofrequency (RF) Ablation Robot	Microwave Ablation Robot	Cryoablation Robot	Irreversible Electroporation Robot	Laser Ablation Robot
Energy Source	High-frequency alternating current	Electromagnetic waves (915 MHz-2.45 GHz)	Argon/helium gas	Pulsed electric fields	Laser
Mechanism of Action	Heat generation (50-100C) via ionic agitation	Dielectric heating (tissue water molecules)	Freezing (-40C to -100C) → cellular necrosis	Non-thermal cell membrane perforation	Photothermal coagulation
Clinical Applications	Liver, kidney, bone, lung tumors	Liver, lung, thyroid, soft tissue tumors	Prostate, breast, renal tumors	Pancreatic, liver tumors near vessels	Brain, liver, small tumors
Advantages	Precise control, mature technology	Faster heating, larger ablation volumes	Minimal pain, real-time ice-ball imaging	Preserves vessels/bile ducts	Ultra-precise, minimal invasiveness
Limitations	Limited ablation zone, heat sink effect	Potential collateral thermal damage	Risk of cracking adjacent tissues	Requires general anesthesia	Limited penetration depth
Approval	×	✓	×	×	×

Source: Literature review, CIC

Introduction to Percutaneous Microwave Ablation Surgical Robot

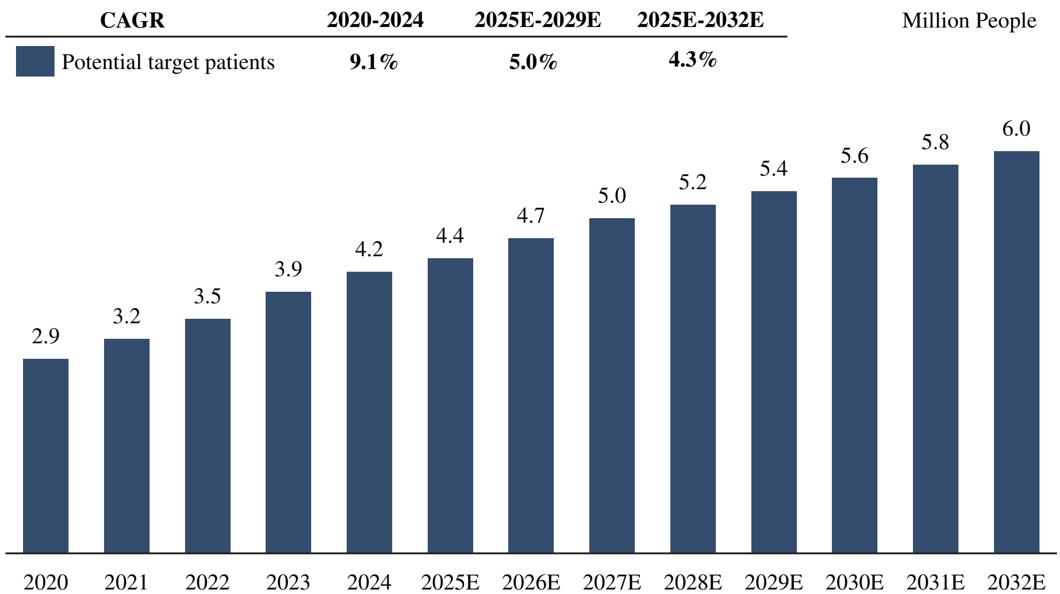
A percutaneous microwave ablation surgical robot is a minimally invasive system that integrates navigation, percutaneous needle placement and microwave ablation energy delivery on a single platform. Compared with percutaneous puncture surgical robots, this all-in-one system first performs image-guided navigation and precise percutaneous puncture, and then delivers electromagnetic energy to the target region via a microwave generator, inducing rapid dielectric polarization and rotation of water molecules in local tissues to generate heat, raise tumor cells to cytotoxic temperatures and achieve local ablation. By unifying imaging guidance, needle positioning and ablation control in one device, the system enables closed-loop control and parameter linkage. This enhances spatial accuracy and safety and supports more consistent, standardized ablation than separate puncture robots and ablation platforms. Currently, microwave ablation procedures are used for indications such as liver cancer, breast cancer, thyroid nodules and lung nodules. At present, the approved indication for microwave ablation surgical robots is limited to the microwave ablation of solid liver tumors. Over time, these systems are expected to expand their indications to a broader range of organs and tumor types.

China's Potential Target Patients for Percutaneous Microwave Ablation Surgical Robot

China's target patients for percutaneous microwave ablation surgical robots are defined as individuals who, after completing diagnostic evaluation in accordance with clinical practice guidelines, are deemed clinically eligible for percutaneous microwave ablation. Examples include patients who, after imaging assessment and percutaneous biopsy, are confirmed to have positive liver nodules presenting as a single tumor with a diameter ≤5 cm, or 2–3 tumors with a maximum diameter ≤3 cm, or who are found intra-operatively to be unsuitable for surgical resection, as well as patients with malignant pulmonary nodules whose cardiopulmonary function cannot tolerate surgical resection. According to this definition, the potential target patients for percutaneous microwave ablation surgical robot in China increased from 2.9 million in 2020 to 4.2 million in 2024, representing a CAGR of 9.1%. It is projected to rise further to 6.0 million by 2032, implying a CAGR of 4.6% from 2024 to 2032. Ongoing normalization of screening for liver, pulmonary and breast nodules and improved imaging availability contribute to earlier detection and a higher proportion of patients suitable for minimally invasive local therapy.

Clinical practice is increasingly adopting standardized ablation pathways across liver, lung and kidney indications, which broadens awareness among clinicians and patients and improves referral efficiency. The sustained growth in patient numbers provides clearer visibility on procedure demand and underpins the long-term expansion of standardized, minimally invasive ablation pathways.

Potential target patients for percutaneous ablation surgical robots in China, 2020-2032E

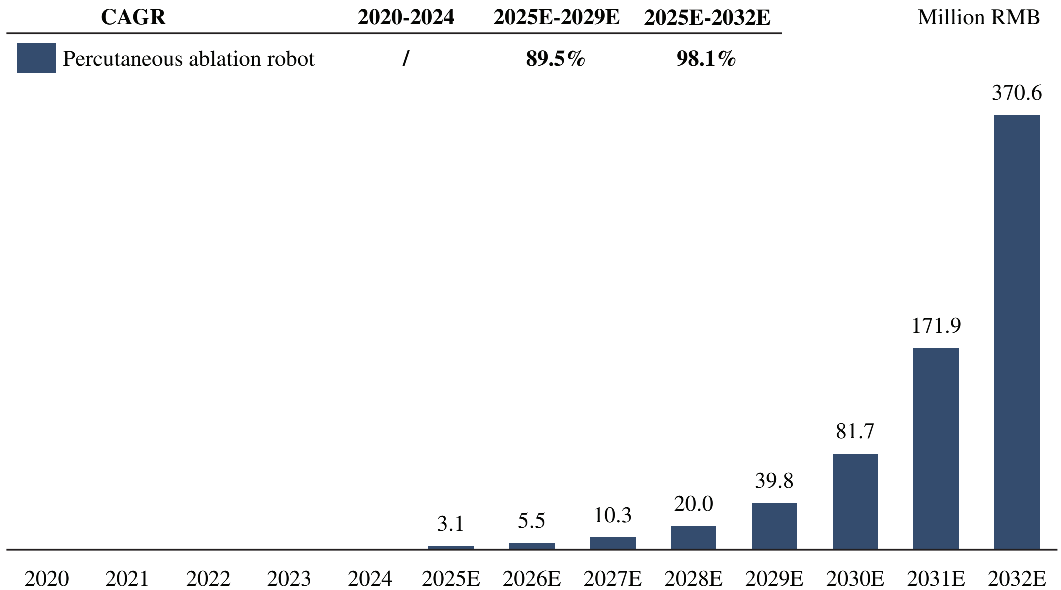


Source: WHO, NHC, The National Cancer Center (NCC) of China, Global Cancer Observatory, CIC

China's Percutaneous Microwave Ablation Surgical Robot Market Size

China's percutaneous microwave ablation surgical-robot market is at an early commercialization stage, with meaningful revenue expected to commence after 2024. Market size is projected to rise from approximately RMB3.1 million in 2025E to RMB370.6 million by 2032, reflecting rapid scale-up as approvals translate into hospital tenders, initial installations, and expanding clinical indications. Growth is underpinned by the widening pool of ablation candidates, improvements in image-guided navigation and robotic execution, and supportive hospital procurement and policy environments that enable conversion from pilot use to scaled clinical deployment.

China's percutaneous microwave ablation surgical robot market size, 2020-2032E



Source: Expert Interview, CIC

Competitive Landscape of Percutaneous Microwave Ablation Surgical Robot Market

At present, several cleared percutaneous puncture robots can be used in microwave ablation workflows when paired with compatible microwave generators and probes. Representative examples include XACT ACE and Quantum Surgical Epione. These products operate as navigation and robotic insertion platforms and are used together with third-party microwave energy devices rather than providing an integrated ablation module. In contrast, our company's Navigational Positioning Microwave Ablation System in China is described as an integrated solution that combines puncture navigation and microwave energy delivery, and has been designated by the NMPA as "the first system of its kind worldwide". Aside from our company's products, no approved percutaneous microwave ablation surgical robot has been identified that natively integrates both puncture navigation and microwave ablation within a single platform.

China's percutaneous ablation surgical robot market remained at an early stage, and had not yet entered routine, large-scale procurement and deployment. In September 2024, our company's percutaneous microwave ablation surgical robot received NMPA approval, becoming the first approved product in this sub-segment, and in November 2025, we obtained a second NMPA approval for another percutaneous microwave ablation surgical robot. However, due to the late timing of approval, there were no substantive shipments recorded in 2024. Other relevant companies had not obtained NMPA approval for this category of robotic products and had not commenced commercial delivery.

Growth Drivers and Future Trends of Percutaneous Microwave Ablation Surgical Robot Market

The growth of the percutaneous microwave ablation surgical robot market is expected to be driven and shaped by the following factors:

- ***Increasing need for precision and individualized therapy***: In clinical practice, tumor ablation places growing emphasis on precise localization of patient-specific lesions and protection of adjacent critical anatomy. Percutaneous ablation surgical robots can generate individualized puncture paths and energy-delivery plans based on a patient's imaging data and use multi-degree-of-freedom manipulators to maintain stable control and fine trajectory adjustments intra-operatively. This model is intended to improve targeting accuracy, reduce impact on surrounding organs and critical tissues, decrease the need for repeat punctures, and to some extent shorten the learning curve.

- ***Broader access and indications***: China's uneven distribution of medical resources is driving demand for standardized, minimally invasive tumor treatments that can be supported remotely, with percutaneous ablation surgical robots expected to help extend specialist care to less-developed regions. At the same time, clinical use is anticipated to expand beyond historically concentrated liver and thyroid indications to additional anatomical sites and into broader multidisciplinary care settings. As new indications are validated and incorporated into routine practice, the addressable patient population and procedure volumes are expected to increase, supporting a larger instaled base of percutaneous ablation surgical robots.

- ***Technology iteration-driven integrated ablation upgrade***: With continued technology iteration, percutaneous ablation surgical robots are shifting from stand-alone navigation platforms paired with separate energy devices to integrated systems that combine puncture planning, robotic execution and microwave energy delivery within a unified architecture. Integrated robots can better align the actual ablation zone with the planned target volume, and reduce reliance on manual coordination between different devices. This integrated navigation and energy design is regarded as critical for enhancing procedural repeatability, standardizing workflows across hospitals and clinicians, and accelerating broader clinical adoption of percutaneous ablation surgery.

OVERVIEW OF ORGAN PRESERVATION ROBOT

Introduction of Organ Preservation Robot

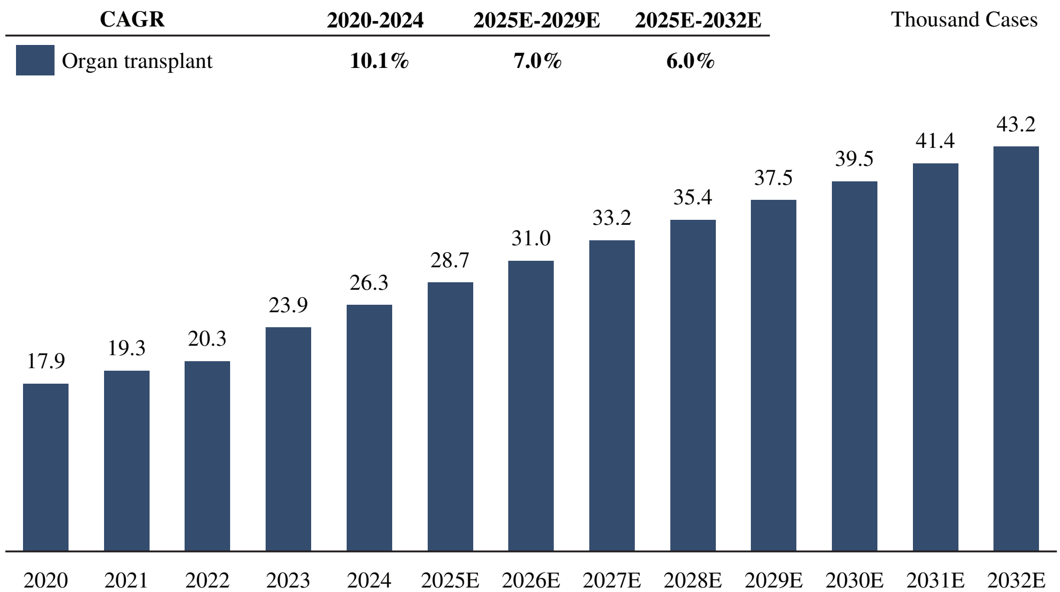
Organ preservation robots generally refer to intelligent perfusion platforms designed for ex vivo preservation, in-transit maintenance and functional assessment of donor organs. These systems can operate at near-normothermic or sub-physiological temperatures, continuously monitoring key physiological indicators of the explanted organ, such as perfusion flow, oxygen delivery and metabolic status, and dynamically adjusting perfusate composition, temperature and pressure through algorithmic control to provide a microenvironment that approximates physiological conditions. In future configurations, the platform may be combined with perfusion modules, including robotic manipulators for localized interventions or supportive treatment, to deliver stable support and targeted repair during transport and bridging periods.

Clinically, organ preservation robots are intended for the ex vivo preservation and functional maintenance of solid organs such as the liver and kidney and are used in critical steps from procurement at the donor hospital to implantation at the recipient center, including storage, transport and viability assessment. The objective is to maintain, and in certain cases improve, the transplantability of marginal donor organs prior to surgery, while also laying a technical foundation for in-transit support of other vital organs.

China's Number of Organ Transplant Cases

China's organ transplant volume increased from 17.9 thousand in 2020 to 26.3 thousand in 2024, representing a CAGR of 10.1%. It is projected to reach 43.2 thousand by 2032, implying a CAGR of 6.4% from 2024 to 2032. The steady trajectory indicates sustained expansion of transplant activity, supported by improvements in donor management and allocation, growth in qualified transplant centers, and more standardized care pathways. The rising procedure volume enlarges the addressable need for ex vivo preservation, in-transit maintenance, and functional assessment solutions.

Number of organ transplant in China, 2020-2032E



Source: NHC, CIC

Needs of Organ Preservation

- ***Reducing ischemic injury and maintaining organ viability***: Cold static storage and low oxygen supply leading to function decline. Under conventional cold static storage, organs experience low oxygen supply, and their function progressively declines due to cold ischemia. Providing a normothermic, oxygenated, nutrient-rich perfusion environment during transport helps sustain basic metabolic activity, effectively shorten the ischemic period, limit tissue injury en route, and thereby improve the utilization of donor organs for transplantation.

- ***Stabilizing the physical environment and lowering the risk of mechanical damage during transfer***: With standard boxes, repeated handovers and long-distance transport can expose organs to vibration, compression and impact. There is a clinical need for carrier systems that provide stable support and dampen external shocks across ground transport, flights and handovers, helping to keep organ conditions consistent and reduce quality loss from physical damage.

- ***Improving the controllability of preservation duration***: In real-world transport, traffic delays, flight waiting times and mismatches between transport and surgical schedules can cause organs to exceed the intended cold-storage window. Clinicians therefore need preservation systems that can maintain near-physiological or sub-physiological temperatures for longer periods and continuously monitor perfusion and oxygenation, rather than relying solely on cold immersion and passive insulation, so as to slow irreversible functional decline and extend the transplantable window.

- ***Enabling real-time preoperative assessment to improve transplant success***: Under current practice, organs often lack continuous, quantitative functional evaluation before arrival, and transplant teams must quickly decide whether an organ remains usable. Clinical demand is therefore shifting from simple preservation to full-process monitoring and dynamic assessment, with continuous recording of perfusion, viability and functional indicators during transport to determine in advance whether the organ is still suitable for transplantation.

- ***Enhancing utilization of marginal donor organ***: Persistent organ shortages and long transplant waiting lists coexist with a pool of donor organs classified as marginal, for example due to donor age, comorbidities or procurement related injury, whose post transplant function is uncertain and therefore often underutilized. This underutilization represents a missed opportunity to treat patients and highlights the need to safely convert more marginal organs into transplantable grafts. Organ preservation robots using normothermic oxygenated perfusion provide a controlled near physiological environment during transport, enabling continuous functional assessment and active rehabilitation of organ status.

Competitive Landscape of Organ Preservation Robot Market

The global organ preservation product landscape is steadily shifting toward more advanced platforms, with 3 major companies worldwide emerging as the primary providers. Transnovo focuses on the liver with CE and FDA PMA approvals and is extending to kidney devices and multi-organ perfusion. Transmedics's Organ Care System covers heart, lung and liver with CE and FDA approvals and is advancing kidney perfusion, longer heart preservation windows and air-logistics optimization. Transmedics is a listed company with a market capitalization of around US$4 billion as of the Latest Practicable Date. OrganOx metra® provides normothermic machine perfusion platforms that simulate near-physiological conditions with oxygenated blood at approximately 37°C to maintain organ activity. On August 25, 2025, Japan's medical technology company Terumo announced a deal to acquire OrganOx for approximately US$1.5 billion, with the aim of expanding its presence in the organ-transplantation field. The transaction underscores the strong growth potential of organ preservation and perfusion technologies amid persistent organ shortages and significant unmet clinical needs.

Growth Drivers and Future Trends of Organ Preservation Robot Market

The growth of the organ preservation robot market is expected to be driven and shaped by the following factors:

- ***Clinical demand driven by severe donor-organ shortages***: There is a persistent global shortage of suitable donor organs, and the number of patients with organ failure far exceeds the transplants that can be performed. According to the China Organ Transplant Response System (COTRS) in China, over 140,000 patients were registered on the national transplant waiting list in 2023. Organ preservation robots are viewed as an important way to ease this imbalance by providing continuous perfusion, oxygenation and maintenance from procurement to implantation, improving the condition of damaged or marginal-quality organs and converting some that are not immediately transplantable into viable grafts, thereby expanding the donor pool without relying on additional sources of donation.

- ***Policy orientation and funding support***: Governments and regulators are giving higher policy priority to organ preservation, transport and repair across the donationtransplant pathway and increasing investment in this field. In China, the *Opinions on Promoting the Healthy Development of Human Organ Donation* (《關於促進人體器官捐獻工作健康發展的意見》) and the *Proposal on Promoting the Development of High-Tech Fields Related to Mechanical Perfusion Preservation and Repair of Organs* (《推動我國器官機械灌注保存與修復高新技術領域發展的提案》) call for standardized management, improved donor-organ quality and utilization, and focused support for mechanical perfusion, continuous preservation and in-transit repair, encouraging clinical adoption of related devices. In the European Union, *Horizon Europe* provides funding for medical device innovation and transplantation-related technologies, including organ preservation and repair and next-generation organ maintenance platforms.

- ***Advances in Ex Vivo Perfusion and Organ-Repair Technologies***: Organ preservation robots are evolving from traditional cold, passive preservation into integrated platforms that combine perfusion maintenance, functional assessment and active repair. Bioreactors provide donor organs, or key functional regions, with a controlled ex vivo microenvironment for perfusion, oxygenation and nutrient support, while maintaining near-physiological temperature, flow and pressure to help stabilize function and viability during transport. At the same time, 3D-printed scaffolds can be customized to match damaged sites, offering local structural support and attachment interfaces so that reparative cells, bioactive factors or regenerative biomaterials can act more stably on target areas under perfusion.

SOURCE OF INFORMATION

We engaged CIC, an independent market research and consulting company that provides industry consulting services, commercial due diligence, and strategic consulting, to conduct detailed research on and analysis of the medical robot market in China and globally. We have agreed to pay a fee of RMB0.8 million to CIC in connection with the preparation of the CIC Report. We have incorporated certain information from the CIC Report into this section, as well as into "Summary," "Business," and elsewhere in this document to provide potential [**REDACTED**] with a comprehensive presentation of the industries where we operate.

During the preparation of the CIC Report, CIC conducted both primary and secondary research, and gathered knowledge, statistics, information, and insights on industry trends within the target research markets. The primary research involved interviews with key industry experts and leading industry participants. The secondary research consisted of analyzing data from various publicly available sources, such as the National Bureau of Statistics.

The CIC Report was compiled based on the following assumptions: (i) the overall social, economic, and political environment in China and globally is expected to remain stable during the forecast period; (ii) the economic and industrial development in China and globally is likely to maintain a steady growth trajectory during the forecast period; (iii) key industry drivers are likely to propel the medical robot market in China and globally forward during the forecast period; and (iv) the market will not be dramatically or fundamentally affected by any extreme force majeure events or unforeseen industry regulations.