

# The Rising Tide of Cardiovascular Disease: A Looming Crisis for Cardiovascular Intervention Resources

Cardiovascular disease (CVD) is rapidly increasing in the United States, fueled by an aging population and rising obesity rates. In 2024 alone, 4.1 million Americans are turning 65 years of age. Between 2017 and 2020, 127.9 million US adults (48.6%) had some form of CVD including hypertension. This growing prevalence places immense pressure on health care systems and their resources, highlighting the urgent need for strategic planning and investment to manage the surge in inpatient volumes, outpatient volumes and care demand (Figure 1).

FIGURE 1. Sg2 IMPACT OF CHANGE® INPATIENT AND OUTPATIENT CARDIOVASCULAR DEMAND FORECAST

Inpatient Cardiovascular Forecast  
US Market, 2024–2034

+8%

Outpatient Cardiovascular Forecast  
US Market, 2024–2034

+25%

**Note:** Analysis excludes 0–17 age group. **Sources:** Impact of Change®, 2024; HCUP National Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP) 2019. Agency for Healthcare Research and Quality, Rockville, MD; Proprietary Sg2 All-Payer Claims Data Set, 2022; The following 2022 CMS Limited Data Sets (LDS): Carrier, Denominator, Home Health Agency, Hospice, Outpatient, Skilled Nursing Facility; Claritas Pop-Facts®, 2024; Sg2 Analysis, 2024.

## The Financial and Operational Strain of Cardiovascular Disease

The financial burden on hospitals and health care providers is immense. In the US, CVD costs soared to \$407.3 billion in 2018–2019, outpacing other major diseases such as cancer. Health care organizations across the country are grappling with the challenge of balancing the current supply of physical infrastructure, ancillary services and workforce against increasing demand. This imbalance can create operational, strategic and financial challenges. Severe aortic stenosis, for example, is increasingly prevalent as risk factors such as hypertension, obesity and high cholesterol continue to rise while treatments receive expanded indications and improve survival rates. Hospitals struggling to provide timely access to interventions such as transcatheter aortic valve replacement (TAVR) may encounter sicker patients who need more intensive services and longer hospital stays.

Even organizations that have streamlined care delivery for TAVR are not immune to the challenges posed by forecasted demand growth. Nationally, Sg2 predicts a 49% increase in demand for all transcatheter valve procedures (primarily TAVR, but increased demand is also seen for mitral, pulmonic and tricuspid interventions) over the next five years. And, although care redesign has reduced the overall ALOS and is expected to continue doing so, the growth in demand signals net bed days will grow 21% in that same five-year period. This trend translates to more than 230,000 additional bed days in 2029 for transcatheter valve patients alone.

## Increasing Heart Valve Disease Rate Requires Increased Resources for Interventions

The growth in heart valve diseases such as aortic stenosis stems from increased prevalence of the underlying risk factors, including hypertension, high cholesterol, obesity and diabetes, along with other cardiovascular diseases such as congestive heart failure. In addition, increased procedure demand requires more utilization of lab space, imaging and patient management. Organizations that lack a focus on short-term care redesign and long-term investment plans will be challenged to balance the demand for catheterization (cath) labs, care teams, resources and beds for patients. To address the growing demand, health systems must ask themselves these critical questions: Is our cardiovascular service line set up to optimally capture and serve this growth opportunity? Do we have the processes and infrastructure in place to prioritize and address the CV service needs of our market? What dependencies and considerations are needed to match forecasted demand with the current supply of resources, such as cath labs, staff and ancillary services?

## Cath Lab Procedure Mix Is Changing: Structural Heart Grows

Sg2 forecasts significant demand growth across the CV service line over the next decade in both IP and OP procedures, such as coronary artery bypass grafting, percutaneous coronary interventions (PCIs), transcatheter valve procedures, intracardiac catheter ablations, pacemakers or implantable cardioverter defibrillators, and vascular procedures (Figure 2). This increased demand will challenge CV leaders and hospital administrators to expand capacity and develop access strategies across multiple sites and locations.

One analysis highlighting this trend is the Sg2 forecast for procedures often performed in the cath lab. While the overall volume of cath lab procedures is expected to remain flat over the next 5 and 10 years, the procedure mix will shift significantly. Figure 2 shows that transcatheter valve procedures, for instance, are projected to grow from 7% to 15% of overall volumes.

FIGURE 2. NATIONAL ADULT FORECAST FOR SELECT CATH LAB PROCEDURES

<b>Diagnostic Catheterization</b> ▶	<b>-1%</b> IP	<b>-22%</b> OP	<b>-17%</b> IP+OP
<b>PCI</b> ▶	<b>+6%</b> IP	<b>+6%</b> OP	<b>+6%</b> IP+OP
<b>Transcatheter Valve</b> ▶	<b>+68%</b> 5-year	<b>+126%</b> 10-year	
<b>Percutaneous Left Atrial Appendage Closure</b> ▶	<b>+61%</b> 5-year	<b>+92%</b> 10-year	

**Note:** Analysis excludes 0–17 age group. **Sources:** Impact of Change®, 2024; HCUP National Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP) 2019. Agency for Healthcare Research and Quality, Rockville, MD; Proprietary Sg2 All-Payer Claims Data Set, 2022; The following 2022 CMS Limited Data Sets (LDS): Carrier, Denominator, Home Health Agency, Hospice, Outpatient, Skilled Nursing Facility; Claritas Pop-Facts®, 2024; Sg2 Analysis, 2024.

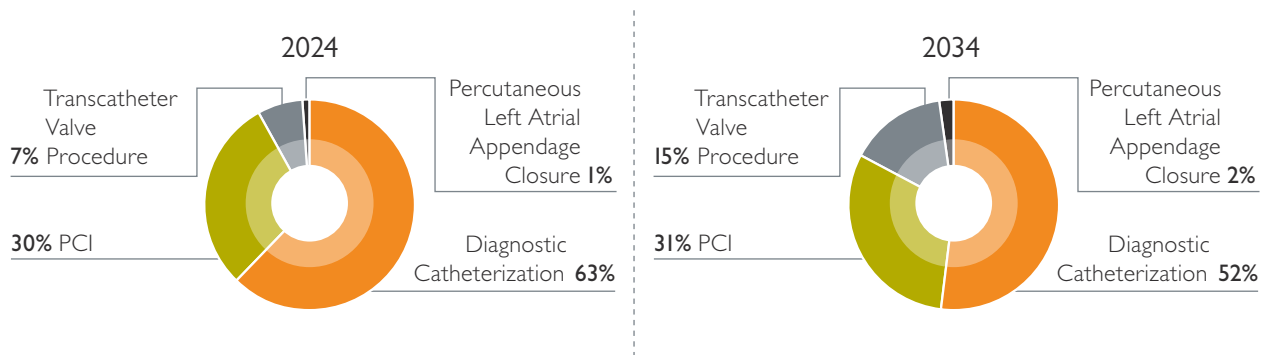
Converting these procedure volumes into minutes (Table 1) reveals that this shift will increase the utilization demand for the cath lab by 11% by 2029 and 21% by 2034 (Figure 3). However, volumes and lab time only tell a portion of the story, as different procedures require varying resources. For example, TAVR necessitates a cardiac surgeon; a proceduralist; and a valve team that often includes device support, technicians, nurses and scrub staff.

TABLE 1. ESTIMATED PROCEDURAL LENGTH FOR SELECT CARDIOVASCULAR PROCEDURES

SETTING	PROCEDURE	MINUTES
Cath lab	Diagnostic catheterization	60
Cath lab	PCI	75
Cath lab—structural heart	Transcatheter valves	240
Cath lab—structural heart	Percutaneous left atrial appendage closure	60

Note: Estimates based on provider interviews. Sources: Sg2 Analysis, 2024.

FIGURE 3. SHARE OF TIME BY SELECT CV CATH LAB PROCEDURES

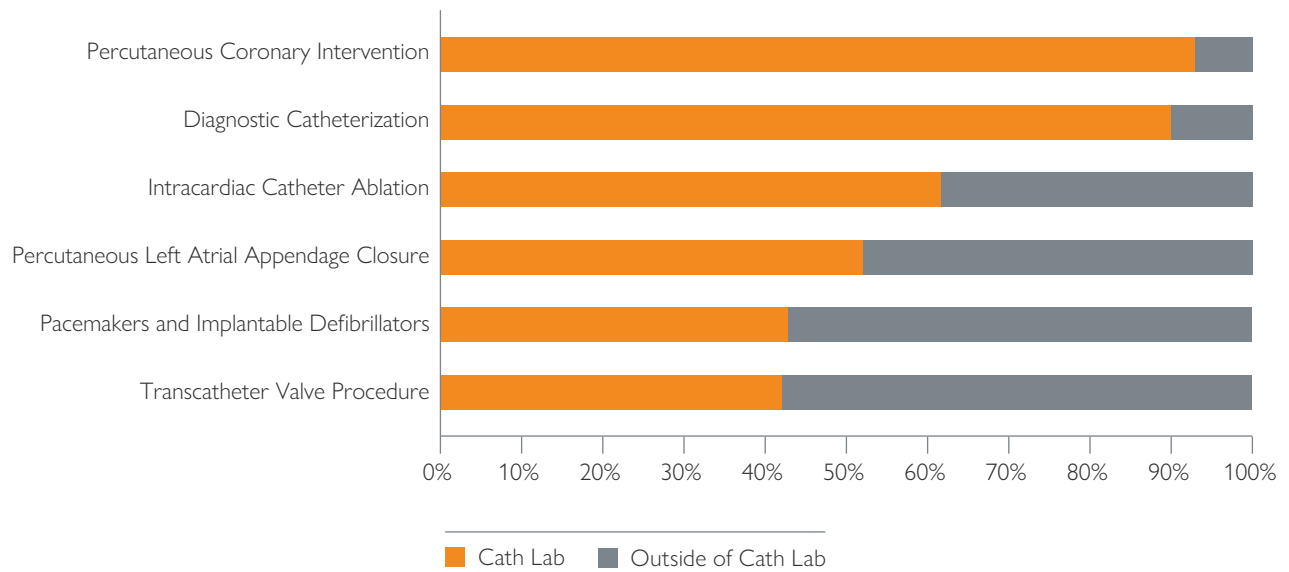


Note: Analysis excludes 0–17 age group. Total cath lab time for 2024: 225 million minutes; 2034: 272 million minutes. Sources: Impact of Change®, 2024; HCUP National Inpatient Sample (NIS), Healthcare Cost and Utilization Project (HCUP) 2019. Agency for Healthcare Research and Quality, Rockville, MD; Proprietary Sg2 All-Payer Claims Data Set, 2022; The following 2022 CMS Limited Data Sets (LDS): Carrier, Denominator, Home Health Agency, Hospice, Outpatient, Skilled Nursing Facility; Claritas Pop-Facts®, 2024; Sg2 Analysis, 2024.

### Optimizing Procedure Locations: The Shift From Hybrid OR to Cath Lab

To increase margins for TAVR procedures, providers have begun performing them in the lowest-cost site of care. Procedures are moving from the hybrid OR to the cath lab based on risk assessment, patient comfort and access to OR resources. This shift has continued, with more structural heart procedures being moved from the hybrid OR to the cath lab, further straining cath lab capacity (Figure 4). From 2021 to 2023, the most significant shift has been seen in the relatively new percutaneous left atrial appendage closure procedure, with the percentage of procedures done in the cath lab increasing from 45% in 2021 to 52% in 2023. TAVR procedures followed closely, increasing from 38% in 2021 to 42% in 2023. This is in addition to the standard interventional cardiology procedures already being performed in cath labs.

FIGURE 4. DISTRIBUTION OF INPATIENT CARDIOVASCULAR ENCOUNTERS WITH CATH LAB CHARGES IN THE VIZIENT® CLINICAL DATA BASE, CALENDAR YEAR 2023

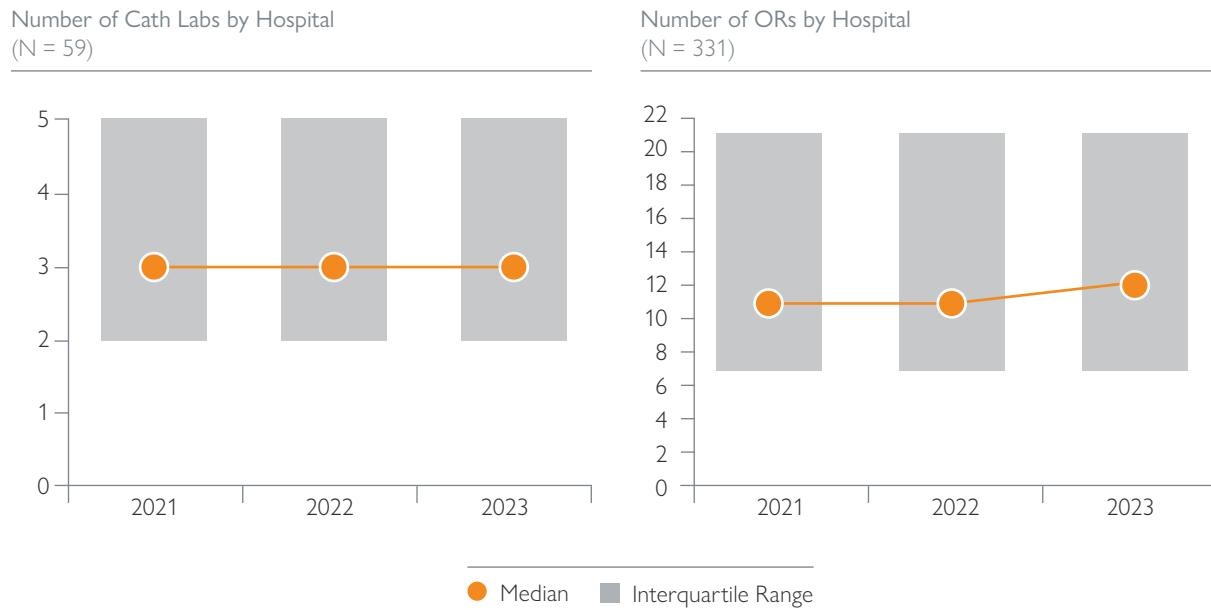


**Note:** 709 hospitals with continuous IP data were analyzed, but not all hospitals have volumes in each disease and/or procedure combination. Analysis includes procedures performed in the OR setting that may leverage the cath lab for a portion of the hospital stay. **Sources:** Data from the Vizient® Clinical Data Base used with permission of Vizient, Inc. All rights reserved; Sg2 Analysis, 2023.

### Limited Expansion of Cath Labs Amid Growing Demand

Strong growth in cardiovascular procedures can be a double-edged sword, as these interventions often compete with other surgical specialties for limited operating room or cath lab space. Recovering from the COVID-19 pandemic has strained health care finances, limiting access to cash and capital for expansion investments. So, despite the increasing population-based demand for CV procedures, investment in new cath labs (+0%) or operating room space (+8%) has been limited (Figure 5).

FIGURE 5. TRENDS IN THE NUMBER OF CATH LABS AND OPERATING ROOMS IN THE VIZIENT OPERATIONAL DATA BASE



Sources: Data from the Vizient® Operational Data Base used with permission of Vizient, Inc. All rights reserved; Sg2 Analysis, 2021–2023.

CV services lines have managed to eke out incremental efficiency gains in physician, procedure and operating room workflows to cope with higher demand. The cardiovascular procedural forecast is growing, particularly for more complex, resource-intensive procedures like TAVR. Therefore, the resource demands in terms of the cath lab, cath lab capabilities, and the number and type of staff needed during the procedures will require health care leaders to act more broadly than by implementing care redesign to manage demand. Increasing efficiency alone cannot offset the current and projected demands on the cath lab. Now is the time to rethink strategic planning for short- and long-term CV service lines.

### It Is Already Happening

With future demand for volumes and resources to support care delivery forecasted to continue growing, organizations are already making tough decisions due to current capacity constraints. Data show that, comparing January through June 2023 with the same period in 2024, TAVR procedures increased by 5% overall (Table 2). However, for average- and low-volume centers, this increase was more pronounced in urgent and emergent TAVRs, at approximately 20% or more during the same period.

### Bed Days and ALOS

Emergent and urgent TAVR requires more resources, involves more complex patients and carries a higher risk of complications. These trends have recently manifested in an increase in emergent average length of stay. For high-volume centers, 16% of their recent cases are urgent or emergent.

TABLE 2. TRENDS IN TAVR CASE VOLUME AND LENGTH OF STAY, 2023 TO 2024

	2023 VOLUMES		2024 VOLUMES		PERCENTAGE CHANGE		
	Elective	Urgent/ Emergent	Elective	Urgent/ Emergent	Elective	Urgent/ Emergent	Urgent/ Emergent of Total
High Volume	10,823	1,827	11,189	2,058	3%	13%	16%
Average Volume	4,603	508	4,611	616	0%	21%	12%
Low Volume	1,633	164	1,760	206	8%	26%	10%
Total	17,059	2,499	17,560	2,880	3%	15%	14%
Overall		19,558		20,440		5%	

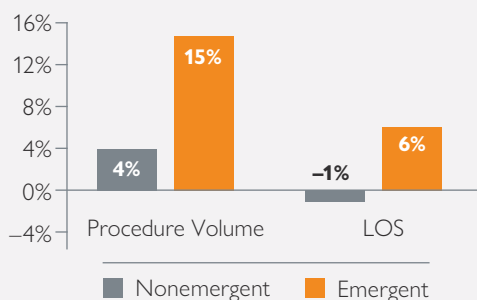
Note: Analysis includes data for January–June 2023 and January–June 2024. Sources: Vizient® Clinical Data Base used with permission of Vizient, Inc. All rights reserved; Sg2 Analysis, 2024.

### Trends in TAVR Case Volume and Length of Stay

With volumes of emergent cases increasing (Figure 6), capacity-constrained organizations are concerned that this increase may represent those who are sicker and whose comorbidities have worsened.

FIGURE 6. TAVR VOLUME AND LENGTH OF STAY TRENDS

Trends in TAVR Case Volume and Length of Stay  
January–June 2024 vs January–June 2024



“My guess [regarding the increase in urgent/emergent cases] would be either people have longer wait lists and then these patients just get readmitted while they wait for their date or the team who puts the data in the registries are more aware of how to appropriately code them and actually do it.”

—Interventional Cardiologist, Structural Heart Specialist

Source: Data from the Vizient® Clinical Data Base used with permission of Vizient, Inc.

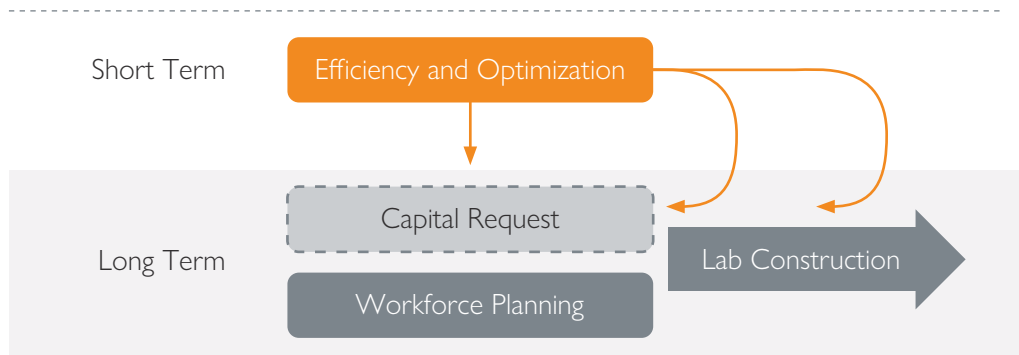
Note: Data limited to 276 continuously submitting hospitals with a TAVR in each year of the study period. Volumes trended year over year. Emergent cases based on ED revenue codes (450–459). Source: Data from the Vizient® Clinical Data Base used with permission of Vizient, Inc. All rights reserved.

## Strategy for Cardiovascular Service Line Expansion: Solve Today's Challenges, Plan for Tomorrow

### The Problem Is Now

To assess the current state of the CV service line and begin making strategic investments for the future, Sg2 proposes a two-phase approach (Figure 7).

FIGURE 7. OPTIMIZING CURRENT SYSTEMS WHILE PREPARING FOR THE FUTURE



### Short-term Solutions

#### 1. Evaluate the ROI of Additional Surgical Suites

One of the most pressing needs for health care organizations is expanding capacity for cardiovascular procedures, especially for high-acuity cases such as structural heart disease and complex PCI. A comprehensive market assessment is critical to understanding a region's clinical demand, regulatory environment and financial viability. Based on these findings, leaders should weigh the costs and benefits of investing in additional cardiovascular procedure suites. This process includes understanding the expected return on investment, evaluating whether existing capacity can be optimized, and determining whether expanding surgical suites will improve access and decrease patient wait times.

#### Action Steps

- Analyze the market for gaps in cardiovascular service delivery.
- Conduct financial modeling to forecast ROI.
- Engage with regulatory bodies to ensure compliance and alignment with state and local health care requirements.

## 2. Optimize Existing Capacity

Before investing in new infrastructure, health care leaders must first evaluate how existing resources can be optimized. Strategic management of cath labs and cardiovascular procedure suites can free up capacity for complex procedures. Leaders should work to create flexible scheduling protocols, enable cross-department collaboration and identify low-risk procedures that can be shifted to noninvasive approaches.

### Action Steps

- Audit current cath lab utilization and identify underused time slots.
- Create a cross-functional task force to streamline scheduling and reduce bottlenecks for high-acuity cases.
- Implement standardized protocols to prioritize high-risk patients while shifting lower-risk procedures to outpatient or noninvasive settings.

## 3. Adopt AI-Enabled Tools for Patient Management

Integrating advanced patient management tools, such as AI-enabled platforms, into electronic health records can revolutionize how cardiovascular patients are identified and managed. These tools help identify high-risk patients, assess social determinants of health (SDOH) and ensure the efficient provision of guideline-directed medical therapy. Proactive patient management reduces wait times, improves outcomes and streamlines referral pathways.

### Action Steps

- Embed AI-driven risk assessment tools into the system's EHR.
- Establish automated workflows that flag high-risk cardiovascular patients, especially those affected by SDOH.
- Implement digital tracking systems for managing patient referrals, thereby ensuring timely interventions.

## 4. Shift Low-Risk Patients to Noninvasive Solutions

With resource constraints limiting access to operating rooms and cath labs, organizations must consider alternative, noninvasive solutions for managing low-risk coronary heart disease patients. Technologies such as coronary computed tomography angiography (CCTA) or enhanced medical management can reduce the need for diagnostic catheterizations, freeing up capacity for more complex cases.

### Action Steps

- Deploy advanced imaging technologies such as CCTA to replace traditional diagnostic catheterizations.
- Train physicians and staff on updated protocols that prioritize noninvasive diagnostic tools.
- Collaborate with insurance payers to ensure coverage for noninvasive imaging solutions.

## 5. Establish Timely Lab Management Protocols

Efficient lab management and timely reporting are keys to improving operational workflows. Real-time communication and reporting between lab teams and clinical staff can reduce inefficiencies, optimize lab utilization and improve patient throughput. Establish protocols that ensure lab results are promptly shared with the care team, enabling faster clinical decision-making and reducing procedural delays.

### Action Steps

- Standardize real-time lab reporting across cardiovascular departments.
- Create a communication framework with regular lab utilization reports and feedback loops between lab technicians and clinical staff.
- Monitor lab turnaround times and establish benchmarks for efficiency improvements.



## 6. Collaborate With Home Health for Same-Day Discharge

Collaborating with home health agencies to enable same-day discharge for certain cardiovascular procedures can significantly improve patient throughput and reduce bed-day utilization. Implementing remote patient monitoring (RPM) and follow-up care ensures safe transitions while maintaining high-quality care standards.

### Action Steps

- Partner with local home health providers to create same-day discharge and postdischarge monitoring protocols.
- Leverage RPM tools to track postprocedural recovery in real time and quickly address complications.
- Train staff to assess patient eligibility for same-day discharge and educate patients on home health protocols.

## 7. Engage Teams Closest to the Patient for Process Improvements

Staff members on the front lines often have valuable insights into process inefficiencies and areas for improvement. In decision-making, engage clinical and nonclinical staff to gather innovative ideas on optimizing patient flow, lab utilization and procedural management.

### Action Steps

- Host regular brainstorming sessions with cardiovascular care teams to identify operational bottlenecks.
- Encourage team-based decision-making for cath lab scheduling, bed management and procedure prioritization.
- Implement a suggestion system that rewards innovative ideas for improving cardiovascular service line operations.

## Long-term Solutions

### 1. Leverage Remote Patient Monitoring for Workforce Efficiency

With a growing number of patients requiring postprocedural observation and chronic disease management, remote patient monitoring offers a scalable solution. RPM can act as a force multiplier, allowing staff to manage more patients without overwhelming available resources. This approach is particularly effective for managing chronic conditions such as heart failure, hypertension and post-TAVR follow-up.

### Action Steps

- Implement RPM technology to monitor postprocedural cardiovascular patients remotely.
- Develop clinical workflows that integrate RPM data into daily rounding and decision-making.
- Train staff on interpreting RPM data and responding to alerts, thereby creating an efficient workflow.

### 2. Expand the Use of Advanced Practitioners

As the demand for cardiovascular procedures grows, it is imperative to expand the use of advanced practitioners (APs), including nurse practitioners, physician assistants and certified registered nurse anesthetists. These professionals can take on many responsibilities traditionally held by physicians, alleviating workforce shortages and improving patient access.

### Action Steps

- Build a pipeline of advanced practitioners with expertise in cardiovascular care.
- Develop training programs for APs to perform routine procedures, conduct pre- and postoperative care, and assist in complex cases.
- Foster a collaborative environment in which APs are integral cardiovascular team members contributing to inpatient and outpatient care.

### 3. Acquire or Build Additional Capacity

Meeting the future demand for cardiovascular services requires significant capital investment in infrastructure. Securing board approval for capital projects, including acquiring ambulatory surgery centers (ASCs) or building additional procedural suites, is essential. Local and state regulations will determine the difficulty and the speed of building this additional capacity. Certificate of Need regulations, for example, may challenge health care leaders in prioritizing resources across the system. However, these additional ASCs or procedural suites will alleviate capacity constraints and ensure the organization is prepared for the projected growth in transcatheter valve procedures, PCIs and other high-demand interventions.

#### Action Steps

- Present a strategic capital investment plan to the board, including short-term gains and long-term capacity planning.
- Explore partnership opportunities with ASCs to refer lower-acuity cases, freeing up hospital resources for complex interventions.
- Assess the need for expanding ICU, imaging, lab and transport capabilities to support growth in cardiovascular procedures.

### 4. Create a Pipeline of Nonclinical Staff

Human capital constraints are not limited to clinical staff. Nonclinical roles such as scrub technicians, cardiovascular technicians and support staff are critical to service line operations. Creating a robust pipeline for recruiting nonclinical staff, and a comprehensive plan to train them, ensures operational efficiency and smooth patient flow, thereby reducing procedural delays.

#### Action Steps

- Partner with local educational institutions to create training programs for nonclinical cardiovascular staff.
- Offer competitive compensation packages and career development opportunities to retain skilled technicians and support staff.
- Implement cross-training programs to allow nonclinical staff to assist in multiple areas of the service line.

By implementing short- and long-term strategies, hospitals and health systems can improve their cardiovascular service lines, enhance patient care and position themselves to meet growing market demand. Strategically optimizing existing resources and making the necessary investments in people, technology and infrastructure now will ensure sustainable growth and long-term success.

Sources: Martin SS et al. *Circulation*. 2024;149(8):e347–e913; Impact of Change®, 2024; HCUP National Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP) 2019. Agency for Healthcare Research and Quality, Rockville, MD; Proprietary Sg2 All-Payer Claims Data Set, 2022; The following 2022 CMS Limited Data Sets (LDS): Carrier, Denominator, Home Health Agency, Hospice, Outpatient, Skilled Nursing Facility; Claritas Pop-Facts®, 2024; Sg2 Analysis, 2024.