August 2021

The Promise of Robotic Process Automation and Artificial Intelligence in Revenue Cycle Management
The Leading Health System Perspective

TheAcademy + WAYSTAR

Table of Contents

Report Overview and Profile of Participating Health Systems

Project Outline

The Academy sought to understand how LHS are adopting robotic process automation (RPA) and artificial intelligence (AI) in their revenue cycles along with the benefits and barriers of the adoption process.

The Academy is defining RPA and AI as:

- **RPA:** Technology in the form of a script that automates transactional and repetitive processes based on a set of precoded rules.

- **AI:** Technology such as machine learning programs that intake a large amount of labeled data and analyze the data for patterns. Once these patterns are established, the program can use them to predict future outcomes from new data inputs.
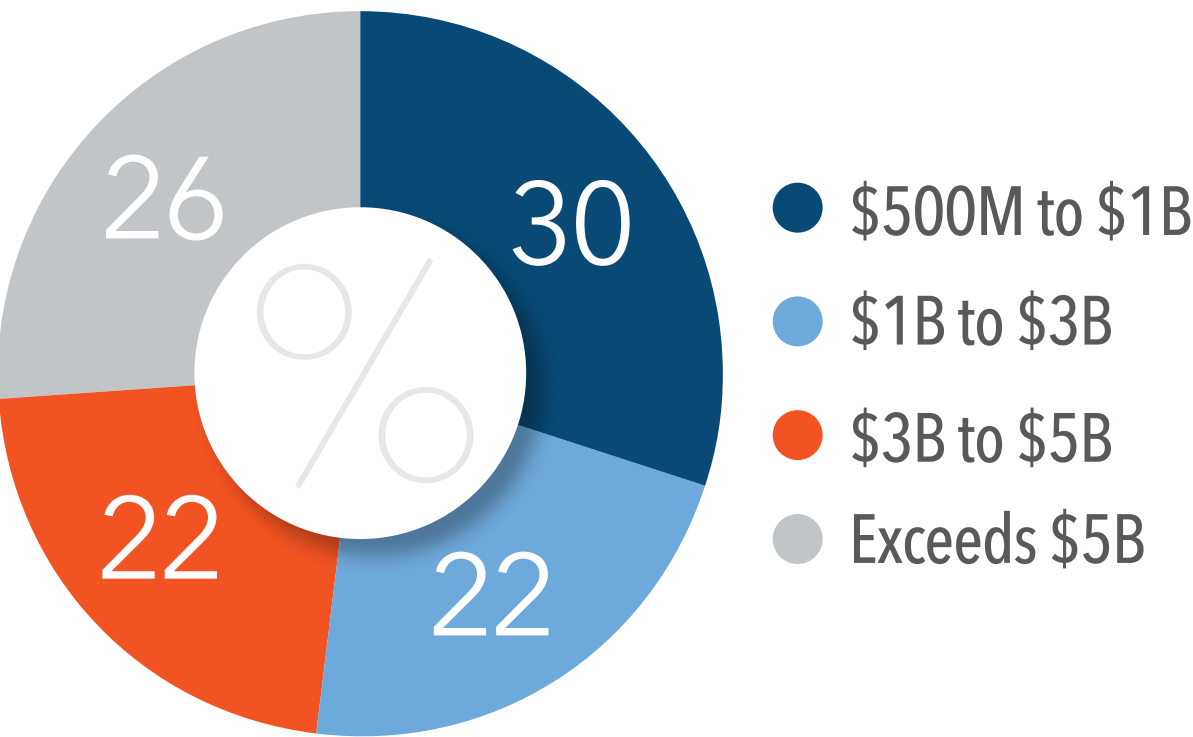
The Academy captured perspectives across 50 unique health systems which represent a significant share of the LHS market.
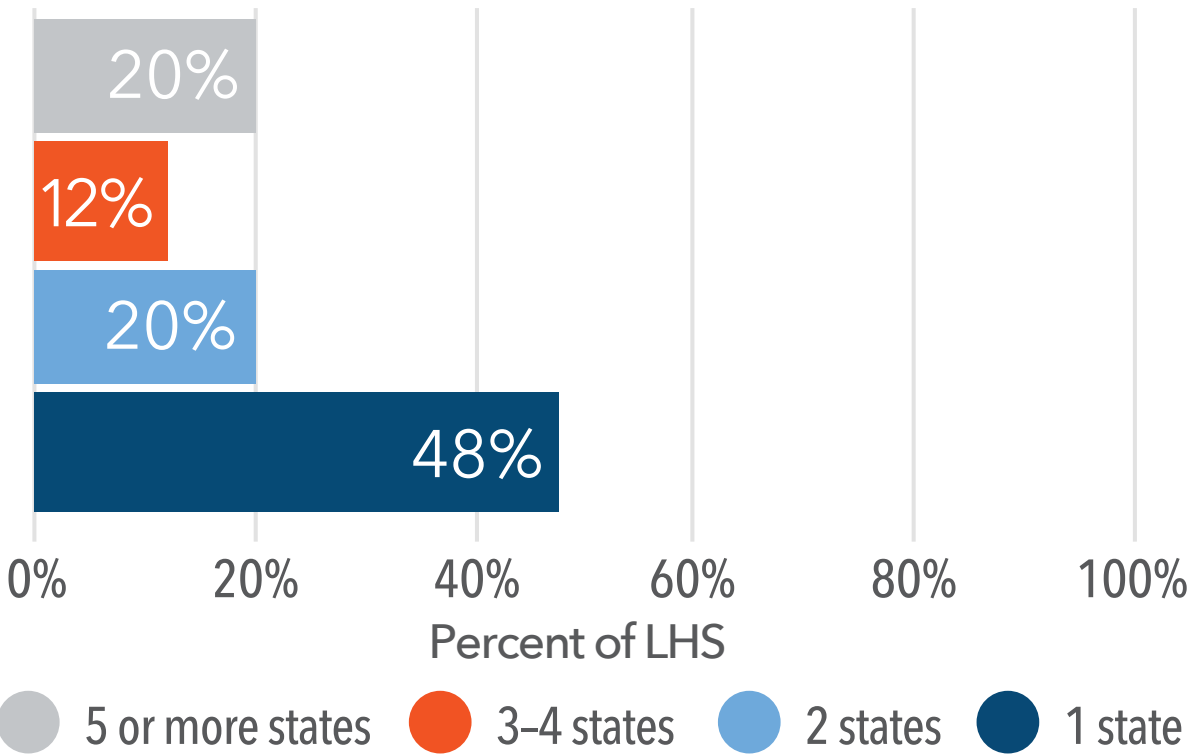
Participating Executives

- VP of Revenue Cycle (34%)
- IT Executive or Leader (20%)
- Chief Financial Officer (14%)
- VP of Finance (6%)
- Other (26%)

Profile of Participating Health Systems

LHS Net Patient Revenue (NPR)

- 30 — $500M to $1B
- 22 — $1B to $3B
- 22 — $3B to $5B
- 26 — Exceeds $5B

LHS Geographic Footprint

- 20% — 5 or more states
- 12% — 3–4 states
- 20% — 2 states
- 48% — 1 state

Percent of LHS

LHS Region

- 4 — MidAtlantic
- 24 — Midwest
- 24 — Northeast
- 2 — Northwest
- 10 — Pacific Coast
- 24 — Southeast
- 12 — Southwest

LHS EMR Vendor

- 32 — Cerner
- 58 — Epic
- 10 — Other

Will Robotic Process Automation and Artificial Intelligence Transform Revenue Cycle Management?

The revenue cycle process has a long and cumbersome history that continues to become more complex as policies, payer relationships, and patient expectations evolve. Despite that, many health systems still rely on manual processes prone to human error or bolt-on technologies that only solve specific RCM pain points—making revenue cycle management (RCM) particularly ripe for innovation. With increased financial pressure stemming from the COVID-19 pandemic, there is a greater focus on innovating in RCM to ensure viable operating margins for health systems.

Robotic process automation and artificial intelligence are two technologies that stand to greatly impact RCM due to the repetitive nature of many of the tasks. These two technologies are defined as follows:

- RPA is traditional automation whereby simple standardized tasks can be completed by rule-based software.

- AI uses large data sets to train software to analyze patterns; this software can then be used to solve more complex challenges than RPA.

When fully implemented and optimized, RPA and AI promote efficiency, strengthen employee engagement, minimize human error, increase standardization, enhance the patient financial experience, and ultimately improve financial performance. While the return on investment (ROI) is not always immediate, the benefits and efficiency of the technology will only increase over time. However, the technology alone will not produce results—changes to workflow and workforce, as well as ample back-end data are required to support the technology.

Some LHS are already using RPA or AI technologies across some or all parts of the revenue cycle (see graphic below) and are still grappling with how to reach full ROI. Others have not yet invested but plan to in the near-term future. Regardless of current RPA/AI status, LHS need to continue to integrate RPA and AI and optimize existing processes to achieve the goal of improved financial performance and return on investment.

Parts of the Revenue Cycle

Front-end

- Patient Registration QA
- Eligibility Verification
- Patient Estimates
- Prior Authorizations

Mid-Cycle

- Coding

Back-end

- Denial Management
- Payment Posting and Reconciliation
- Claims Management
- Revenue Capture

Key Takeaways

The key takeaways captured below represent the main findings of this report and are discussed in further detail in the corresponding sections of the report.

1   Use of Robotic Process Automation and Artificial Intelligence Adoption for RCM Remains Low, But Likely to See Rapid Growth.

The majority of LHS are not yet using RPA and AI for RCM. Current RPA or AI usage is not consistent across all parts of the revenue cycle and higher in areas that are repetitive in nature and ripe for automation. While not conclusive, it's likely LHS are using RPA more often than AI in RCM. However, these trends are likely to change in the coming years. Over 50% of LHS plan to pursue these technologies in the next 3 years, particularly to improve financial performance.

2   Return on Investment Points to Limitations of Technology Without Workflow and Workforce Changes.

Universally, LHS reported low return on investment (ROI) regardless of how they manage revenue cycle. For LHS using RPA and AI, this may reflect implementation challenges, a disconnect between the expectations and reality of the technology, or untapped opportunities to update revenue cycle processes. To see the full impact of RPA or AI, organizations must make changes to the revenue cycle workflow and workforce, as well as have access to ample back-end data to support the technology.

3   Revenue Cycle Metrics are Ripe for Standardization.

While just over 50% of LHS have fully centralized tracking of revenue cycle metrics across their health system, there isn't universal consensus on how or what metrics to prioritize. LHS are tracking a variety of revenue cycle metrics and tend to favor those linked to financial performance over efficiency. Regardless of method, there is ample room to develop standard revenue cycle metrics to help organizations improve accuracy and efficiency while also measuring financial outcomes.

4   Revenue Cycle Leaders Need to Lay the Groundwork Now for Future RPA, AI Investments.

Overwhelmingly, health system leaders are interested in automation and optimistic about AI at their organization—with 94% either highly or somewhat optimistic. However, one of the biggest barriers to adoption is the variable understanding of automation, AI, and machine learning among healthcare executives, providers, and staff. Beyond securing budget, one of the best steps revenue cycle leaders can take now to support future investments in technology is C-suite education—including capabilities, limitations, and "myth-busting" misplaced perceptions.

Section 1:
RCM Current Landscape

Approach to Revenue Cycle Management Highly Variable

Technology Common But Not Universal in RCM

Leading Health Systems (LHS) manage their revenue cycle through four main channels: a technology vendor, internally built technology, people and processes, or via the electronic medical record system. The most popular approach to revenue cycle management (RCM) at LHS is using a technology vendor. When broken down by parts of RCM, eligibility verification (78%), claims management (62%), and prior authorizations (56%) most often rely on vendor technology. LHS typically use technology vendors for most parts of the revenue cycle with the exception of patient registration QA. Notably, very few LHS opted to built internal technologies in these areas of RCM.

Outsourcing to a vendor isn't the dominant approach in every part of the revenue cycle, as many LHS vary their management approach (i.e., using people/processes or EMR) across different parts of the revenue cycle. For example, LHS typically manage patient registration and quality assurance processes directly through the EHR more often than any other approach, including using a technology vendor or leveraging people-driven processes.

There are still a number of LHS managing their revenue cycle through people and processes, with almost 25% of LHS using this approach for prior authorization and 20% in denial management. However, across the board, management through people and processes and internally built technology are least popular with LHS.

Few Opting to Internally Build RCM Technology

Currently, 14% of participating LHS built their own technology for RCM. Areas where internal technology is particularly low include eligibility verification and claims management, both of which see a high proportion of outsourcing. This points to the efficiency of existing market options as well as the well-documented, numerous challenges associated with developing the technology internally.[1] Given this, it's not surprising that LHS are primarily relying on technology vendors and EMR integrated tools to improve revenue cycle.

LHS Approach to Managing Revenue Cycle

---

[1] Healthcare Innovation. No More DIY Approaches to Revenue Cycle Management (2020).

Current RPA, AI Use Low, Targeting Repetitive Tasks

RPA, AI Not Majority But Higher Than Expected

The use of robotic process automation (RPA) and artificial intelligence (AI) for RCM was higher than expected when compared to recent studies. A 2019 study found 15% of health system executives were targeting RPA for RCM in 2019 as compared to none in 2018, indicating a sizable investment in the technology across three years. [2] Despite growing investment in RPA and AI, the majority of LHS are not currently using these technologies for RCM.

Technology Primarily Used for Repetitive Tasks

Similar to the overall approach to RCM, the use of RPA or AI is not consistent across all parts of the revenue cycle. 40% of participating LHS reported using RPA or AI for claims management while only 6% are leveraging it for patient registration quality assurance.

When considering this in conjunction with the benefits of RPA and AI for RCM, these variations make sense. Current RPA/AI usage is higher for eligibility verification and coding, which are repetitive in nature and ripe for automation.

Conversely, patient registration quality assurance may have a higher level of complexity due to the variability of patient inputs on forms. As a result, it is less repetitive and less conducive to automation at this time. As organizations continue to standardize these more complex processes, RPA may become more common across the board.

LHS Approach to Managing Revenue Cycle

Legend:
- Currently using RPA/AI
- Currently evaluating RPA/AI solutions or vendors
- Considering RPA/AI in 1-3 years
- Considering RPA/AI in more than 3 years
- Not considering RPA/AI

[2] Healthcare Financial Management Association. Top revenue cycle challenges and opportunities (2019).

Current RPA, AI Use Low, Targeting Repetitive Tasks

Most LHS Considering RPA/AI in the Near Term

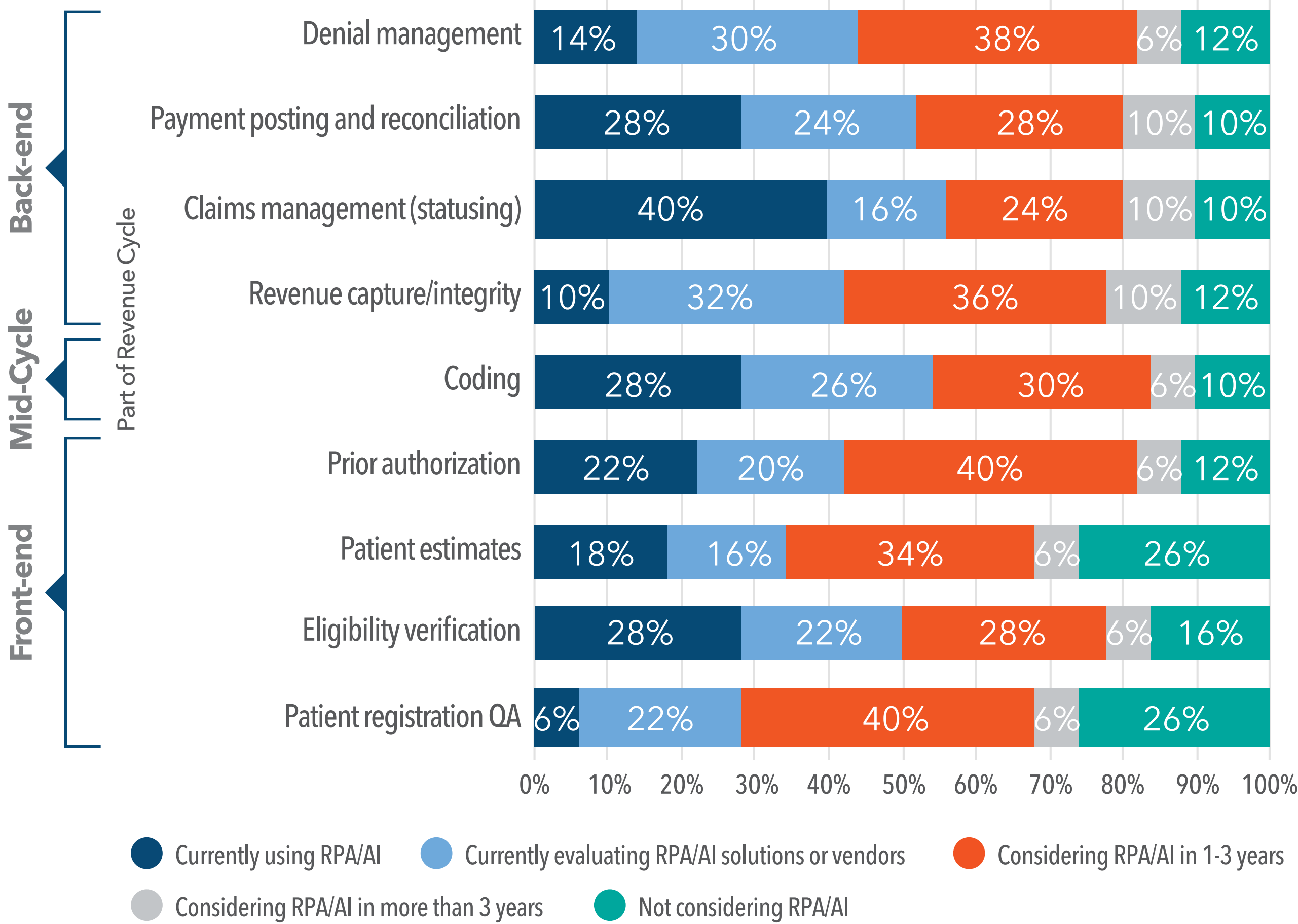There is considerable interest in implementing RPA/AI for RCM in the near term. Across most areas of the revenue cycle, over 50% of LHS are either currently evaluating or considering adoption of RPA/AI in the next three years. This is in line with findings from other research and reasonable given the financial pressures coming out of the COVID-19 pandemic.[3,4]

When looking across the three stages of the revenue cycle—front-end, mid-cycle, and back-end—there are ample opportunities for LHS to leverage RPA/AI particularly to improve financial performance in the mid- and back-end. A study of revenue cycle management estimated that a 250-bed hospital leaks $4.7-$11 million per year through their mid-cycle.[5] While only 28% of participating LHS report using RPA/AI for coding today, 62% of LHS reported future interest and only 10% reported no interest.

Across other parts of the revenue cycle, interest in RPA/AI to assist with revenue generation holds. Notably on the back-end, short-term interest in RPA/AI usage—those currently evaluating and considering in 1-3 years—are highest for revenue capture (68%) and denial management (68%). Conversely, the percent of LHS who aren't considering RPA/AI at all are lowest for mid-cycle and back-end management. While not conclusive, these results may indicate a growing interest and comfort with AI in areas where predictive analytics show potential, such as denials management.

LHS Approach to Managing Revenue Cycle

Back-end

Denial management	14%	30%	38%	6%	12%
Payment posting and reconciliation	28%	24%	28%	10%	10%
Claims management (statusing)	40%	16%	24%	10%	10%
Revenue capture/integrity	10%	32%	36%	10%	12%

Mid-Cycle

| Coding | 28% | 26% | 30% | 6% | 10% |

Front-end

Prior authorization	22%	20%	40%	6%	12%
Patient estimates	18%	16%	34%	6%	26%
Eligibility verification	28%	22%	28%	6%	16%
Patient registration QA	6%	22%	40%	6%	26%

- ● Currently using RPA/AI
- ● Currently evaluating RPA/AI solutions or vendors
- ● Considering RPA/AI in 1-3 years
- ● Considering RPA/AI in more than 3 years
- ● Not considering RPA/AI

---

[3] Gartner. Robotic Process Automation in the Healthcare Industry (2021).
[4] Modern Healthcare. COVID-19 hastens hospitals' revenue cycle outsourcing moves (2021).
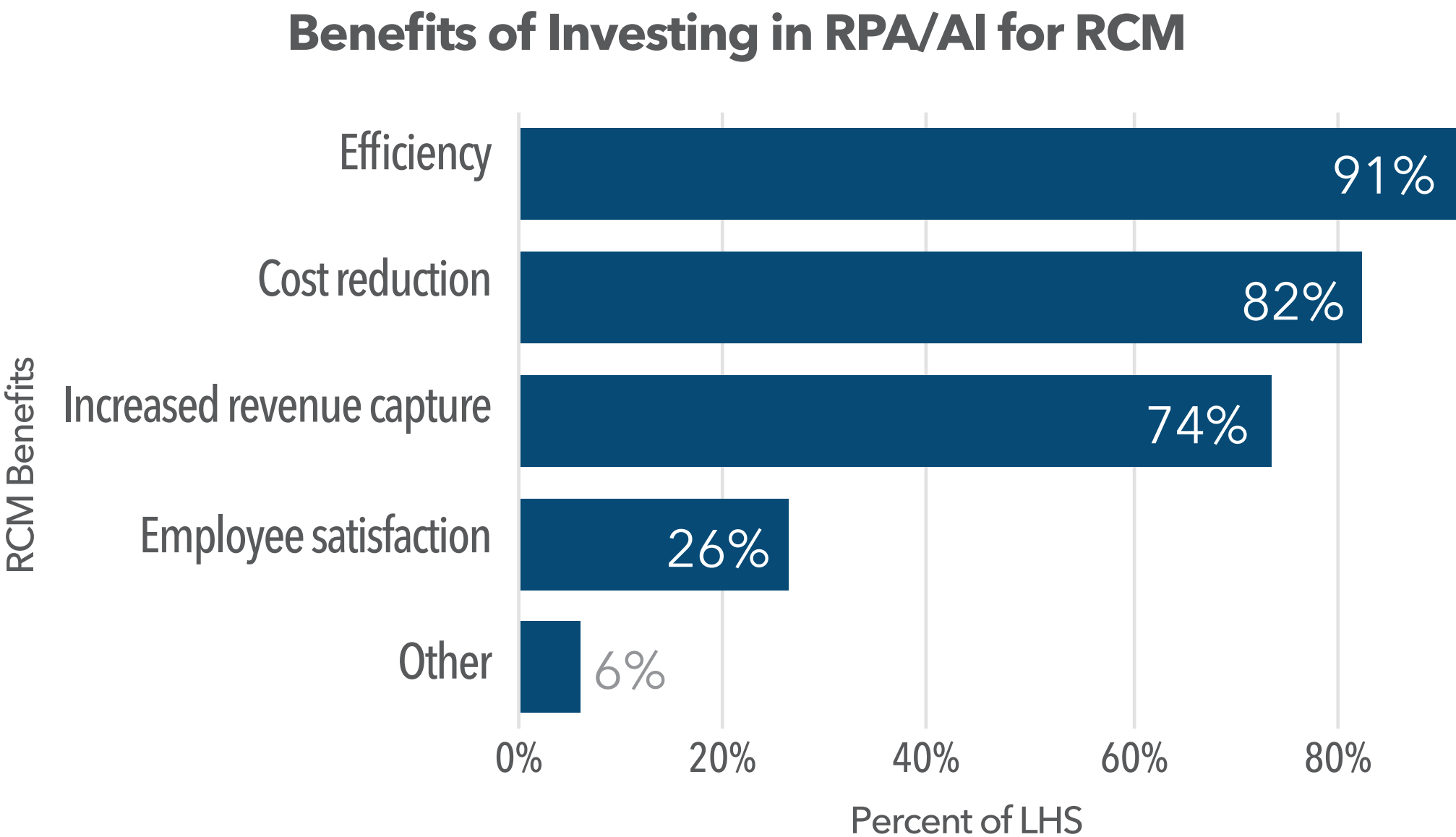[5] Health Leaders. Proactive strategies for reducing mid-revenue cycle leakage (2021).

Section 2:
Impact of RPA/AI on RCM

Efficiency Benefits Widely Reported with RPA/AI Use

Efficiency Reported as Top Benefit of RPA, AI

One of the most compelling benefits of RPA/AI is its ability to streamline efficiency throughout the revenue cycle. Almost universally, LHS currently using RPA/AI for RCM reported efficiency as the top benefit (91%) over both cost reduction (82%) and increased revenue capture (74%).
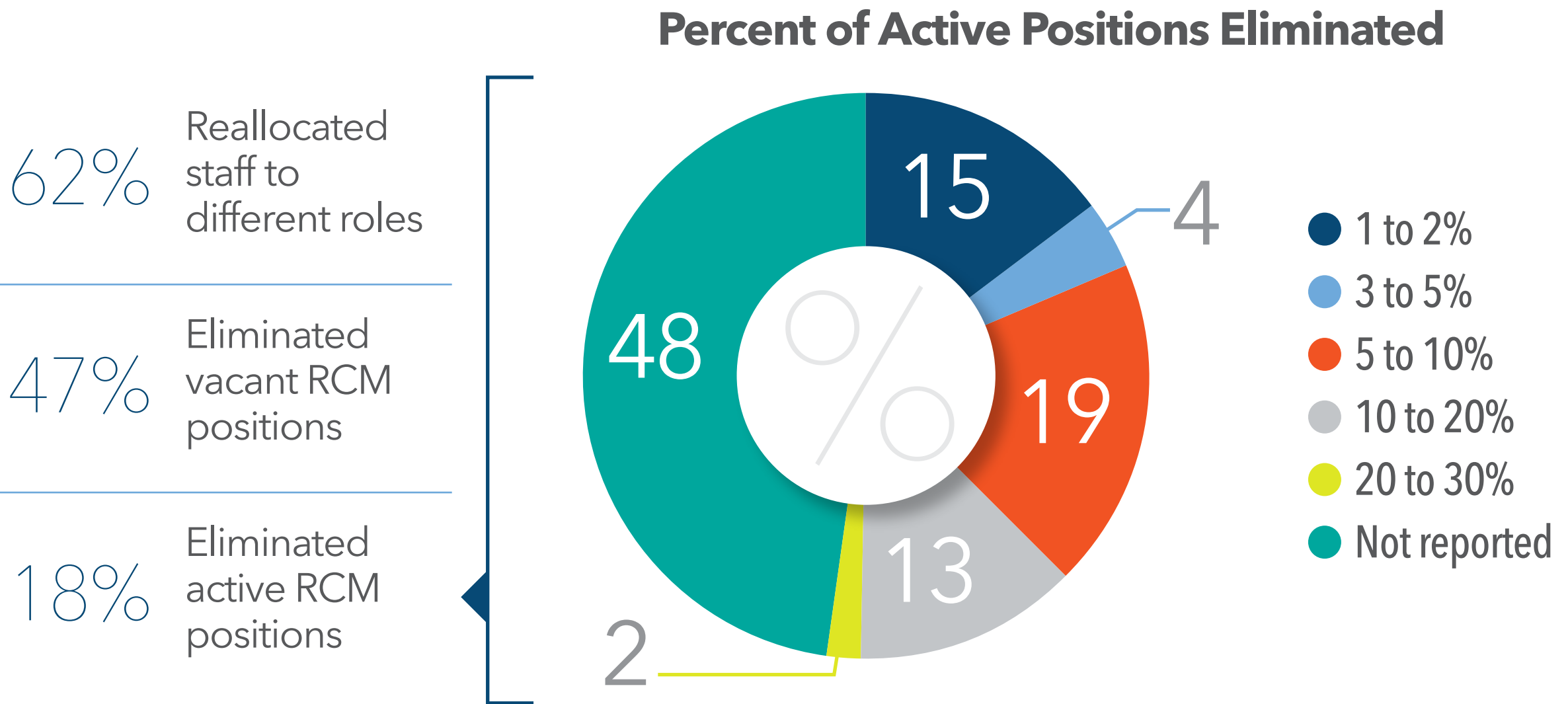
Benefits of Investing in RPA/AI for RCM

Only 26% of LHS reported employee satisfaction as a top benefit of investing RPA/AI for RCM. This could indicate that LHS executives do not measure or consider employee satisfaction as important as other benefits attributed to RPA/AI investments. Alternatively, the disruption to workflow when RPA or AI are initially implemented can create challenges for employees and may result in lower employee satisfaction across the short- or long-term.

Revenue Cycle Workforce Often Reallocated to Different Roles, Further Supporting RCM Efficiency

Automation ensures speed and precision while freeing up staff to work on more complex, higher value tasks within the revenue cycle. As a result, many LHS (82%) reduced their RCM workforce following the implementation of RPA/AI, with 62% of executives specifically stating they reallocated staff to different roles. Less than a quarter of executives reported eliminating active positions, supporting previous studies that found automation doesn't often lead to mass layoffs.[6] More commonly, staff roles change to meet new or evolving business needs.

Across all three reduction types, less than 25% of LHS reduced their RCM workforce by more than 10%. This is equivalent to the proportion of LHS who are not reducing their workforces at all. Meaning, some LHS are only making marginal shifts in workforce while others are laying off up to 20% of current RCM staff. This variation in workforce changes may also contribute to the cost savings benefits, which will be higher for LHS that eliminated at least some RCM positions.

Percent of Active Positions Eliminated

62% Reallocated staff to different roles

47% Eliminated vacant RCM positions

18% Eliminated active RCM positions

See appendix for additional data cuts.

Yet, Benefits Not Aligned with Reasons for Technology Investment

Investment Driven By Promise of Increased Net Revenue

Over 80% of LHS currently using RPA/AI reported improving financial performance as their primary reason for investing. However, when comparing this with top benefits LHS received from RPA/AI, increased revenue capture was reported third (out of four) behind both efficiency and cost reduction. While executives are certainly benefiting from RPA/AI, there is a slight disconnect between the reasons for initially investing and the benefits reaped once adopted.

LHS invest in RPA/AI to alleviate margin pressure through increased net revenue capture. While efficiency can contribute to margin indirectly, LHS but may not be fully executing the workforce or workflow changes needed to maximize the revenue benefits. For example, RPA/AI in denial management can yield immediate revenue increases, but in other areas of RCM, like coding, the impact on revenue isn't as straightforward. RPA may free up the workforce to focus on higher level work while AI can increase coding accuracy (and in turn, ensure reimbursement is sought or decrease the number of denied claims). However, these revenue benefits are indirect and take more time to realize.

Interestingly, only 62% of LHS invested in RPA/AI to fix specific revenue cycle pain points. It could be that they attempt to solve these pain points with people and processes before investing in technology. Other responses included opportunity identification. This could indicate that LHS are using RCM technology to further improve their process or positively impact the patient financial experience.

Reason for investing	Percent of LHS Reporting Reason for Investing	Benefit	Percent of LHS Reporting Benefit
Improve financial performance	82%	Efficiency	91%
Address workforce efficiencies	79%	Cost reduction	82%
Fix specific RCM pain points	62%	Increased revenue capture	74%

LHS Strategy Potentially Influencing Investment

Beyond revenue cycle leaders, C-suite executives play a role in determining technology investments for revenue cycle. Almost a third of LHS indicated they invested in RPA/AI to better support value-based care reimbursement (32%) or leverage existing technology partnerships (32%), while nearly a quarter (24%) invested to gain competitive advantage. While these drivers are outweighed by revenue cycle specific challenges, they do indicate that broader LHS strategy and leadership may play a role in RPA/AI investment decisions.

See appendix for additional data cuts.
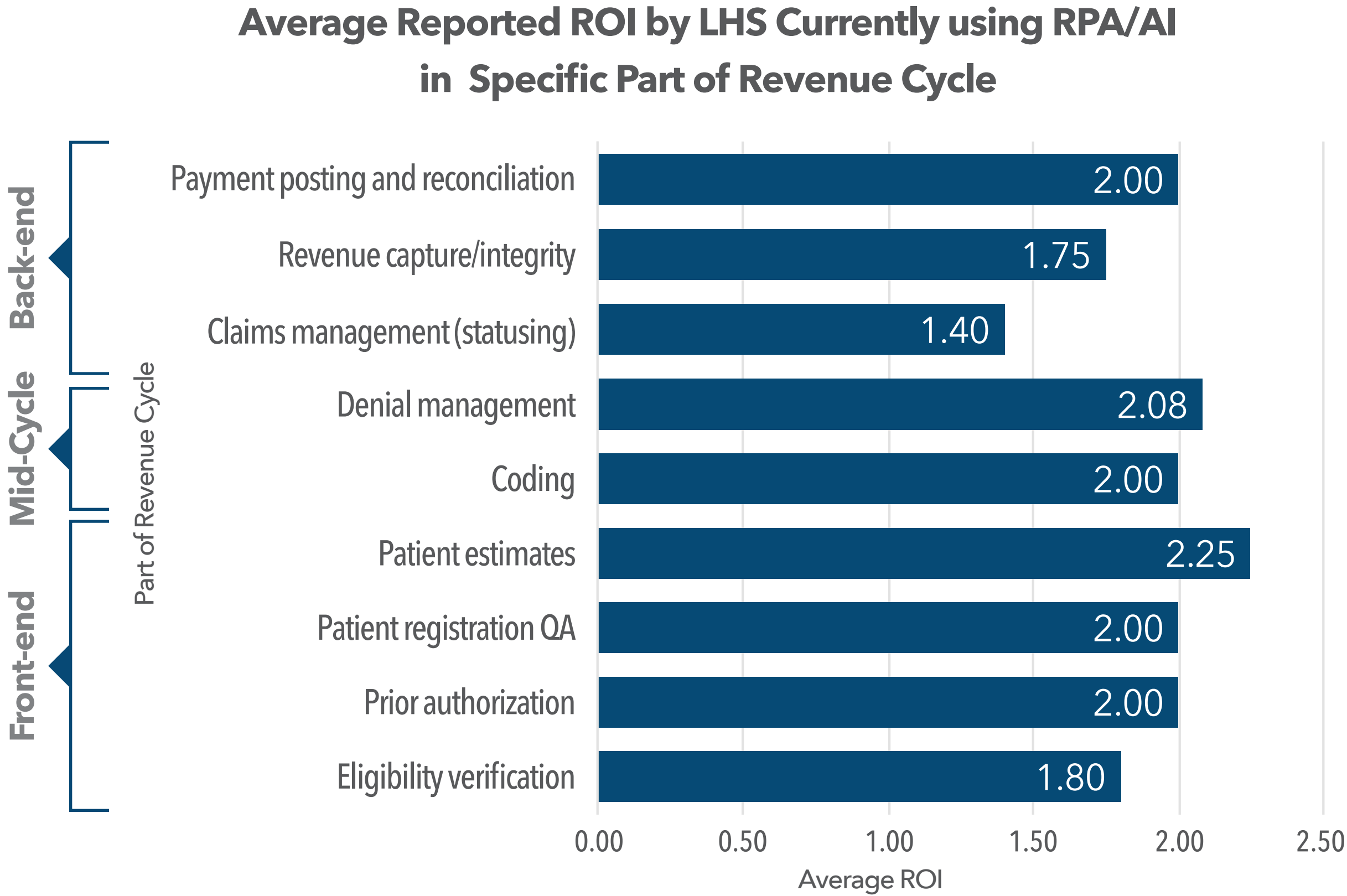
Reported RCM Return on Investment Low Among LHS

LHS currently using RPA/AI for at least one part of the revenue cycle were asked how they would evaluate the return on investment (ROI) of RPA/AI for RCM, with 1 representing no ROI and 5 representing high ROI. The average ROI reported was 2.21—with the majority selecting 2 (47%) or 3 (32%).

When considering ROI by LHS size (measured by net patient revenue), larger LHS have higher average ROI (2.44) compared to smaller organizations. This may be due to the benefits of scale.

Though low across the board, front-end RPA/AI use yields a slightly greater ROI than back-end. This may reflect a difference in the primary outcome of efficiency (front-end) over financial performance (back-end)—although not a perfect correlation. Interestingly, the areas with slightly higher ROI have lower rates of RPA/AI use. For example, patient estimates have the highest ROI but only 18% of LHS are currently using RPA/AI in this part of revenue cycle and 26% are not considering using RPA/AI at all.

LHS Net Patient Revenue	Average ROI
$5 Billion+	2.38
$3-$5 Billion	2.33
$1-$3 Billion	2.33
$500-$1 Billion	1.57

Additional analysis looked at ROI responses by segment of the revenue cycle. The data on the right reflects ROI only for those LHS currently using RPA/AI in the specific part of the revenue cycle. Therefore, the sample sizes across each part of the revenue cycle vary, with some falling below n=20. This data is shared to provide additional insight into ROI by part of the revenue cycle but should not be considered conclusive.

Average Reported ROI by LHS Currently using RPA/AI in Specific Part of Revenue Cycle

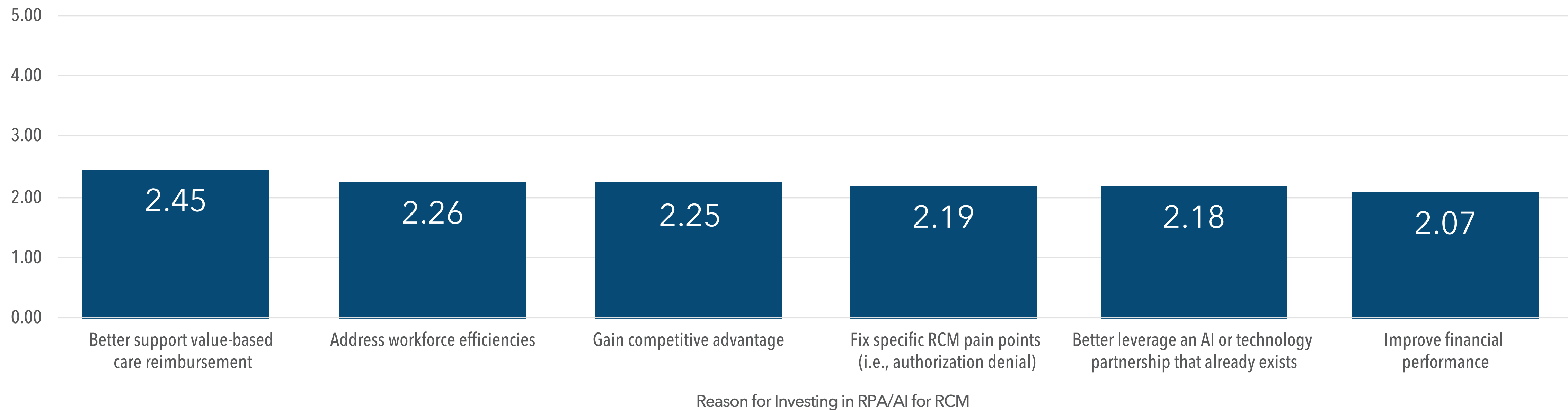| Part of Revenue Cycle		Average ROI
Back-end	Payment posting and reconciliation	2.00
Back-end	Revenue capture/integrity	1.75
Back-end	Claims management (statusing)	1.40
Mid-Cycle	Denial management	2.08
Mid-Cycle	Coding	2.00
Front-end	Patient estimates	2.25
Front-end	Patient registration QA	2.00
Front-end	Prior authorization	2.00
Front-end	Eligibility verification	1.80

ROI measured by the following question: How would you evaluate the ROI of investing in RPA/AI for RCM? ROI range: 1=lowest; 5=highest.

A Closer Look at ROI Points to the Untapped Potential with RPA/AIAI

The low ROI* findings warranted additional exploration to better understand the root causes shaping LHS leaders' perspectives. When analyzing ROI by reason for investing in RPA/AI, the average ROI did not substantially change. No single reason for investing in RPA/AI met the health system-reported ROI threshold of 3*, which indicates that finance leaders are not seeing the full value of these investments. Interestingly, those investing to improve financial performance had the lowest reported ROI.

Additional data analysis (see appendix) did not uncover conflicting trends or additional insight on ROI. However, when reflecting on the previously reported disconnect between LHS' reasons for investing in RPA/AI and the benefits, it is conceivable that expectations and current realities are not aligned for LHS leaders. This may reflect a need for LHS executives to better understand what changes are needed to achieve a higher ROI on RPA/AI investments including: implementation challenges, misinformation about RPA/AI capabilities, a longer timeline to achieve ROI, or untapped opportunities with workflows and workforce. In addition, return on investment is unlikely to improve until there is better alignment on the expectations of RPA and AI technologies and reality.

Geographic Representation of Board Members Across LHS

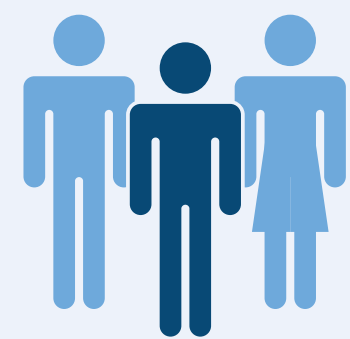| Reason	ROI
Better support value-based care reimbursement	2.45
Address workforce efficiencies	2.26
Gain competitive advantage	2.25
Fix specific RCM pain points (i.e., authorization denial)	2.19
Better leverage an AI or technology partnership that already exists	2.18
Improve financial performance	2.07

Reason for Investing in RPA/AI for RCM

*ROI measured by the following question: How would you evaluate the ROI of investing in RPA/AI for RCM? ROI range: 1=lowest; 5=highest.

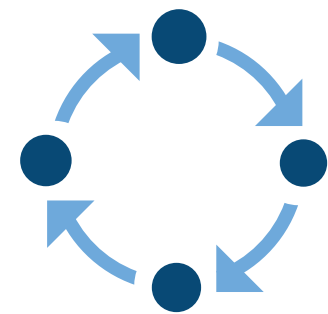# Unlocking ROI for RPA/AI Requires More Than Technology

Automation and AI have potential to address some of the biggest pain points in revenue cycle management, leading to increased efficiency and improved financial performance. However, ROI is not immediate and can be difficult to achieve in short timeframes depending on how LHS executives are measuring it. Based on the most straight forward ROI calculation*, benefits following investment in RPA/AI technology start slow but often ramp up over time.

Beyond time, organizations currently using or evaluating future RPA/AI investments must make changes to support the full implementation of the technology, including upskilling the workforce and making changes to the workflow, as well as ensuring ample back-end data needed to fuel automation and AI.

Upskilling the workforce

Revenue cycle automation significantly reduces manual tasks and improves efficiency. But to see maximum cost savings, organizations need to help transition staff into more complex roles. For example, automation can enable staff to cover more accounts, reduce preventable denials, and work and appeal a larger percentage of all denials therefore increasing reimbursement and reducing costs associated with the process. The current RCM workforce may not have the skills needed for the new roles, so organizations need to invest in training to support the transition and ensure staff can optimize the use of automation and AI.

Changes to the workflow

Even with RPA or AI, revenue cycle management is still a set of rules and processes. When implementing technology, these rules and processes need to be updated and standardized (where possible). If not, inefficient processes may have unintended consequences that create downstream work for others. Organizations should evaluate and update all processes as part of RPA/AI implementation.

Ample Data to Support AI

It's not enough to introduce AI-driven revenue cycle processes. Organizations need the right inputs and enough data to support the established goals. When evaluating an RCM vendor with AI technology, it is critical to verify the depth of their outside data and how it will integrate with existing data systems (like the EMR) to glean insights and improve processes and outcomes. Without enough big data from internal and external sources, AI cannot be successful–regardless of how effective the technology appears.

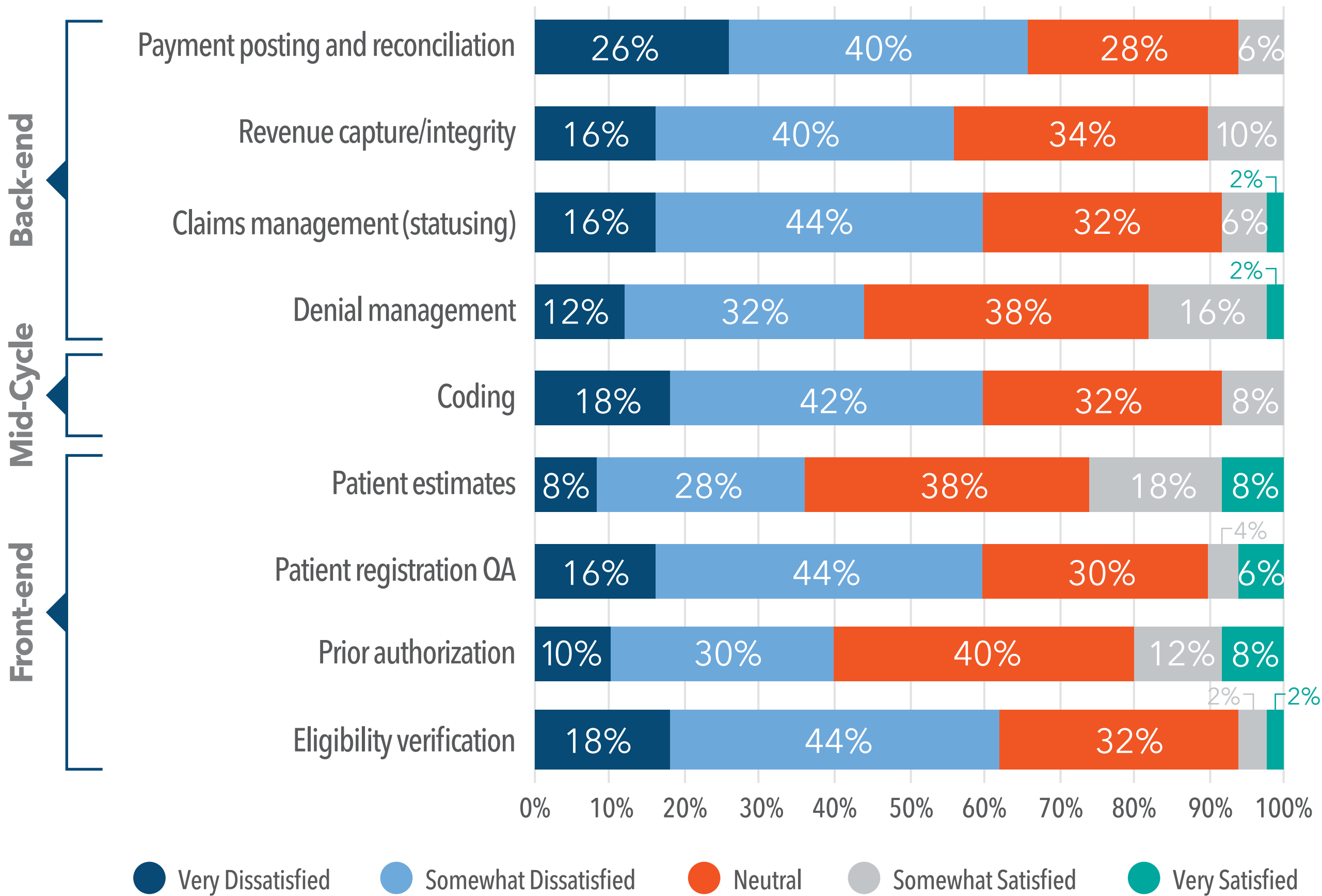# Satisfaction with RCM Approach Also Universally Low

Given the ROI data, it's not surprising that LHS satisfaction with their RCM approach is also low across the board—with an average satisfaction of 2.41 across all respondents. When broken out by approach to RCM, people and processes ranked highest and vendor technology ranked lowest.

Approach to RCM	Average Satisfaction*
People and Processes	2.83
Internally built technology	2.53
Managed via EMR	2.41
Technology Vendor	2.33

Similar to ROI, average satisfaction is slightly higher across the front-end of the revenue cycle. Increasing complexity of claims filing on the back-end of the revenue cycle may result in lower satisfaction with current solutions.

The lowest satisfaction area in the revenue cycle was payment posting and reconciliation. A recent survey found that 71% of LHS still reconcile point-of-service cash and checks manually. By continuing to do this work manually, revenue cycle teams are prone to disorganization of financial information as well as complex and arduous processes. Taken together, these realities are very dissatisfying to LHS. Fortunately, 79% of LHS reported that they are prioritizing automation of this step in the revenue cycle in order to alleviate some of these challenges.

LHS Approach to Managing Revenue Cycle

Back-end

Payment posting and reconciliation: Very Dissatisfied 26%, Somewhat Dissatisfied 40%, Neutral 28%, Somewhat Satisfied 6%

Revenue capture/integrity: Very Dissatisfied 16%, Somewhat Dissatisfied 40%, Neutral 34%, Somewhat Satisfied 10%

Claims management (statusing): Very Dissatisfied 16%, Somewhat Dissatisfied 44%, Neutral 32%, Somewhat Satisfied 6%, Very Satisfied 2%

Denial management: Very Dissatisfied 12%, Somewhat Dissatisfied 32%, Neutral 38%, Somewhat Satisfied 16%, Very Satisfied 2%

Mid-Cycle

Coding: Very Dissatisfied 18%, Somewhat Dissatisfied 42%, Neutral 32%, Somewhat Satisfied 8%

Front-end

Patient estimates: Very Dissatisfied 8%, Somewhat Dissatisfied 28%, Neutral 38%, Somewhat Satisfied 18%, Very Satisfied 8%

Patient registration QA: Very Dissatisfied 16%, Somewhat Dissatisfied 44%, Neutral 30%, Somewhat Satisfied 6%, Very Satisfied 4%

Prior authorization: Very Dissatisfied 10%, Somewhat Dissatisfied 30%, Neutral 40%, Somewhat Satisfied 12%, Very Satisfied 8%

Eligibility verification: Very Dissatisfied 18%, Somewhat Dissatisfied 44%, Neutral 32%, Somewhat Satisfied 2%, Very Satisfied 2%

Legend: ● Very Dissatisfied ● Somewhat Dissatisfied ● Neutral ● Somewhat Satisfied ● Very Satisfied

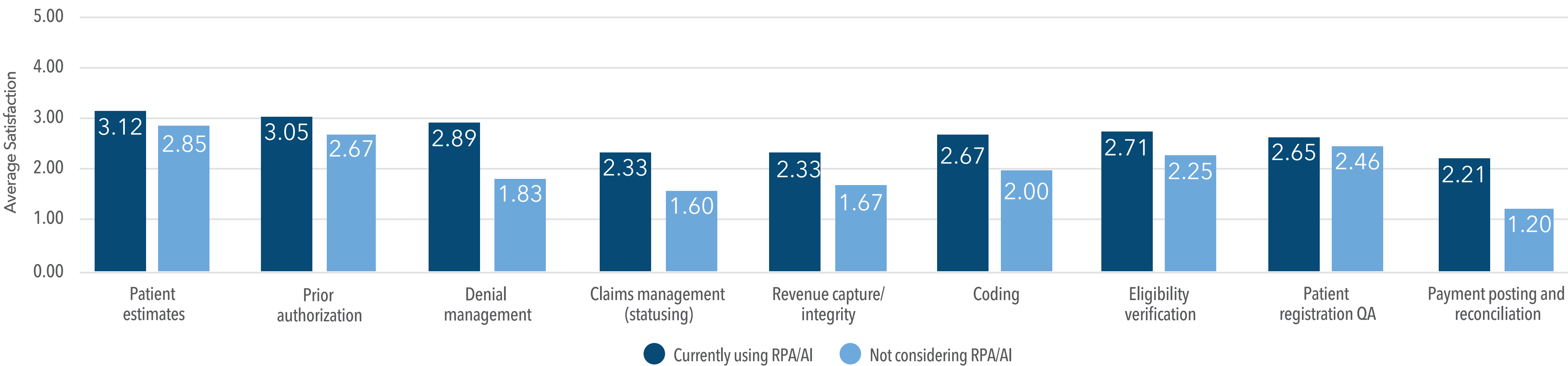*Satisfaction range: 1=lowest; 5=highest.*

Satisfaction Higher on Average Among LHS Using RPA/AI Tools

Notably, satisfaction with RPA/AI usage tells a bit of a different story. LHS currently using RPA/AI have a higher average satisfaction across all parts of the revenue cycle than LHS who are not using or considering RPA/AI. For example, the average satisfaction for a LHS currently using RPA/AI is 2.7 as compared to 2.1 for LHS not considering using RPA/AI. When broken out by part of the revenue cycle, LHS using RPA/AI consistently report higher satisfaction than those who are not considering the technology.

In addition to technology, standardization may play a role these findings. The use of RPA/AI requires more streamlined processes. Therefore, organizations using RPA/AI may have more standardization in revenue cycle processes, driving higher overall satisfaction.

RPA/AI Status	Average Satisfaction*
Currently using RPA/AI	2.7
Currently evaluating RPA/AI	2.6
Considering RPA/AI in 1-3 years	2.6
Considering RPA/AI in more than 3 years	2.2
Not considering RPA/AI	2.1

Average Satisfaction for LHS Using RPA/AI Versus Not Considering RPA/AI

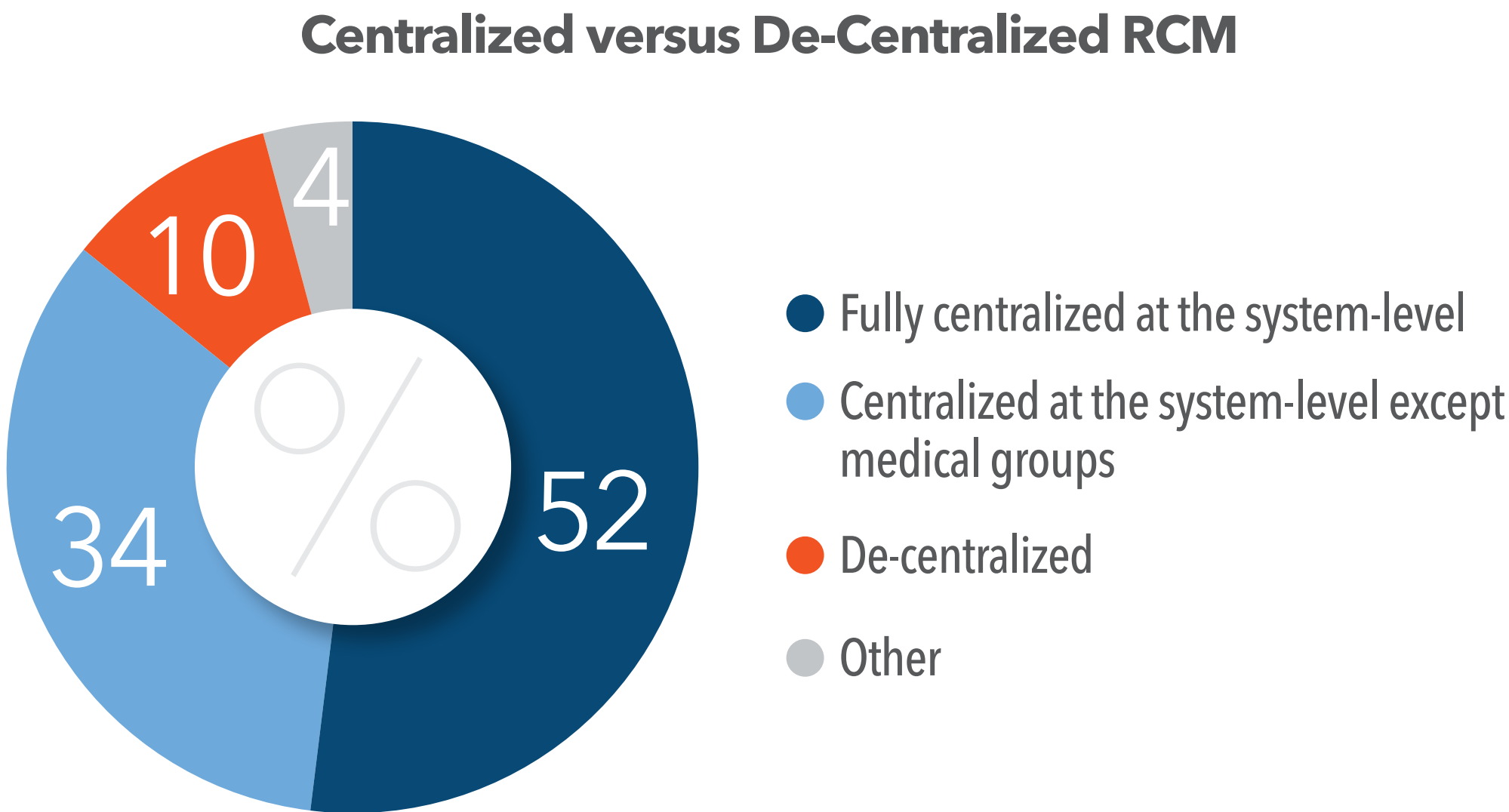|	Currently using RPA/AI	Not considering RPA/AI
Patient estimates	3.12	2.85
Prior authorization	3.05	2.67
Denial management	2.89	1.83
Claims management (statusing)	2.33	1.60
Revenue capture/integrity	2.33	1.67
Coding	2.67	2.00
Eligibility verification	2.71	2.25
Patient registration QA	2.65	2.46
Payment posting and reconciliation	2.21	1.20

Satisfaction range: 1=lowest; 5=highest. See appendix for full graph.

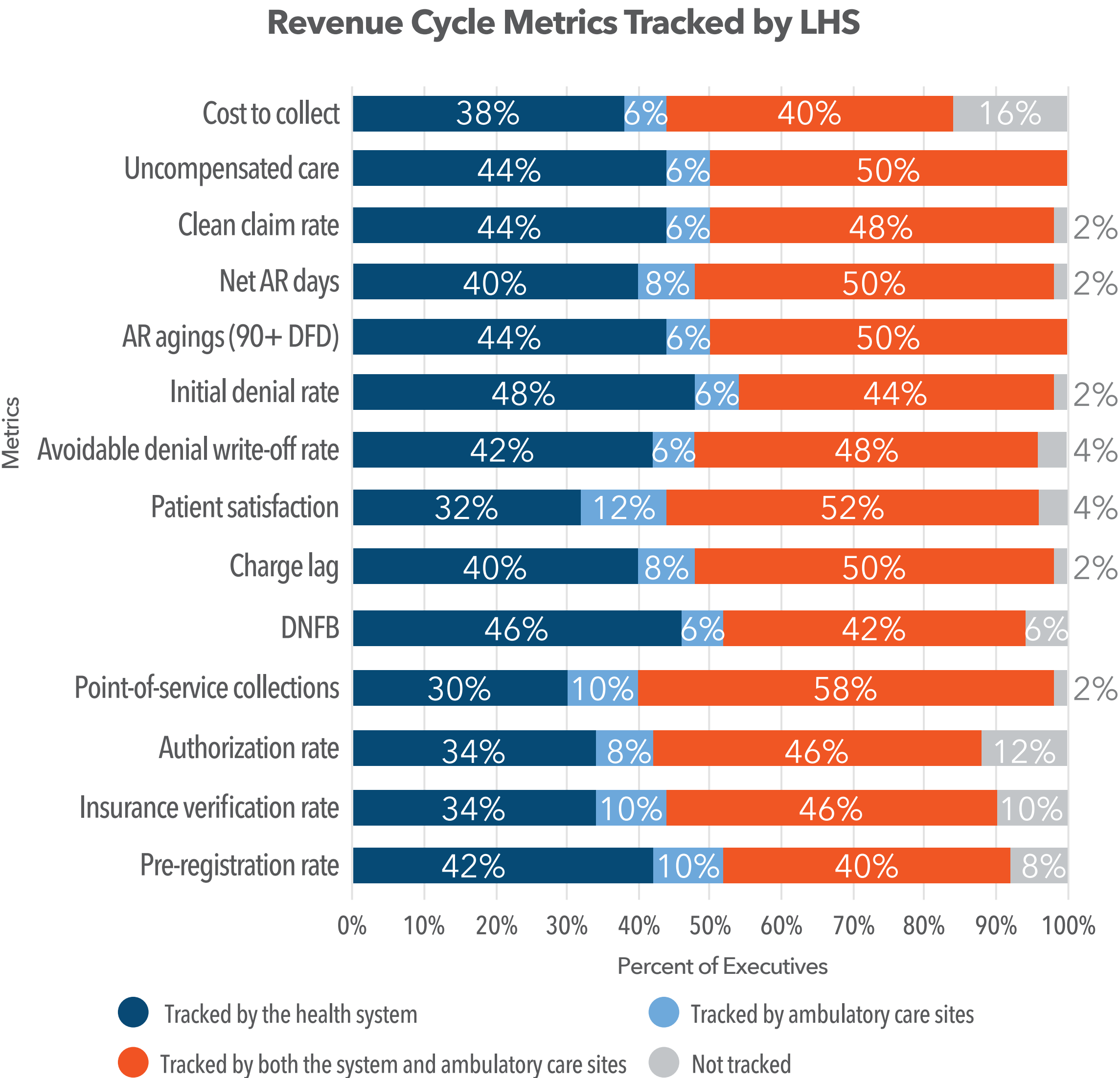# Section 3:
Revenue Cycle Metrics

Centralized Tracking of Revenue Cycle Metrics Not Yet Universal

While just over 50% of LHS have fully centralized tracking of revenue cycle metrics across their health system, there isn't universal consensus on how or what to track. Approximately 1/3 of LHS report their medical group tracking as separate from the rest of the system, and another 10% are completely de-centralized.

Centralized versus De-Centralized RCM

- ● Fully centralized at the system-level
- ● Centralized at the system-level except medical groups
- ● De-centralized
- ● Other

Most LHS are tracking 10 or more revenue cycle metrics with variability in the specific metrics. Only two metrics are universally tracked: uncompensated care and accounts receivable (90 days and older).

Interestingly, 16% of LHS do not track cost to collect. This metric is important in assessing the cost efficiency of the revenue cycle. Without cost to collect, it's difficult to accurately calculate the ROI of an organization's revenue cycle management approach. This lack of data may impact an organization's ability to fully understand the return on investment for RCM technologies, including RPA/AI capabilities.
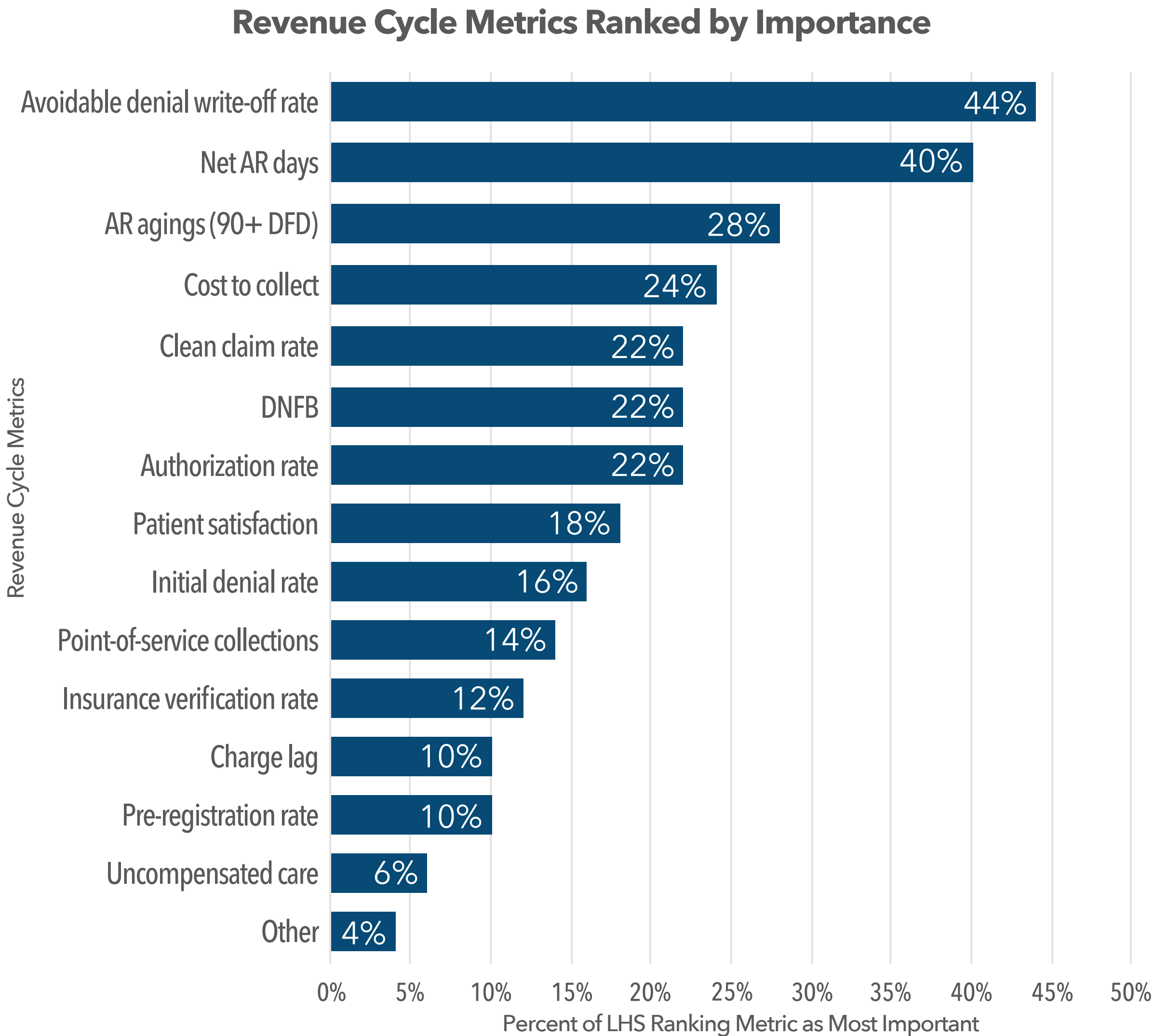
Revenue Cycle Metrics Tracked by LHS

Metrics	Tracked by the health system	Tracked by ambulatory care sites	Tracked by both the system and ambulatory care sites	Not tracked
Cost to collect	38%	6%	40%	16%
Uncompensated care	44%	6%	50%	
Clean claim rate	44%	6%	48%	2%
Net AR days	40%	8%	50%	2%
AR agings (90+ DFD)	44%	6%	50%	
Initial denial rate	48%	6%	44%	2%
Avoidable denial write-off rate	42%	6%	48%	4%
Patient satisfaction	32%	12%	52%	4%
Charge lag	40%	8%	50%	2%
DNFB	46%	6%	42%	6%
Point-of-service collections	30%	10%	58%	2%
Authorization rate	34%	8%	46%	12%
Insurance verification rate	34%	10%	46%	10%
Pre-registration rate	42%	10%	40%	8%

Percent of Executives

- ● Tracked by the health system
- ● Tracked by ambulatory care sites
- ● Tracked by both the system and ambulatory care sites
- ● Not tracked

LHS Prioritize Revenue Metrics over Efficiency Metrics

There isn't consensus on the most important revenue cycle metric to track— with no metric able to garner 50% support from LHS. However, the metrics selected as most important by LHS all measure financial performance (rather than efficiency or other outcomes). For example, avoidable denial write-off rate was ranked the most important metric followed closely by net accounts receivable days. Both are back-end metrics that tie directly to revenue for the health system. Given that most LHS (82%) indicated their top reason for investing in RPA/AI as improving financial performance, it makes sense that LHS are prioritizing these metrics.
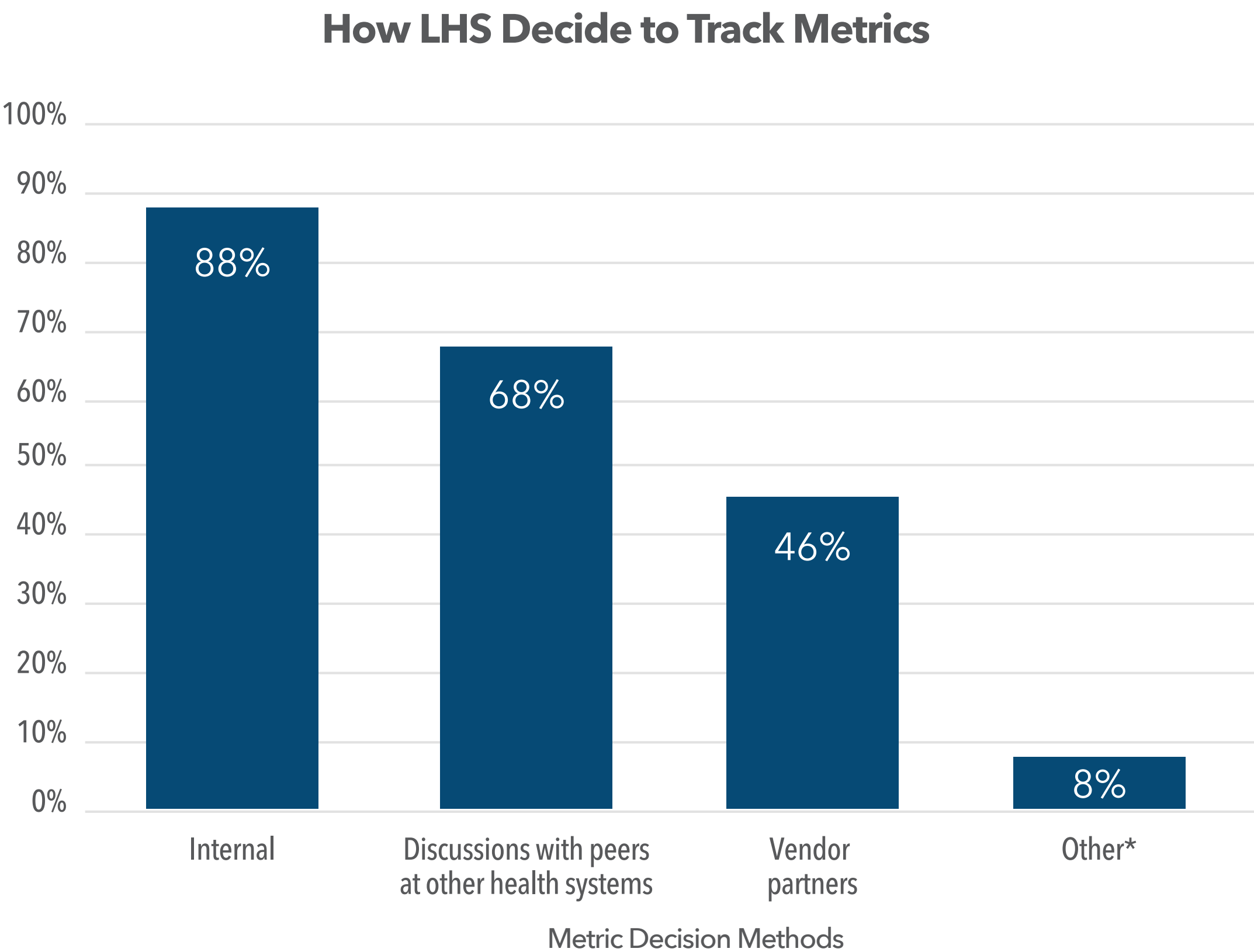
There continues to be variation in metric ranking when considering demographic factors, such as LHS size (measured by net patient revenue). At largest organizations (NPR exceeds 5 billion), patient satisfaction was ranked in the top three. Conversely, in smaller organizations (NPR of 500 million to 1 billion) patient satisfaction ranks in the middle of the list. While the n was too small to analyze top metrics by RPA/AI status, additional data cuts (in the appendix) support a similar finding— there is some variation in the top metrics but an overwhelming focus on financial outcomes.

Top Metrics by Organization Size

NPR Exceeding 5 Billion in NPR

1. Avoidable denial write-off rate
2. Net accounts receivable days
3. Patient satisfaction

NPR of 500 million to 1 Billion

1. Net accounts receivable days
2. Authorization rate
3. (Tie) Avoidable denial write-off rate & Net accounts receivable days (more than 90 days)

Revenue Cycle Metrics Ranked by Importance

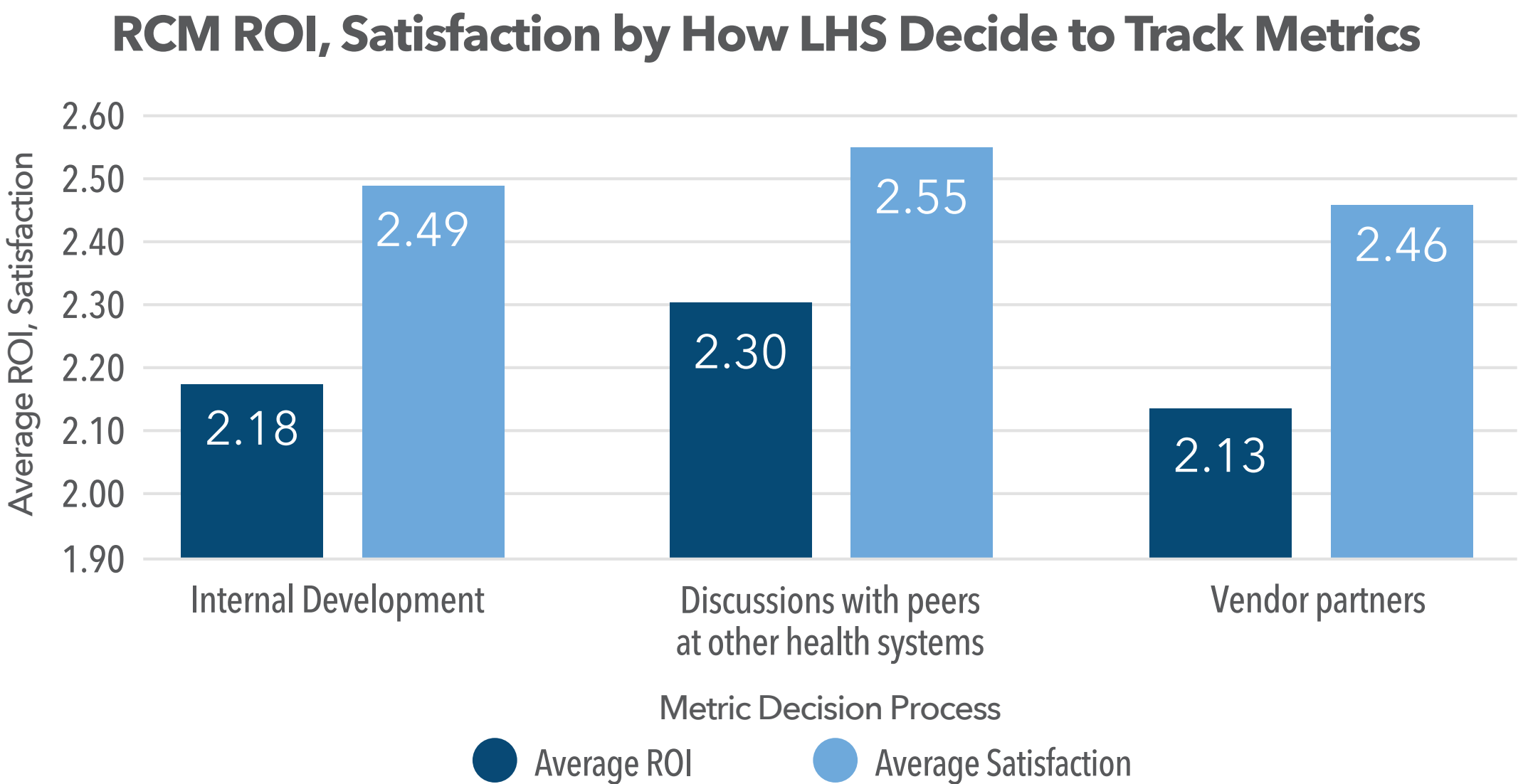| Revenue Cycle Metrics	Percent
Avoidable denial write-off rate	44%
Net AR days	40%
AR agings (90+ DFD)	28%
Cost to collect	24%
Clean claim rate	22%
DNFB	22%
Authorization rate	22%
Patient satisfaction	18%
Initial denial rate	16%
Point-of-service collections	14%
Insurance verification rate	12%
Charge lag	10%
Pre-registration rate	10%
Uncompensated care	6%
Other	4%

Percent of LHS Ranking Metric as Most Important

Revenue Cycle Metrics Ripe for Standardization

When deciding which revenue cycle metrics to track, LHS primarily look internally to revenue cycle and financial leaders. However, many supplement with other methods, including 68% looking to peers, 46% to vendors, and 8% noting other sources, including industry benchmarks available through organizations like Healthcare Financial Management Association and Healthcare Business Insights.

LHS who choose their RCM metrics based on internal development or vendor partners report marginally lower ROI and satisfaction than LHS who choose metrics by seeking outside opinions from peers. Notably, seeking input from vendor partners is used less frequently than peer input and results in slightly lower ROI and satisfaction.

Regardless of method, there is ample room to develop standard revenue cycle metrics to help organizations better track efficiency, ROI, and other outcomes such as patient and staff experience. Researchers, professional organizations, and vendors should play a role to help standardize this as well as determine additional metrics that will help organizations understand the broader impact of RPA and AI in RCM, such as: patient financial experience, staff engagement, and compliance.

How LHS Decide to Track Metrics

RCM ROI, Satisfaction by How LHS Decide to Track Metrics

Other: Individual expertise, consultants, Industry or HFMA/HBI benchmarks.
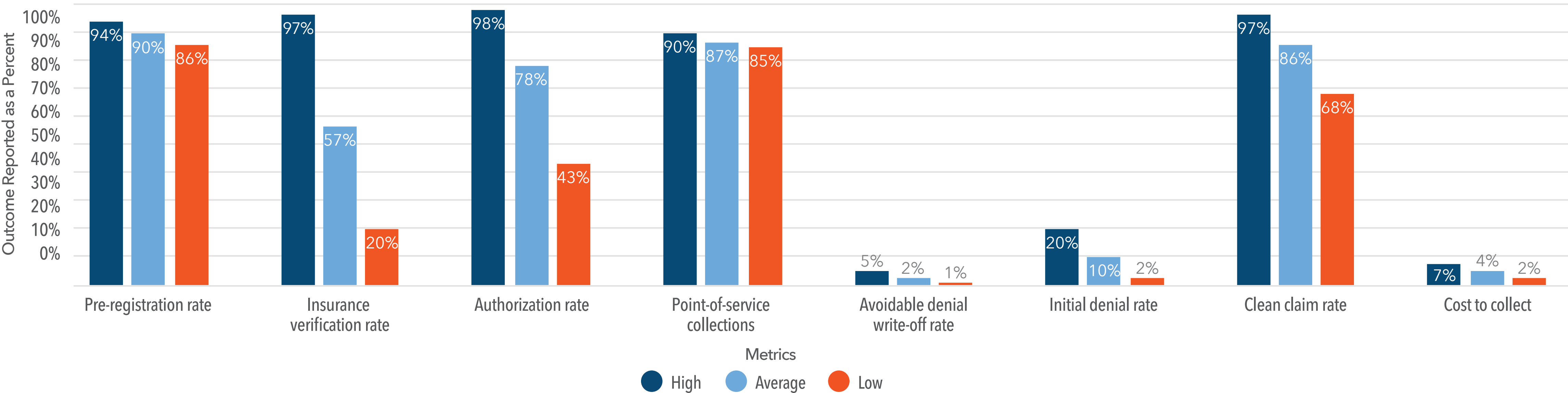
Revenue Cycle Outcomes Less Consistent on Back-End

Reported revenue cycle outcomes were relatively consistent for some metrics, while others varied widely between the lowest and highest reported outcome. For example, net accounts receivable had 28 days between the highest and lowest outcome reported. Alternatively, point-of-service collections only had a 5% difference between the highest and lowest reported outcome metric.

LHS were not required to enter outcomes data and were not required to provide a calculation for each metric. Therefore, additional cuts by RPA/AI use, LHS size, or other demographic area were not possible due to number of respondents for each metric.

LHS Revenue Cycle Outcomes Reported in Days

Metric	High	Average	Low
Discharged, not final bill	80	16.8	2
Charge lag	10	7.3	5
Net accounts receivable	65	24.6	13
Accounts receivable (more than 90 days)	60	49.4	37

LHS Revenue Cycle Outcomes Reported in Percent

Section 4:
Future of RPA and AI in RCM

Automation Likely to See Faster Short-Term Growth Than AI
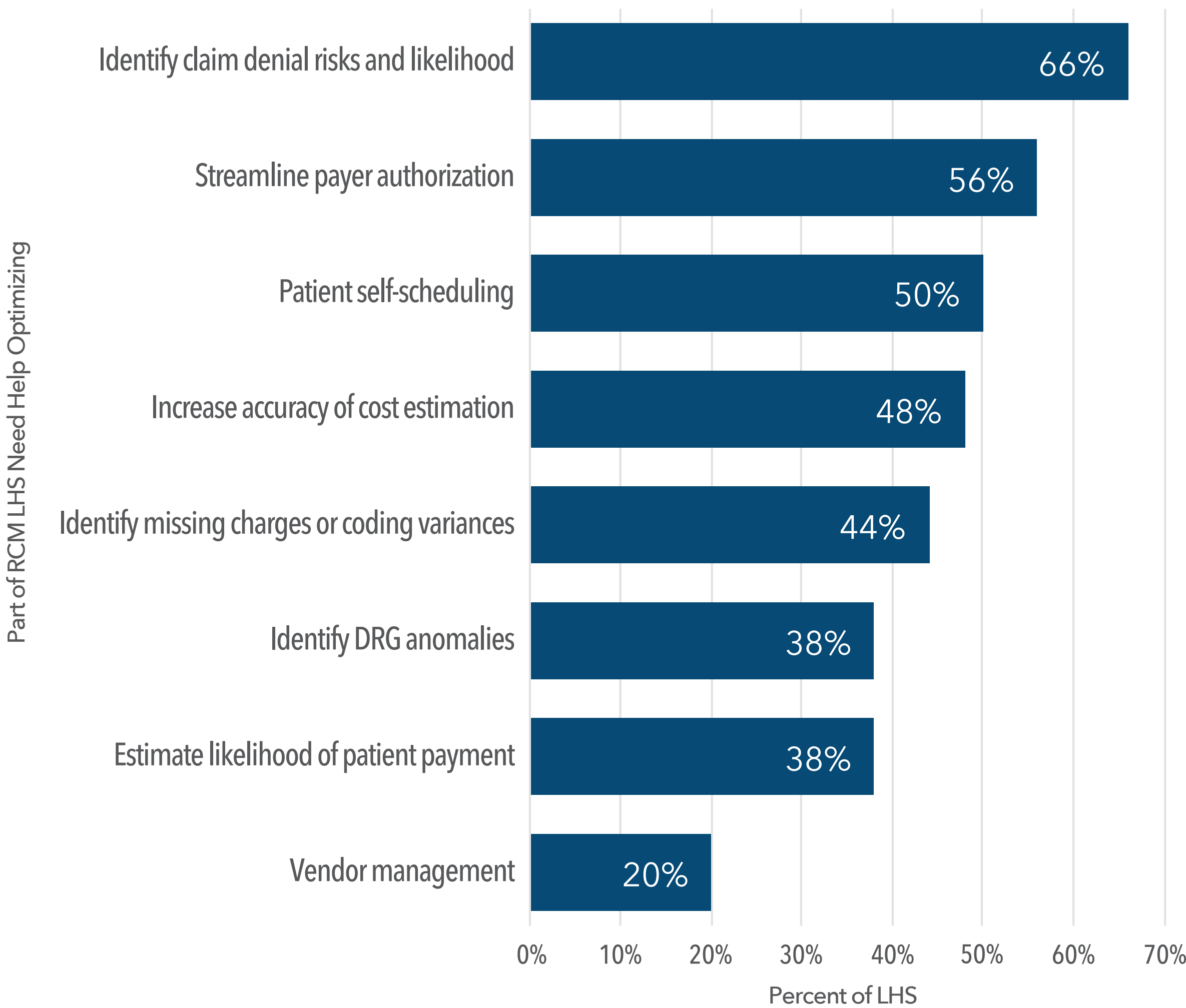
Growth of RPA/AI in RCM Near Certain

The majority of LHS who participated in this research reported either using RPA/AI for RCM (22%) or are actively considering it for the future (64%). Historically, the primary driver of investment in RPA/AI has been financial pressure. Given continued financial strain, it's reasonable to assume that LHS will follow-though on planned investments, resulting in substantial growth in RPA/AI use across the coming decade.

Automation More Common Now, AI Holds Future Potential

Beyond financial pressures, most LHS are looking to increase workforce efficiency by leveraging RPA to reduce repetitive tasks. Of those organizations currently using RPA or AI, most were limiting these capabilities to tasks that are repetitive in nature, such as eligibility verification and coding. Conversely, those areas of RCM that are more aligned with AI capabilities, such as denials management, currently have lower rates of reported RPA/AI use.

While not conclusive, this indicates that few LHS are fully leveraging AI for RCM. For example, when looking at diagnosing denials, only 38% of those who use RPA/AI technologies reported using predictive analytics to identify risk and the problem. This is understandable as AI in the revenue cycle is still in its infancy. That said, there is eagerness for help in this space, as 66% of LHS reported this as their top area for improvement in RCM. Furthermore, as technology and data capabilities evolve, AI for RCM will become more sophisticated and able to more quickly deliver on ROI. While growth across both RPA and AI are expected, it's likely that LHS will first invest in automation and then consider AI.

Parts of Revenue Cycle LHS Most Need Help Optimizing

Bar chart — Part of RCM LHS Need Help Optimizing (y-axis) vs. Percent of LHS (x-axis):
- Identify claim denial risks and likelihood: 66%
- Streamline payer authorization: 56%
- Patient self-scheduling: 50%
- Increase accuracy of cost estimation: 48%
- Identify missing charges or coding variances: 44%
- Identify DRG anomalies: 38%
- Estimate likelihood of patient payment: 38%
- Vendor management: 20%

Beyond Budget, Perceptions of Technology are a Major Barrier

As Expected, Budget is Top Barrier to Investment

Budget or cost can be daunting barriers to LHS particularly when many are evaluating RPA/AI due to financial pressure. LHS will ultimately have to decide whether the cost of the technology and implementation is worth the investment. It's important to note that strong ROI cases are needed for RPA/AI, as a number of respondents noted the lack of ROI as a major barrier (other 14%).
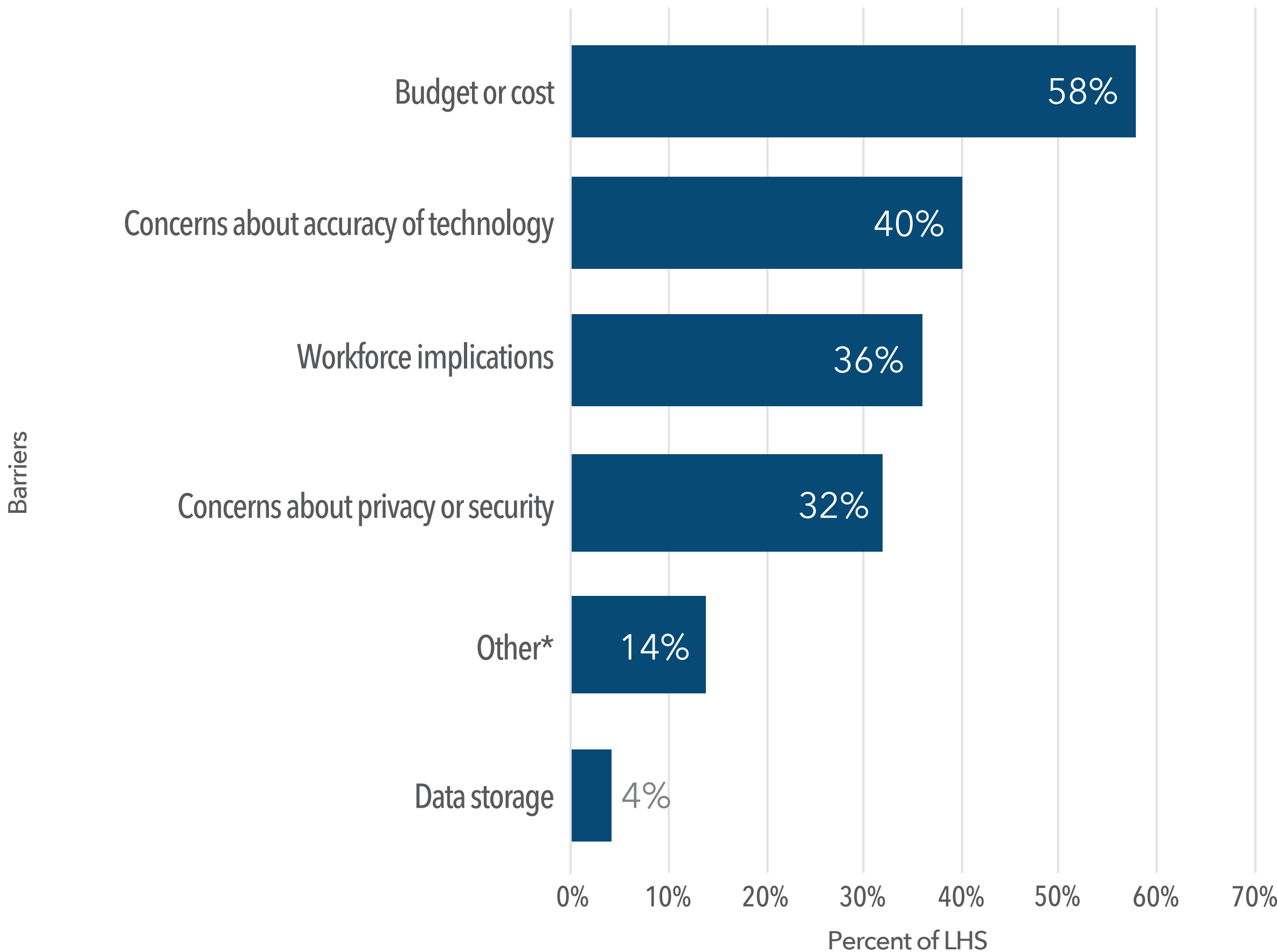
Perceptions of Accuracy, Security are Alarming

The perceptions of RPA/AI technologies also play a role around accuracy, privacy, and workforce implications. Forty percent of LHS cited concerns about the accuracy of the technology, which may stem from general mistrust of automation and AI, lack of understanding, or limited data. Like other software, RPA and AI are only as good as the instructions and data that support them. A LHS with cutting edge software may not be able to yield meaningful insights if the data they input into the program is insufficient.

Notably, only 4% of LHS are concerned about data storage. It is possible that LHS are already successfully managing large amounts of RCM data. But it's also likely that LHS do not currently have data storage issues because they are not collecting the detailed revenue cycle data required for AI programs. This barrier may increase as more LHS invest in AI.

While these barriers are valid concerns, perceptions of the technology's accuracy and security can be the hardest to overcome. To start, revenue cycle leaders who are interested in investing in RPA or AI technologies need to understand these perceptions among leaders and staff and strategize how they can influence successful implementation of the technology.
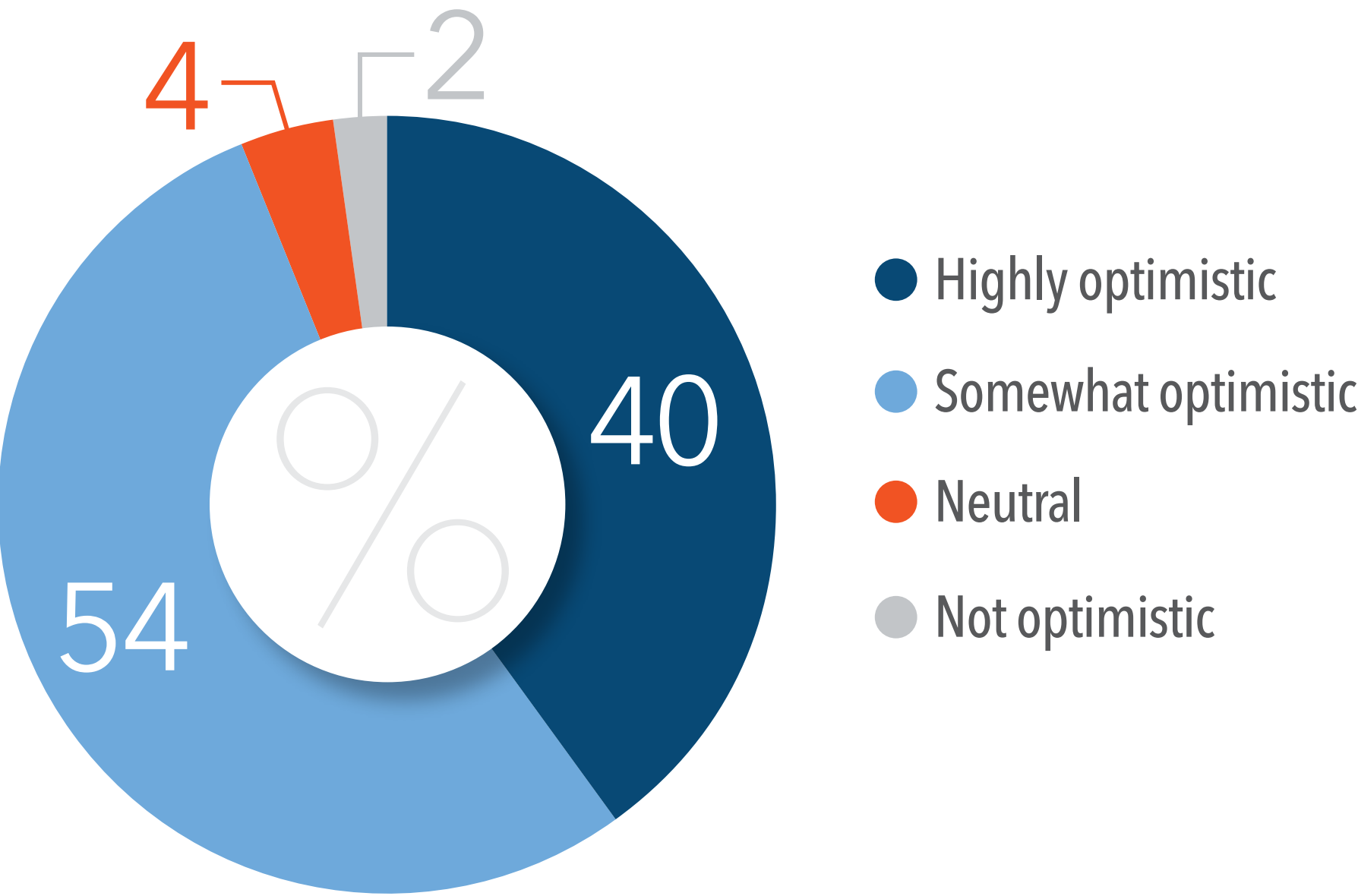
Barriers to Investing in RPA/AI for RCM

Other includes: ROI, inability to prove value, prioritization, integration and implementation, internal IT resource constraints, challenges with execution.

Setting the Groundwork for the Future of RPA and AI

Despite barriers, there is a future for RPA and AI in revenue cycle. Overwhelmingly, health system leaders are interested in automation and optimistic about AI at their organization—with 94% either highly or somewhat optimistic. Given this, revenue cycle leaders should start or continue setting the groundwork for future investment, whether that comes this year or in 5-10 years.

Health System Leaders' Optimism about the Future of AI at their Organization

- ● Highly optimistic
- ● Somewhat optimistic
- ● Neutral
- ● Not optimistic

40
54
4
2

How to Set the Groundwork for RPA, AI

Educate Leaders and Staff on Automation and AI

Currently, understanding of automation, AI, and machine learning among healthcare executives, providers, and staff is widely variable. Often, the terms are used interchangeably. One of the best steps revenue cycle leaders can take now to support future investments in technology is education—including capabilities, limitations, and "myth-busting" misplaced perceptions. Ideally, education would come from a subject matter expert fluent in both AI and RCM, which means some LHS may need to bring in outside experts.

Be Clear on Technology Capabilities and Limitations

Currently, there is a disconnect between what many LHS believe they will get from RPA or AI investments and reality. For example, the technology may be great but there isn't the volume of data needed, the implementation process may be longer than expected, or workflows and workforce may need to change to see true ROI. Revenue cycle leaders need to be clear upfront on what they are and are not getting with these technologies to make informed decisions about investment.

Gain Efficiency and Early Wins with Automation

There are many components of the revenue cycle that are repetitive and can be automated, freeing up some or even all of the workforce to do higher level work while reducing errors. By aiming for efficiency gains over financial performance in the first year of implementation, revenue cycle leaders can build trust and buy-in with the technology.

Methodology

Methodology

In June 2021, The Health Management Academy conducted a quantitative assessment of Leading Health System executives regarding their strategic approaches to robotic process automation (RPA) and artificial intelligence (AI) in the revenue cycle.

The 50 quantitative survey responses represent 50 unique health systems and 50 total executives.

Respondent roles included: VP of Revenue Cycle, VP of Finance, Chief Financial Officer, and IT Executives

Academy Project Team

Study Authors

- **James Cheung,** Analyst, Research & Advisory

- **Anne Herleth,** Senior Director, Research & Advisory

- **Tomi Ogundimu,** Executive Director, Research & Advisory

TheAcademy

Trusted Partner to Leading Health Systems and Industry Members

The Academy brings together Leading Health System (LHS) and industry executives to collectively address healthcare's biggest challenges and opportunities.

Leading Health Systems by the Numbers

150 Health Systems

500+ C-suite Executives

1,600+ Health System Leaders

80%
Inpatient Admissions

77%
Outpatient Admissions

75%
Total Physicians

77%
Total Operating Revenue (TOR)

How We Serve Members

Convene exceptional peer groups that facilitate meaningful relationships and knowledge exchange

Create world-class leadership development designed to prepare next generation healthcare leaders

Produce original research leveraging member insights on healthcare's greatest challenges and opportunities

Deliver custom insights and actionable intel supporting new partnership growth between industry and health systems

Facilitate high-impact partnership arrangements between health systems and industry

About Waystar

Waystar's market-leading technology simplifies and unifies healthcare payments. Our cloud-based platform removes friction in billing processes, streamlines workflows and improves financials for healthcare providers in every care setting.

Learn more at waystar.com

The Academy extends its appreciation to Waystar for the financial support for this report.

Data Appendix

RPA/AI Impact on Revenue Cycle Workforce

LHS Reduction in RCM Workforce due to RPA/AI Investment

Percent of LHS

- Other: 3%
- No: 18%
- Re-allocated staff to different roles: 62%
- Eliminated vacant RCM positions: 47%
- Eliminated active RCM positions: 18%

Percent Reduction in RCM Workforce After RPA/AI Investment

Legend:
- Not reported
- 1 to 2%
- 3 to 5%
- 5 to 10%
- 10 to 20%
- 20 to 30%
- 30 to 40%
- 40 to 50%
- More than 50%

Categories: Eliminated vacant positions, Eliminated active positions, Re-allocated staff to different roles

Reasons for RPA, AI Investment

Reasons for LHS Investment in AI/RPA for RCM

Reasons for Investment	Percent of LHS
Improve financial performance	82%
Address workforce efficiencies	79%
Fix specific RCM pain points (i.e., authorization denial)	62%
Better leverage an AI or technology partnership that already exists	32%
Better support value-based care reimbursement	32%
Gain competitive advantage	24%
Other (please specify):	9%

Benefits of Investing in RPA/AI for RCM

Benefits of Investing in RPA/AI for RCM

ROI by RCM Approach Across the Revenue Cycle

1=low ROI; 5=high ROI

ROI by RCM Approach Across the Revenue Cycle

Category	Internally built technology	Using vendor technology	Manage through people/processes	Manage through HIS/EMR
Claims management (statusing)	2.50	2.50	3.00	2.04
Patient registration QA	2.33	2.14	2.67	2.14
Prior authorization	2.17	2.67	2.13	
Payment posting and reconciliation	2.50	1.90	2.40	2.27
Coding	2.50	2.00	2.25	2.21
Eligibility verification	2.33	2.19		
Denial management	2.83	1.71	2.17	2.20
Patient estimates	2.00	2.30	2.33	2.16
Revenue capture/integrity	2.25	2.17	2.00	2.25

ROI of RCM Approach by RPA/AI Status

1=low ROI; 5=high ROI

ROI of RCM Approach by RPA/AI Status

● Currently using RPA/AI ● Currently evaluating RPA/AI solutions or vendors ● Considering RPA/AI in 1-3 years ● Considering RPA/AI in more than 3 years ● Not considering RPA/AI

RPA/AI Impact on Revenue Cycle Workforce

RCM Technology ROI by EHR Vendor

Legend:
- Epic
- Cerner
- Other

Data labels shown:
- Bar 1: Epic 15%, Cerner 3%
- Bar 2: Epic 24%, Cerner 24%
- Bar 4: Epic 15%, Cerner 9%, Other 9%
- Bar 5: Epic 3%

ROI of RCM Approach by Workforce Changes

Categories:
- Yes, we eliminated active RCM positions
- Yes, we eliminated vacant RCM positions
- Yes, we re-allocated staff to different roles
- No
- Other

LHS Satisfaction with Approach to RCM

1=low satisfaction; 5=high satisfaction

LHS Satisfaction with Approach to RCM

LHS Satisfaction with Approach to RCM

1=low satisfaction; 5=high satisfaction

LHS Satisfaction with Approach to RCM by RPA/AI Status

Legend:
- Currently using RPA/AI
- Currently evaluating RPA/AI solutions or vendors
- Considering RPA/AI in 1-3 years
- Considering RPA/AI in more than 3 years
- Not considering RPA/AI

LHS Satisfaction with Approach to RCM by EHR Vendor

1=low satisfaction; 5=high satisfaction

LHS Satisfaction with Approach to RCM by EHR Vendor

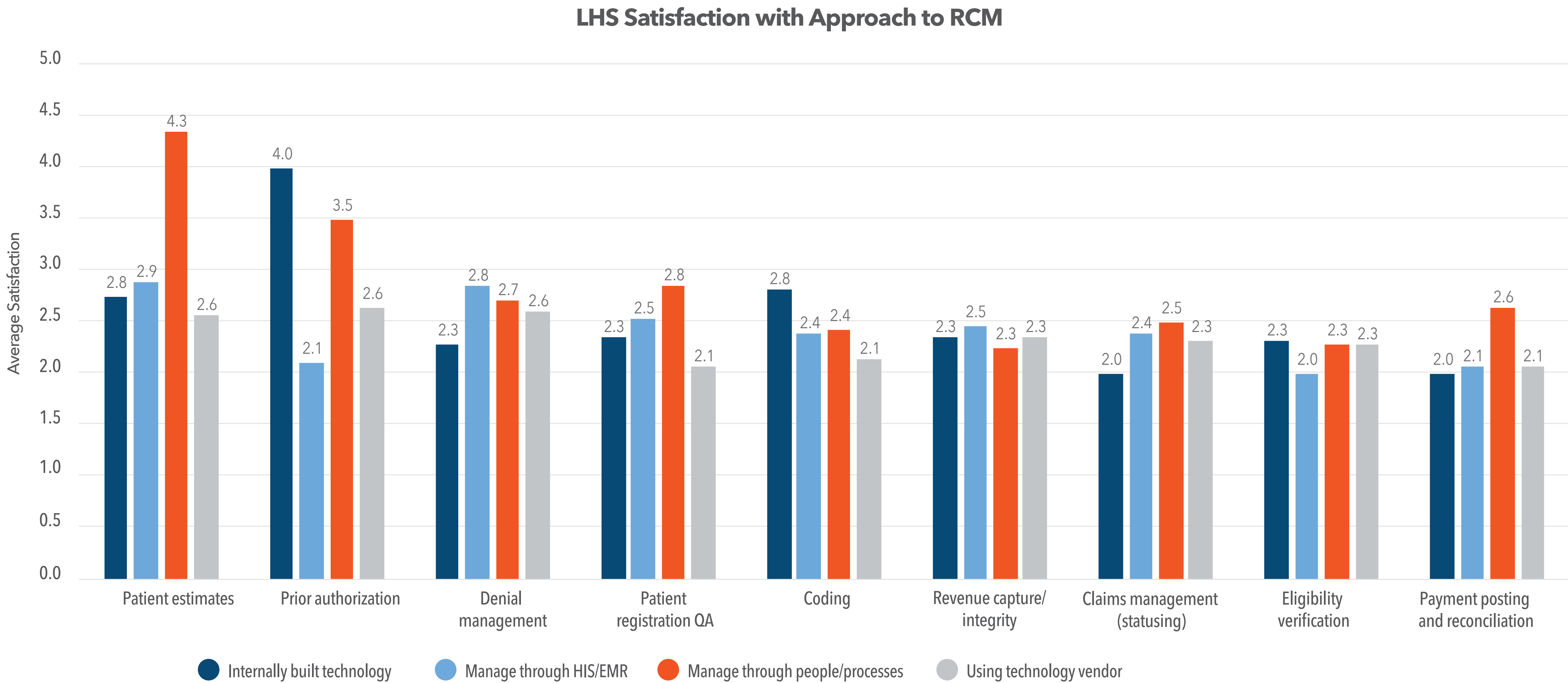| Category	Epic	Cerner	Other
Patient estimates	3.0	2.8	3.2
Prior authorization	2.8	2.7	3.0
Denial management	2.8	2.6	2.8
Revenue capture/integrity	2.4	2.2	3.0
Patient registration QA	2.4	2.3	3.2
Eligibility verification	2.4	2.1	3.0
Claims management (statusing)	2.5	2.2	2.8
Coding	2.3	2.3	2.4
Payment posting and reconciliation	2.2	2.1	2.4

Legend: Epic, Cerner, Other

Top RCM Metrics by LHS Size

Most Important RCM Metrics by LHS Size

Legend:
- $1 to 3B (dark blue)
- $3 to 5B (light blue)
- $500M to $1B (orange)
- Exceeds $5B (gray)

Metric	$1 to 3B	$3 to 5B	$500M to $1B	Exceeds $5B
Avoidable denial write-off rate	10%	8%	8%	18%
Net AR days	12%	4%	16%	8%
AR agings (90+ DFD)	4%	10%	8%	6%
Cost to collect	4%	8%	6%	6%
Clean claim rate	6%	8%	4%	4%
DNFB	6%	6%	6%	4%
Authorization rate		6%	12%	4%
Patient satisfaction	4%		6%	8%
Initial denial rate	6%	4%	4%	2%
Point-of-service collections	4%	0%	6%	4%
Insurance verification rate	6%		4%	2%
Charge lag	4%			6%
Pre-registration rate		4%	4%	2%
Uncompensated care			2%	4%
Other		2%	2%	

Top RCM Metrics by EMR Vendor

Most Important RCM Metrics by LHS Size

Use of Predictive Analytics to Identify Risk and Diagnose Denials

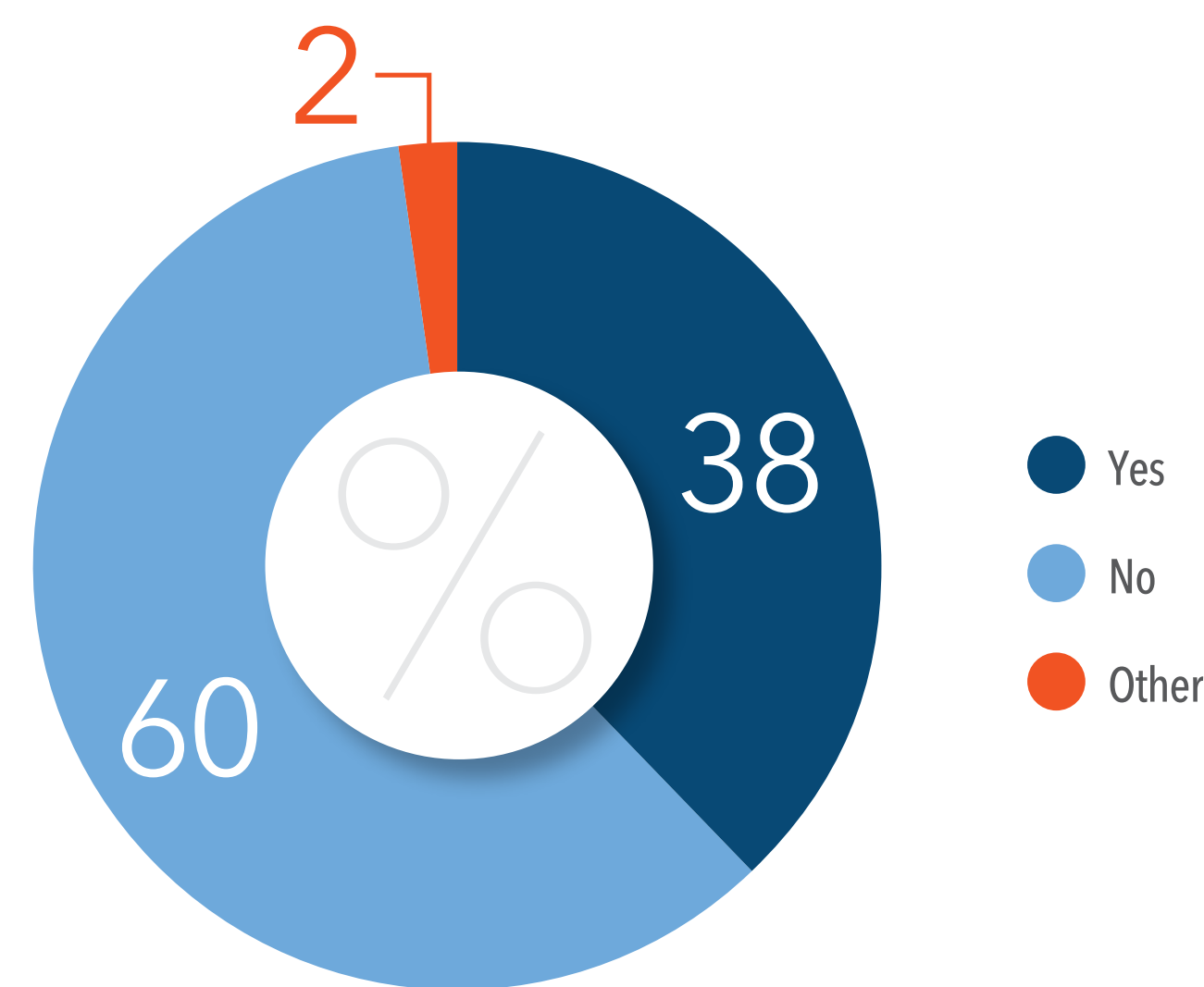**LHS Use of Predictive Analytics to Identify Risk and Diagnose Denials**

Legend:
- Yes
- No
- Other

Values: 2, 38, 60

Table of Contents

Report Overview and Profile of Participating Health Systems

Project Outline

The Academy sought to understand how LHS are adopting robotic process automation (RPA) and artificial intelligence (AI) in their revenue cycles along with the benefits and barriers of the adoption process.

The Academy is defining RPA and AI as:

- **RPA:** Technology in the form of a script that automates transactional and repetitive processes based on a set of precoded rules.

- **AI:** Technology such as machine learning programs that intake a large amount of labeled data and analyze the data for patterns. Once these patterns are established, the program can use them to predict future outcomes from new data inputs.
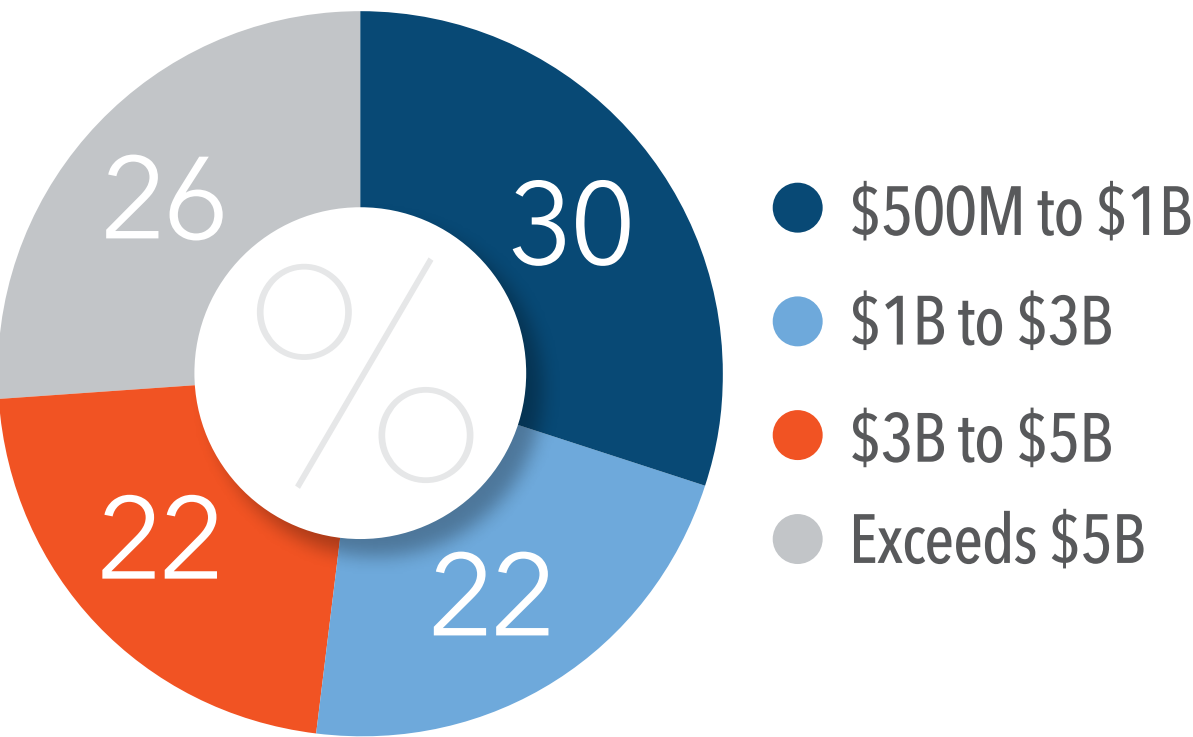
The Academy captured perspectives across 50 unique health systems which represent a significant share of the LHS market.

Participating Executives

- VP of Revenue Cycle (34%)
- IT Executive or Leader (20%)
- Chief Financial Officer (14%)
- VP of Finance (6%)
- Other (26%)

Profile of Participating Health Systems

LHS Net Patient Revenue (NPR)

- 30 — $500M to $1B
- 22 — $1B to $3B
- 22 — $3B to $5B
- 26 — Exceeds $5B

LHS Geographic Footprint

- 20% — 5 or more states
- 12% — 3–4 states
- 20% — 2 states
- 48% — 1 state

Percent of LHS

LHS Region

- 4 — MidAtlantic
- 24 — Midwest
- 24 — Northeast
- 2 — Northwest
- 10 — Pacific Coast
- 24 — Southeast
- 12 — Southwest

LHS EMR Vendor

- 32 — Cerner
- 58 — Epic
- 10 — Other

Will Robotic Process Automation and Artificial Intelligence Transform Revenue Cycle Management?

The revenue cycle process has a long and cumbersome history that continues to become more complex as policies, payer relationships, and patient expectations evolve. Despite that, many health systems still rely on manual processes prone to human error or bolt-on technologies that only solve specific RCM pain points—making revenue cycle management (RCM) particularly ripe for innovation. With increased financial pressure stemming from the COVID-19 pandemic, there is a greater focus on innovating in RCM to ensure viable operating margins for health systems.

Robotic process automation and artificial intelligence are two technologies that stand to greatly impact RCM due to the repetitive nature of many of the tasks. These two technologies are defined as follows:

- RPA is traditional automation whereby simple standardized tasks can be completed by rule-based software.

- AI uses large data sets to train software to analyze patterns; this software can then be used to solve more complex challenges than RPA.

When fully implemented and optimized, RPA and AI promote efficiency, strengthen employee engagement, minimize human error, increase standardization, enhance the patient financial experience, and ultimately improve financial performance. While the return on investment (ROI) is not always immediate, the benefits and efficiency of the technology will only increase over time. However, the technology alone will not produce results—changes to workflow and workforce, as well as ample back-end data are required to support the technology.

Some LHS are already using RPA or AI technologies across some or all parts of the revenue cycle (see graphic below) and are still grappling with how to reach full ROI. Others have not yet invested but plan to in the near-term future. Regardless of current RPA/AI status, LHS need to continue to integrate RPA and AI and optimize existing processes to achieve the goal of improved financial performance and return on investment.

Parts of the Revenue Cycle

Front-end

- Patient Registration QA
- Eligibility Verification
- Patient Estimates
- Prior Authorizations

Mid-Cycle

- Coding

Back-end

- Denial Management
- Payment Posting and Reconciliation
- Claims Management
- Revenue Capture

Key Takeaways

The key takeaways captured below represent the main findings of this report and are discussed in further detail in the corresponding sections of the report.

1

Use of Robotic Process Automation and Artificial Intelligence Adoption for RCM Remains Low, But Likely to See Rapid Growth.

The majority of LHS are not yet using RPA and AI for RCM. Current RPA or AI usage is not consistent across all parts of the revenue cycle and higher in areas that are repetitive in nature and ripe for automation. While not conclusive, it's likely LHS are using RPA more often than AI in RCM. However, these trends are likely to change in the coming years. Over 50% of LHS plan to pursue these technologies in the next 3 years, particularly to improve financial performance.

2

Return on Investment Points to Limitations of Technology Without Workflow and Workforce Changes.

Universally, LHS reported low return on investment (ROI) regardless of how they manage revenue cycle. For LHS using RPA and AI, this may reflect implementation challenges, a disconnect between the expectations and reality of the technology, or untapped opportunities to update revenue cycle processes. To see the full impact of RPA or AI, organizations must make changes to the revenue cycle workflow and workforce, as well as have access to ample back-end data to support the technology.

3

Revenue Cycle Metrics are Ripe for Standardization.

While just over 50% of LHS have fully centralized tracking of revenue cycle metrics across their health system, there isn't universal consensus on how or what metrics to prioritize. LHS are tracking a variety of revenue cycle metrics and tend to favor those linked to financial performance over efficiency. Regardless of method, there is ample room to develop standard revenue cycle metrics to help organizations improve accuracy and efficiency while also measuring financial outcomes.

4

Revenue Cycle Leaders Need to Lay the Groundwork Now for Future RPA, AI Investments.

Overwhelmingly, health system leaders are interested in automation and optimistic about AI at their organization—with 94% either highly or somewhat optimistic. However, one of the biggest barriers to adoption is the variable understanding of automation, AI, and machine learning among healthcare executives, providers, and staff. Beyond securing budget, one of the best steps revenue cycle leaders can take now to support future investments in technology is C-suite education—including capabilities, limitations, and "myth-busting" misplaced perceptions.

Section 1:
RCM Current Landscape

Approach to Revenue Cycle Management Highly Variable

Technology Common But Not Universal in RCM

Leading Health Systems (LHS) manage their revenue cycle through four main channels: a technology vendor, internally built technology, people and processes, or via the electronic medical record system. The most popular approach to revenue cycle management (RCM) at LHS is using a technology vendor. When broken down by parts of RCM, eligibility verification (78%), claims management (62%), and prior authorizations (56%) most often rely on vendor technology. LHS typically use technology vendors for most parts of the revenue cycle with the exception of patient registration QA. Notably, very few LHS opted to built internal technologies in these areas of RCM.

Outsourcing to a vendor isn't the dominant approach in every part of the revenue cycle, as many LHS vary their management approach (i.e., using people/processes or EMR) across different parts of the revenue cycle. For example, LHS typically manage patient registration and quality assurance processes directly through the EHR more often than any other approach, including using a technology vendor or leveraging people-driven processes.
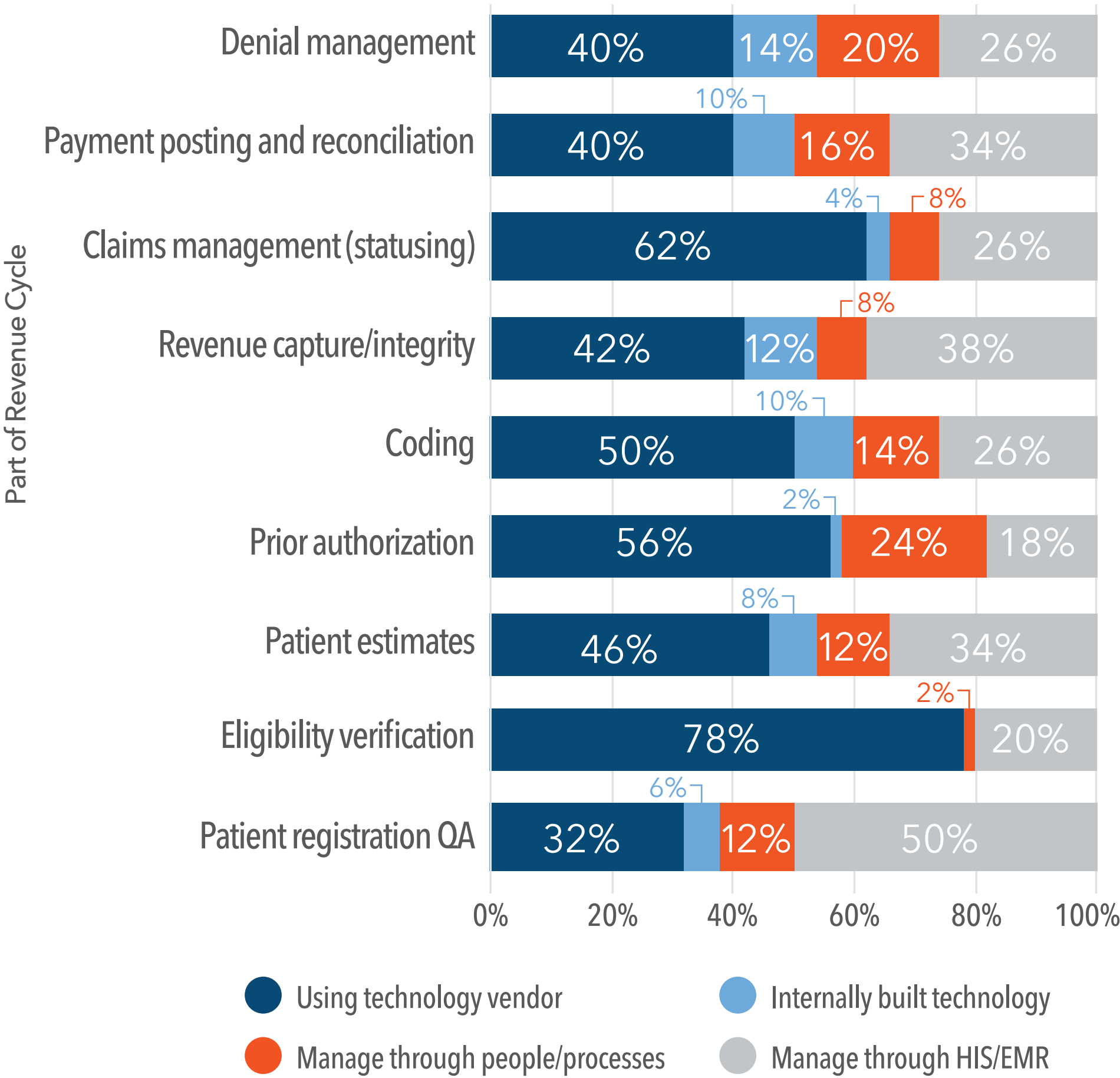
There are still a number of LHS managing their revenue cycle through people and processes, with almost 25% of LHS using this approach for prior authorization and 20% in denial management. However, across the board, management through people and processes and internally built technology are least popular with LHS.

Few Opting to Internally Build RCM Technology

Currently, 14% of participating LHS built their own technology for RCM. Areas where internal technology is particularly low include eligibility verification and claims management, both of which see a high proportion of outsourcing. This points to the efficiency of existing market options as well as the well-documented, numerous challenges associated with developing the technology internally.[1] Given this, it's not surprising that LHS are primarily relying on technology vendors and EMR integrated tools to improve revenue cycle.

LHS Approach to Managing Revenue Cycle

Part of Revenue Cycle

	Using technology vendor	Internally built technology	Manage through people/processes	Manage through HIS/EMR
Denial management	40%	14%	20%	26%
Payment posting and reconciliation	40%	10%	16%	34%
Claims management (statusing)	62%	4%	8%	26%
Revenue capture/integrity	42%	12%	8%	38%
Coding	50%	10%	14%	26%
Prior authorization	56%	2%	24%	18%
Patient estimates	46%	8%	12%	34%
Eligibility verification	78%		2%	20%
Patient registration QA	32%	6%	12%	50%

Legend: ● Using technology vendor ● Internally built technology ● Manage through people/processes ● Manage through HIS/EMR

---

1 Healthcare Innovation. No More DIY Approaches to Revenue Cycle Management (2020).

Current RPA, AI Use Low, Targeting Repetitive Tasks

RPA, AI Not Majority But Higher Than Expected

The use of robotic process automation (RPA) and artificial intelligence (AI) for RCM was higher than expected when compared to recent studies. A 2019 study found 15% of health system executives were targeting RPA for RCM in 2019 as compared to none in 2018, indicating a sizable investment in the technology across three years. [2] Despite growing investment in RPA and AI, the majority of LHS are not currently using these technologies for RCM.
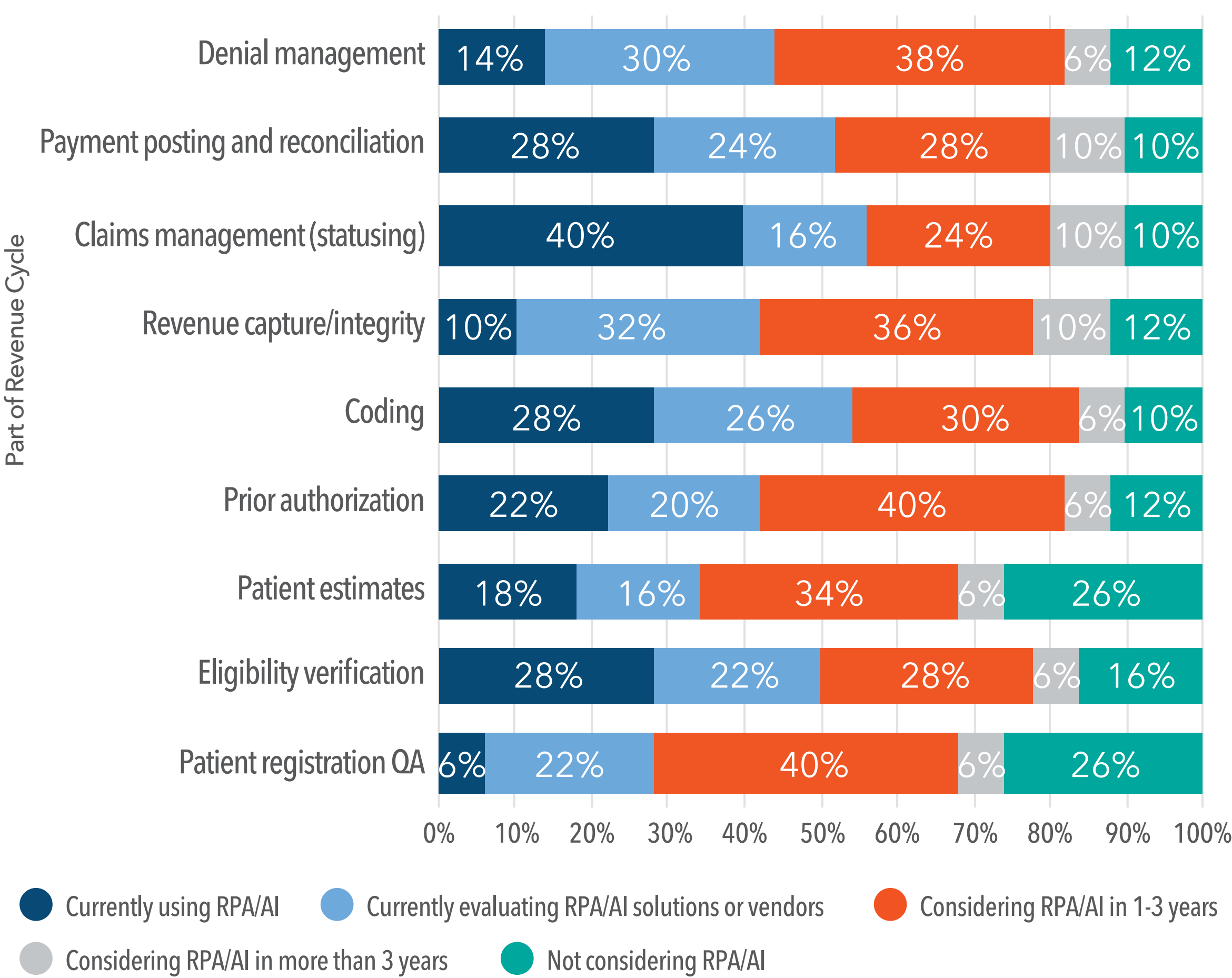
Technology Primarily Used for Repetitive Tasks

Similar to the overall approach to RCM, the use of RPA or AI is not consistent across all parts of the revenue cycle. 40% of participating LHS reported using RPA or AI for claims management while only 6% are leveraging it for patient registration quality assurance.

When considering this in conjunction with the benefits of RPA and AI for RCM, these variations make sense. Current RPA/AI usage is higher for eligibility verification and coding, which are repetitive in nature and ripe for automation.

Conversely, patient registration quality assurance may have a higher level of complexity due to the variability of patient inputs on forms. As a result, it is less repetitive and less conducive to automation at this time. As organizations continue to standardize these more complex processes, RPA may become more common across the board.

LHS Approach to Managing Revenue Cycle

Part of Revenue Cycle (y-axis)

Part of Revenue Cycle	Currently using RPA/AI	Currently evaluating RPA/AI solutions or vendors	Considering RPA/AI in 1-3 years	Considering RPA/AI in more than 3 years	Not considering RPA/AI
Denial management	14%	30%	38%	6%	12%
Payment posting and reconciliation	28%	24%	28%	10%	10%
Claims management (statusing)	40%	16%	24%	10%	10%
Revenue capture/integrity	10%	32%	36%	10%	12%
Coding	28%	26%	30%	6%	10%
Prior authorization	22%	20%	40%	6%	12%
Patient estimates	18%	16%	34%	6%	26%
Eligibility verification	28%	22%	28%	6%	16%
Patient registration QA	6%	22%	40%	6%	26%

Legend:
- Currently using RPA/AI
- Currently evaluating RPA/AI solutions or vendors
- Considering RPA/AI in 1-3 years
- Considering RPA/AI in more than 3 years
- Not considering RPA/AI

---

[2] Healthcare Financial Management Association. Top revenue cycle challenges and opportunities (2019).

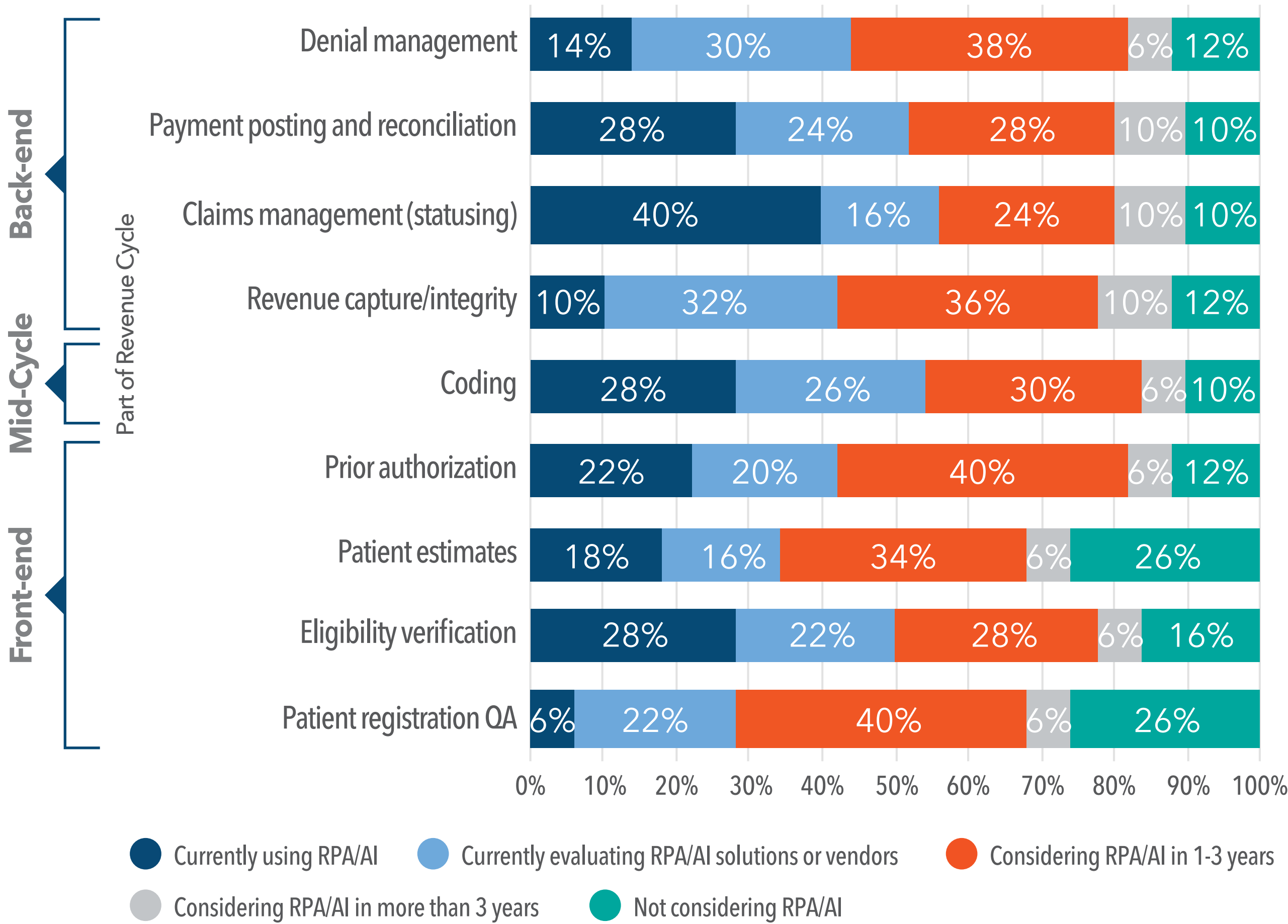# Current RPA, AI Use Low, Targeting Repetitive Tasks

Most LHS Considering RPA/AI in the Near Term

There is considerable interest in implementing RPA/AI for RCM in the near term. Across most areas of the revenue cycle, over 50% of LHS are either currently evaluating or considering adoption of RPA/AI in the next three years. This is in line with findings from other research and reasonable given the financial pressures coming out of the COVID-19 pandemic.[3,4]

When looking across the three stages of the revenue cycle—front-end, mid-cycle, and back-end—there are ample opportunities for LHS to leverage RPA/AI particularly to improve financial performance in the mid- and back-end. A study of revenue cycle management estimated that a 250-bed hospital leaks $4.7-$11 million per year through their mid-cycle.[5] While only 28% of participating LHS report using RPA/AI for coding today, 62% of LHS reported future interest and only 10% reported no interest.

Across other parts of the revenue cycle, interest in RPA/AI to assist with revenue generation holds. Notably on the back-end, short-term interest in RPA/AI usage—those currently evaluating and considering in 1-3 years—are highest for revenue capture (68%) and denial management (68%). Conversely, the percent of LHS who aren't considering RPA/AI at all are lowest for mid-cycle and back-end management. While not conclusive, these results may indicate a growing interest and comfort with AI in areas where predictive analytics show potential, such as denials management.

LHS Approach to Managing Revenue Cycle

Part of Revenue Cycle	Task	Currently using RPA/AI	Currently evaluating RPA/AI solutions or vendors	Considering RPA/AI in 1-3 years	Considering RPA/AI in more than 3 years	Not considering RPA/AI
Back-end	Denial management	14%	30%	38%	6%	12%
Back-end	Payment posting and reconciliation	28%	24%	28%	10%	10%
Back-end	Claims management (statusing)	40%	16%	24%	10%	10%
Mid-Cycle	Revenue capture/integrity	10%	32%	36%	10%	12%
Mid-Cycle	Coding	28%	26%	30%	6%	10%
Front-end	Prior authorization	22%	20%	40%	6%	12%
Front-end	Patient estimates	18%	16%	34%	6%	26%
Front-end	Eligibility verification	28%	22%	28%	6%	16%
Front-end	Patient registration QA	6%	22%	40%	6%	26%

Legend:
- Currently using RPA/AI
- Currently evaluating RPA/AI solutions or vendors
- Considering RPA/AI in 1-3 years
- Considering RPA/AI in more than 3 years
- Not considering RPA/AI

---

[3] Gartner. Robotic Process Automation in the Healthcare Industry (2021).
[4] Modern Healthcare. COVID-19 hastens hospitals' revenue cycle outsourcing moves (2021).
[5] Health Leaders. Proactive strategies for reducing mid-revenue cycle leakage (2021).
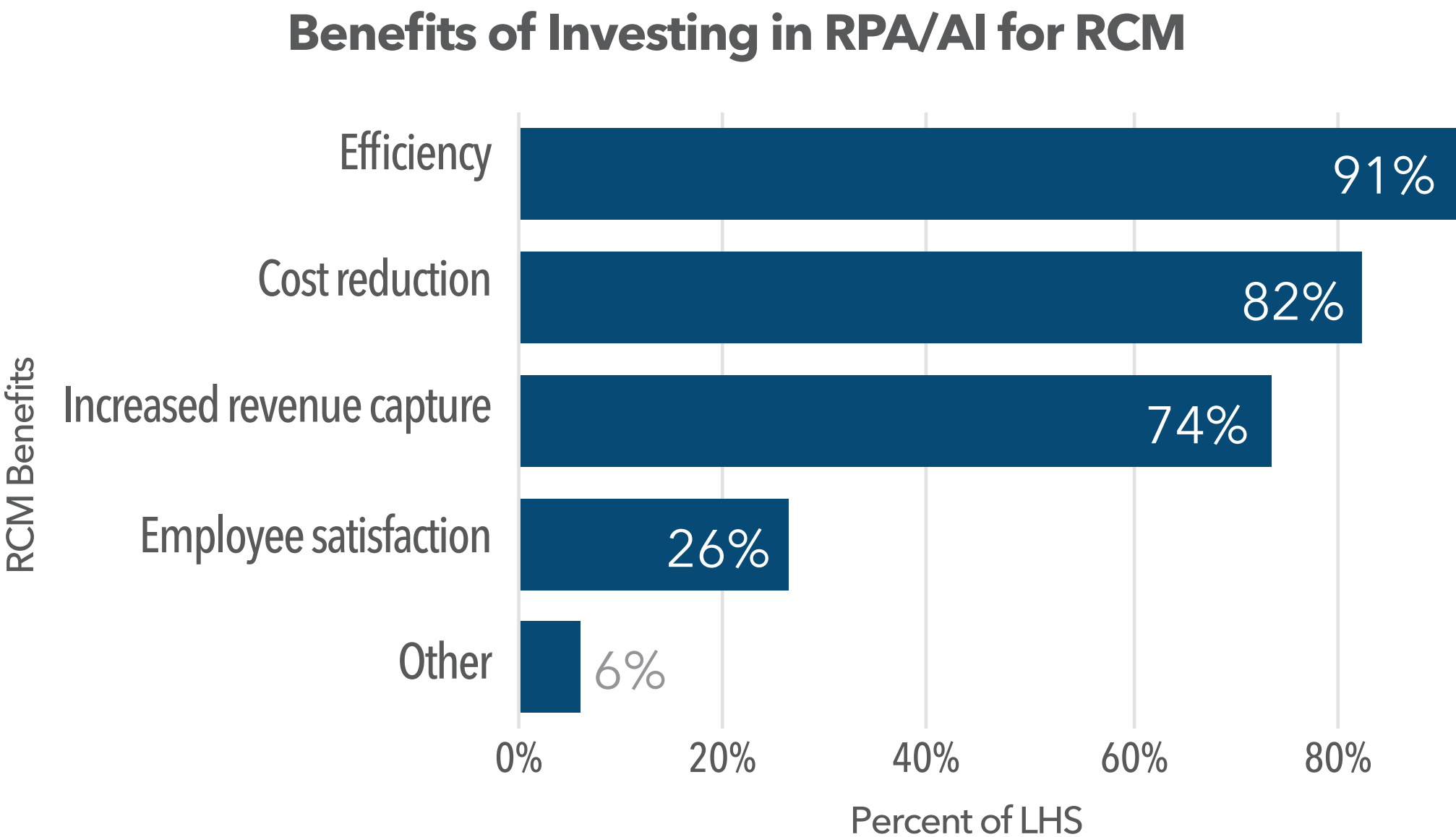
Section 2:
Impact of RPA/AI on RCM

Efficiency Benefits Widely Reported with RPA/AI Use

Efficiency Reported as Top Benefit of RPA, AI

One of the most compelling benefits of RPA/AI is its ability to streamline efficiency throughout the revenue cycle. Almost universally, LHS currently using RPA/AI for RCM reported efficiency as the top benefit (91%) over both cost reduction (82%) and increased revenue capture (74%).

Benefits of Investing in RPA/AI for RCM

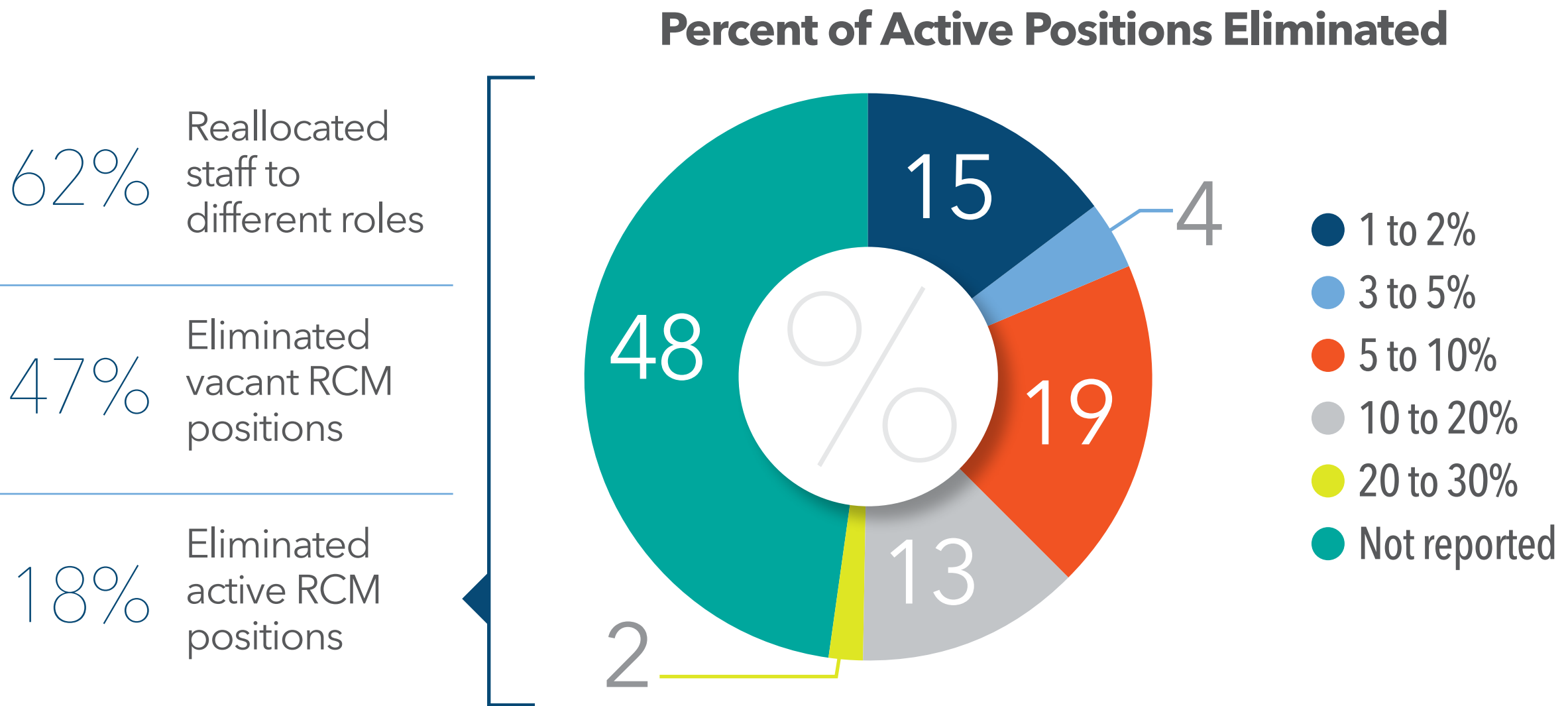| RCM Benefits	Percent of LHS
Efficiency	91%
Cost reduction	82%
Increased revenue capture	74%
Employee satisfaction	26%
Other	6%

Only 26% of LHS reported employee satisfaction as a top benefit of investing RPA/AI for RCM. This could indicate that LHS executives do not measure or consider employee satisfaction as important as other benefits attributed to RPA/AI investments. Alternatively, the disruption to workflow when RPA or AI are initially implemented can create challenges for employees and may result in lower employee satisfaction across the short- or long-term.

Revenue Cycle Workforce Often Reallocated to Different Roles, Further Supporting RCM Efficiency

Automation ensures speed and precision while freeing up staff to work on more complex, higher value tasks within the revenue cycle. As a result, many LHS (82%) reduced their RCM workforce following the implementation of RPA/AI, with 62% of executives specifically stating they reallocated staff to different roles. Less than a quarter of executives reported eliminating active positions, supporting previous studies that found automation doesn't often lead to mass layoffs.[6] More commonly, staff roles change to meet new or evolving business needs.

Across all three reduction types, less than 25% of LHS reduced their RCM workforce by more than 10%. This is equivalent to the proportion of LHS who are not reducing their workforces at all. Meaning, some LHS are only making marginal shifts in workforce while others are laying off up to 20% of current RCM staff. This variation in workforce changes may also contribute to the cost savings benefits, which will be higher for LHS that eliminated at least some RCM positions.

62% Reallocated staff to different roles

47% Eliminated vacant RCM positions

18% Eliminated active RCM positions

Percent of Active Positions Eliminated

Segment	Value
1 to 2%	15
3 to 5%	4
5 to 10%	19
10 to 20%	13
20 to 30%	2
Not reported	48

See appendix for additional data cuts.

[6] Healthcare Financial Management Association. How to prepare your revenue cycle and your employees for a digital workforce. (2019).

Yet, Benefits Not Aligned with Reasons for Technology Investment

Investment Driven By Promise of Increased Net Revenue

Over 80% of LHS currently using RPA/AI reported improving financial performance as their primary reason for investing. However, when comparing this with top benefits LHS received from RPA/AI, increased revenue capture was reported third (out of four) behind both efficiency and cost reduction. While executives are certainly benefiting from RPA/AI, there is a slight disconnect between the reasons for initially investing and the benefits reaped once adopted.

LHS invest in RPA/AI to alleviate margin pressure through increased net revenue capture. While efficiency can contribute to margin indirectly, LHS but may not be fully executing the workforce or workflow changes needed to maximize the revenue benefits. For example, RPA/AI in denial management can yield immediate revenue increases, but in other areas of RCM, like coding, the impact on revenue isn't as straightforward. RPA may free up the workforce to focus on higher level work while AI can increase coding accuracy (and in turn, ensure reimbursement is sought or decrease the number of denied claims). However, these revenue benefits are indirect and take more time to realize.

Interestingly, only 62% of LHS invested in RPA/AI to fix specific revenue cycle pain points. It could be that they attempt to solve these pain points with people and processes before investing in technology. Other responses included opportunity identification. This could indicate that LHS are using RCM technology to further improve their process or positively impact the patient financial experience.

Reason for investing	Percent of LHS Reporting Reason for Investing	Benefit	Percent of LHS Reporting Benefit
Improve financial performance	82%	Efficiency	91%
Address workforce efficiencies	79%	Cost reduction	82%
Fix specific RCM pain points	62%	Increased revenue capture	74%

LHS Strategy Potentially Influencing Investment

Beyond revenue cycle leaders, C-suite executives play a role in determining technology investments for revenue cycle. Almost a third of LHS indicated they invested in RPA/AI to better support value-based care reimbursement (32%) or leverage existing technology partnerships (32%), while nearly a quarter (24%) invested to gain competitive advantage. While these drivers are outweighed by revenue cycle specific challenges, they do indicate that broader LHS strategy and leadership may play a role in RPA/AI investment decisions.

See appendix for additional data cuts.

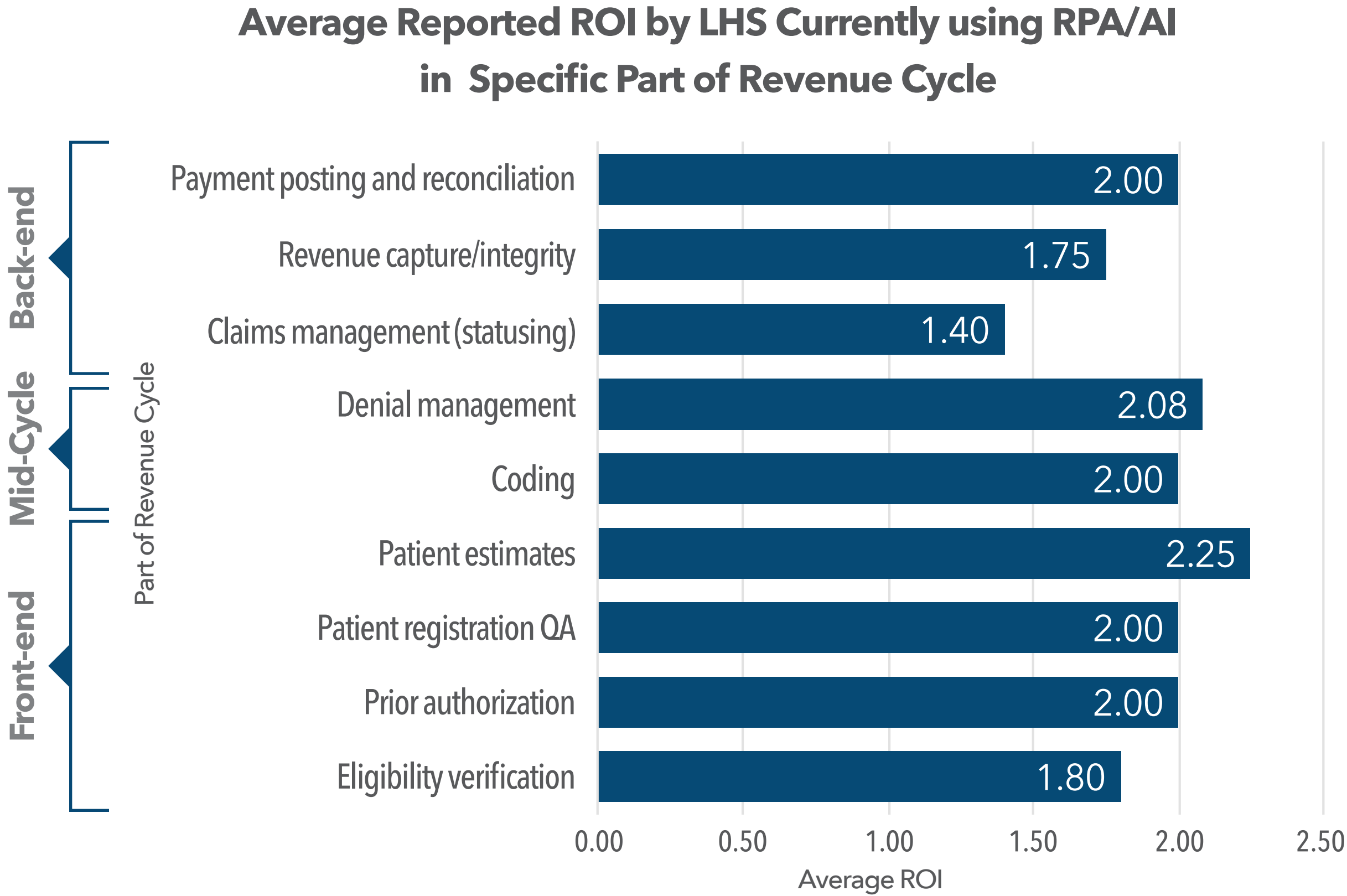# Reported RCM Return on Investment Low Among LHS

LHS currently using RPA/AI for at least one part of the revenue cycle were asked how they would evaluate the return on investment (ROI) of RPA/AI for RCM, with 1 representing no ROI and 5 representing high ROI. The average ROI reported was 2.21—with the majority selecting 2 (47%) or 3 (32%).

When considering ROI by LHS size (measured by net patient revenue), larger LHS have higher average ROI (2.44) compared to smaller organizations. This may be due to the benefits of scale.

Though low across the board, front-end RPA/AI use yields a slightly greater ROI than back-end. This may reflect a difference in the primary outcome of efficiency (front-end) over financial performance (back-end)—although not a perfect correlation. Interestingly, the areas with slightly higher ROI have lower rates of RPA/AI use. For example, patient estimates have the highest ROI but only 18% of LHS are currently using RPA/AI in this part of revenue cycle and 26% are not considering using RPA/AI at all.
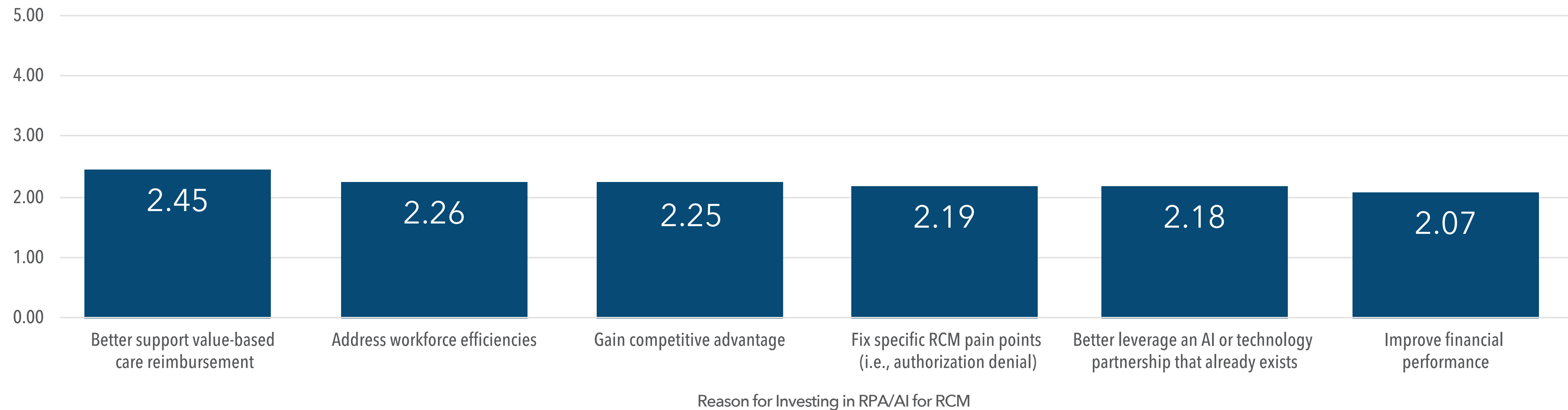
LHS Net Patient Revenue	Average ROI
$5 Billion+	2.38
$3-$5 Billion	2.33
$1-$3 Billion	2.33
$500-$1 Billion	1.57

Additional analysis looked at ROI responses by segment of the revenue cycle. The data on the right reflects ROI only for those LHS currently using RPA/AI in the specific part of the revenue cycle. Therefore, the sample sizes across each part of the revenue cycle vary, with some falling below n=20. This data is shared to provide additional insight into ROI by part of the revenue cycle but should not be considered conclusive.

Average Reported ROI by LHS Currently using RPA/AI in Specific Part of Revenue Cycle

Back-end
- Payment posting and reconciliation: 2.00
- Revenue capture/integrity: 1.75
- Claims management (statusing): 1.40

Mid-Cycle
- Denial management: 2.08
- Coding: 2.00

Front-end
- Patient estimates: 2.25
- Patient registration QA: 2.00
- Prior authorization: 2.00
- Eligibility verification: 1.80

Part of Revenue Cycle

Average ROI

ROI measured by the following question: How would you evaluate the ROI of investing in RPA/AI for RCM? ROI range: 1=lowest; 5=highest.

A Closer Look at ROI Points to the Untapped Potential with RPA/AIAI

The low ROI* findings warranted additional exploration to better understand the root causes shaping LHS leaders' perspectives. When analyzing ROI by reason for investing in RPA/AI, the average ROI did not substantially change. No single reason for investing in RPA/AI met the health system-reported ROI threshold of 3*, which indicates that finance leaders are not seeing the full value of these investments. Interestingly, those investing to improve financial performance had the lowest reported ROI.

Additional data analysis (see appendix) did not uncover conflicting trends or additional insight on ROI. However, when reflecting on the previously reported disconnect between LHS' reasons for investing in RPA/AI and the benefits, it is conceivable that expectations and current realities are not aligned for LHS leaders. This may reflect a need for LHS executives to better understand what changes are needed to achieve a higher ROI on RPA/AI investments including: implementation challenges, misinformation about RPA/AI capabilities, a longer timeline to achieve ROI, or untapped opportunities with workflows and workforce. In addition, return on investment is unlikely to improve until there is better alignment on the expectations of RPA and AI technologies and reality.

Geographic Representation of Board Members Across LHS

	Value
Better support value-based care reimbursement	2.45
Address workforce efficiencies	2.26
Gain competitive advantage	2.25
Fix specific RCM pain points (i.e., authorization denial)	2.19
Better leverage an AI or technology partnership that already exists	2.18
Improve financial performance	2.07

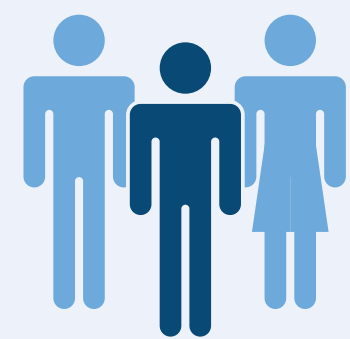Reason for Investing in RPA/AI for RCM

*ROI measured by the following question: How would you evaluate the ROI of investing in RPA/AI for RCM? ROI range: 1=lowest; 5=highest.

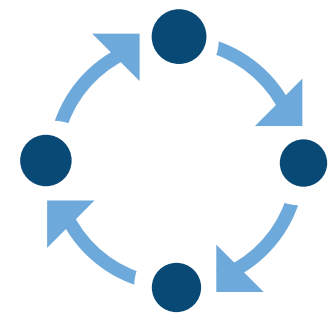# Unlocking ROI for RPA/AI Requires More Than Technology

Automation and AI have potential to address some of the biggest pain points in revenue cycle management, leading to increased efficiency and improved financial performance. However, ROI is not immediate and can be difficult to achieve in short timeframes depending on how LHS executives are measuring it. Based on the most straight forward ROI calculation*, benefits following investment in RPA/AI technology start slow but often ramp up over time.

Beyond time, organizations currently using or evaluating future RPA/AI investments must make changes to support the full implementation of the technology, including upskilling the workforce and making changes to the workflow, as well as ensuring ample back-end data needed to fuel automation and AI.

Upskilling the workforce

Revenue cycle automation significantly reduces manual tasks and improves efficiency. But to see maximum cost savings, organizations need to help transition staff into more complex roles. For example, automation can enable staff to cover more accounts, reduce preventable denials, and work and appeal a larger percentage of all denials therefore increasing reimbursement and reducing costs associated with the process. The current RCM workforce may not have the skills needed for the new roles, so organizations need to invest in training to support the transition and ensure staff can optimize the use of automation and AI.

Changes to the workflow

Even with RPA or AI, revenue cycle management is still a set of rules and processes. When implementing technology, these rules and processes need to be updated and standardized (where possible). If not, inefficient processes may have unintended consequences that create downstream work for others. Organizations should evaluate and update all processes as part of RPA/AI implementation.

Ample Data to Support AI

It's not enough to introduce AI-driven revenue cycle processes. Organizations need the right inputs and enough data to support the established goals. When evaluating an RCM vendor with AI technology, it is critical to verify the depth of their outside data and how it will integrate with existing data systems (like the EMR) to glean insights and improve processes and outcomes. Without enough big data from internal and external sources, AI cannot be successful—regardless of how effective the technology appears.
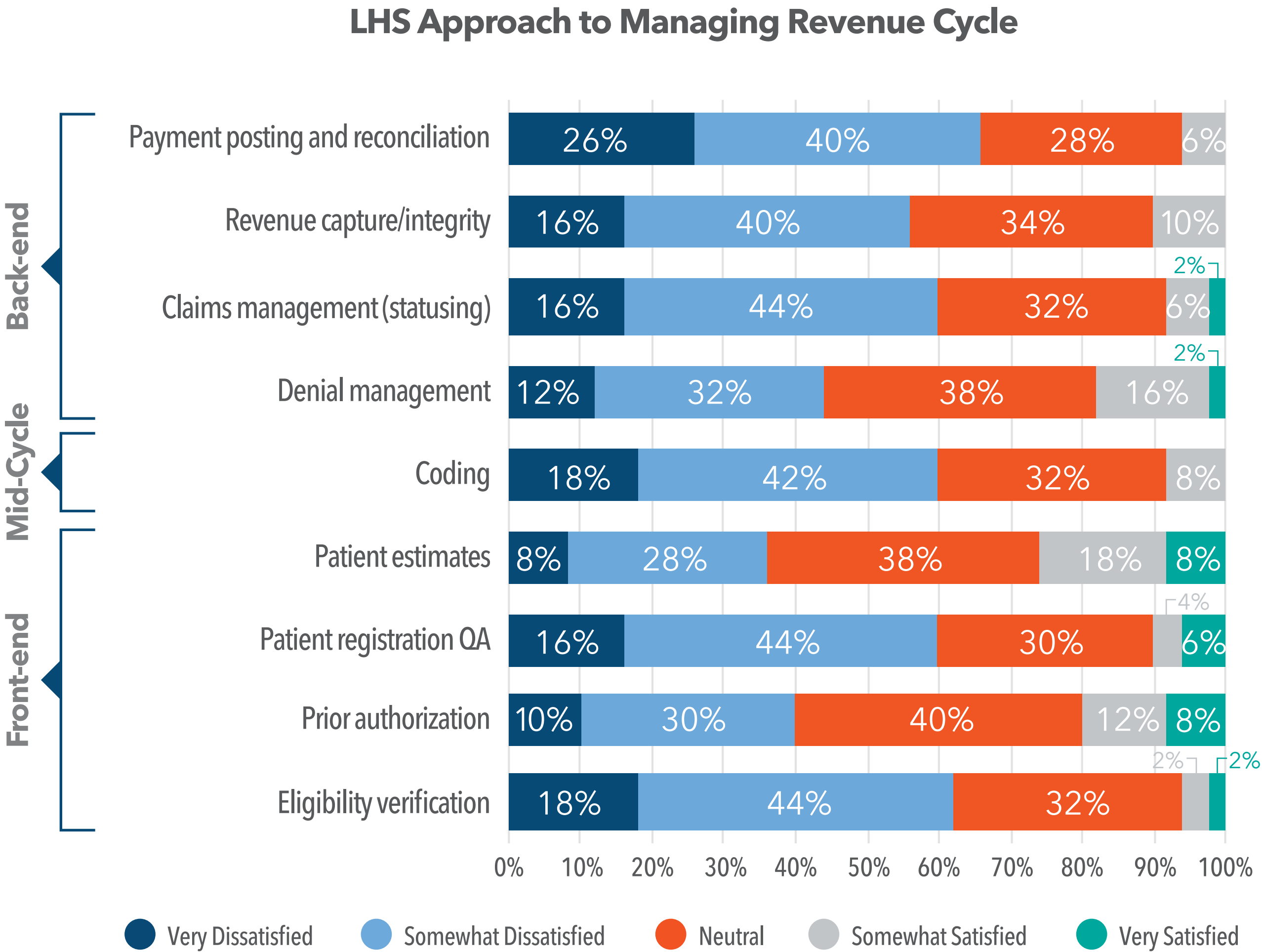
15

Satisfaction with RCM Approach Also Universally Low

Given the ROI data, it's not surprising that LHS satisfaction with their RCM approach is also low across the board—with an average satisfaction of 2.41 across all respondents. When broken out by approach to RCM, people and processes ranked highest and vendor technology ranked lowest.

Approach to RCM	Average Satisfaction*
People and Processes	2.83
Internally built technology	2.53
Managed via EMR	2.41
Technology Vendor	2.33

Similar to ROI, average satisfaction is slightly higher across the front-end of the revenue cycle. Increasing complexity of claims filing on the back-end of the revenue cycle may result in lower satisfaction with current solutions.

The lowest satisfaction area in the revenue cycle was payment posting and reconciliation. A recent survey found that 71% of LHS still reconcile point-of-service cash and checks manually. By continuing to do this work manually, revenue cycle teams are prone to disorganization of financial information as well as complex and arduous processes. Taken together, these realities are very dissatisfying to LHS. Fortunately, 79% of LHS reported that they are prioritizing automation of this step in the revenue cycle in order to alleviate some of these challenges.

LHS Approach to Managing Revenue Cycle

Back-end
- Payment posting and reconciliation: 26% | 40% | 28% | 6%
- Revenue capture/integrity: 16% | 40% | 34% | 10%
- Claims management (statusing): 16% | 44% | 32% | 6% | 2%

Mid-Cycle
- Denial management: 12% | 32% | 38% | 16% | 2%
- Coding: 18% | 42% | 32% | 8%

Front-end
- Patient estimates: 8% | 28% | 38% | 18% | 8%
- Patient registration QA: 16% | 44% | 30% | 6% | 4%
- Prior authorization: 10% | 30% | 40% | 12% | 8%
- Eligibility verification: 18% | 44% | 32% | 2% | 2%

Legend: ● Very Dissatisfied ● Somewhat Dissatisfied ● Neutral ● Somewhat Satisfied ● Very Satisfied

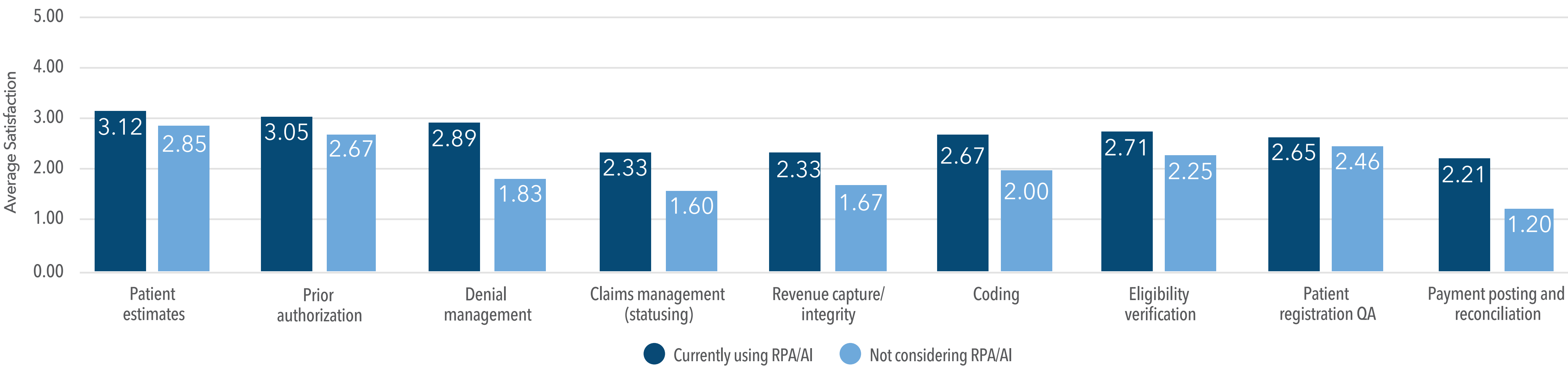*Satisfaction range: 1=lowest; 5=highest.*

Satisfaction Higher on Average Among LHS Using RPA/AI Tools

Notably, satisfaction with RPA/AI usage tells a bit of a different story. LHS currently using RPA/AI have a higher average satisfaction across all parts of the revenue cycle than LHS who are not using or considering RPA/AI. For example, the average satisfaction for a LHS currently using RPA/AI is 2.7 as compared to 2.1 for LHS not considering using RPA/AI. When broken out by part of the revenue cycle, LHS using RPA/AI consistently report higher satisfaction than those who are not considering the technology.

In addition to technology, standardization may play a role these findings. The use of RPA/AI requires more streamlined processes. Therefore, organizations using RPA/AI may have more standardization in revenue cycle processes, driving higher overall satisfaction.

RPA/AI Status	Average Satisfaction*
Currently using RPA/AI	2.7
Currently evaluating RPA/AI	2.6
Considering RPA/AI in 1-3 years	2.6
Considering RPA/AI in more than 3 years	2.2
Not considering RPA/AI	2.1

Average Satisfaction for LHS Using RPA/AI Versus Not Considering RPA/AI

- ● Currently using RPA/AI
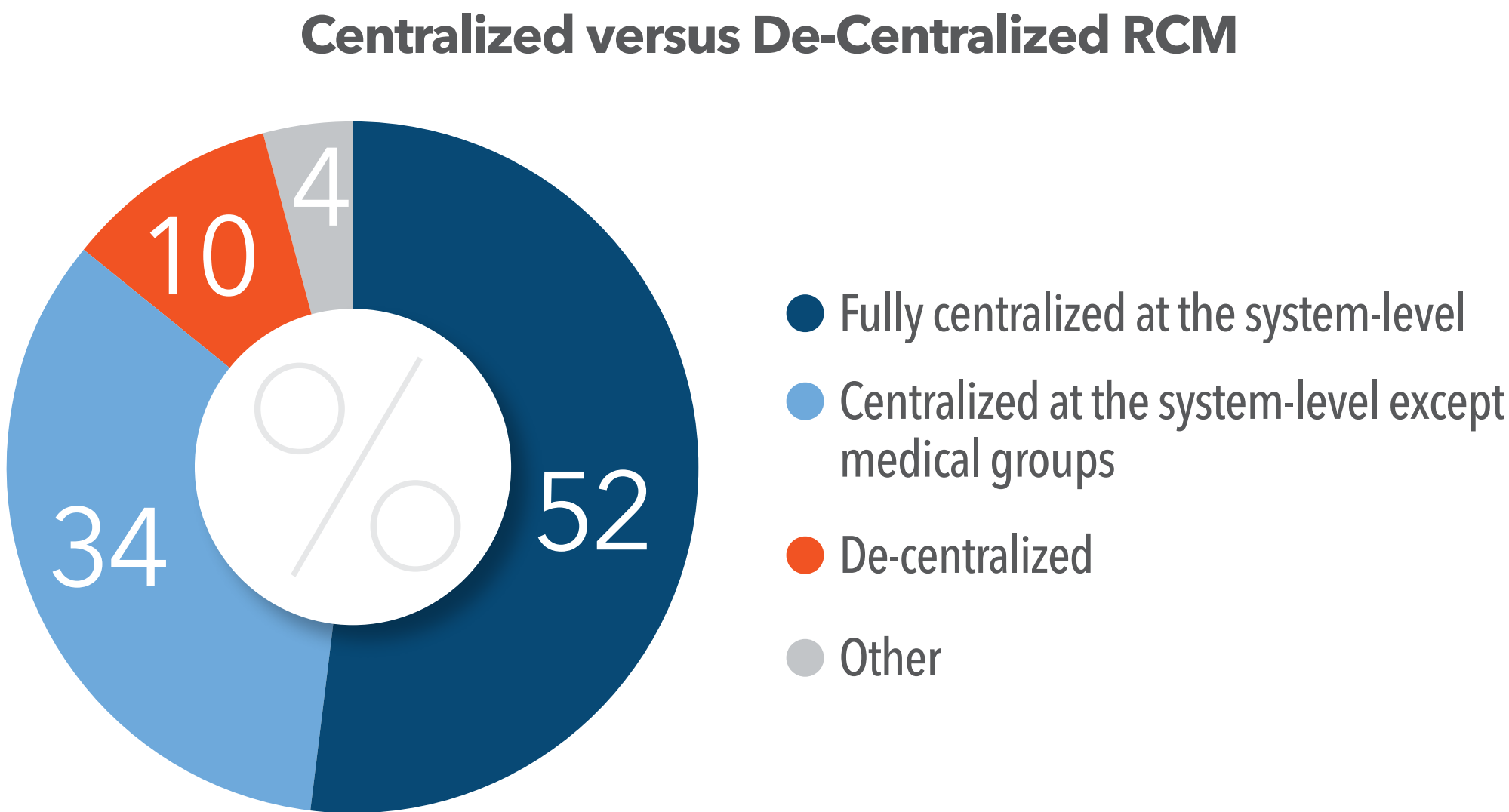- ● Not considering RPA/AI

Satisfaction range: 1=lowest; 5=highest. See appendix for full graph.
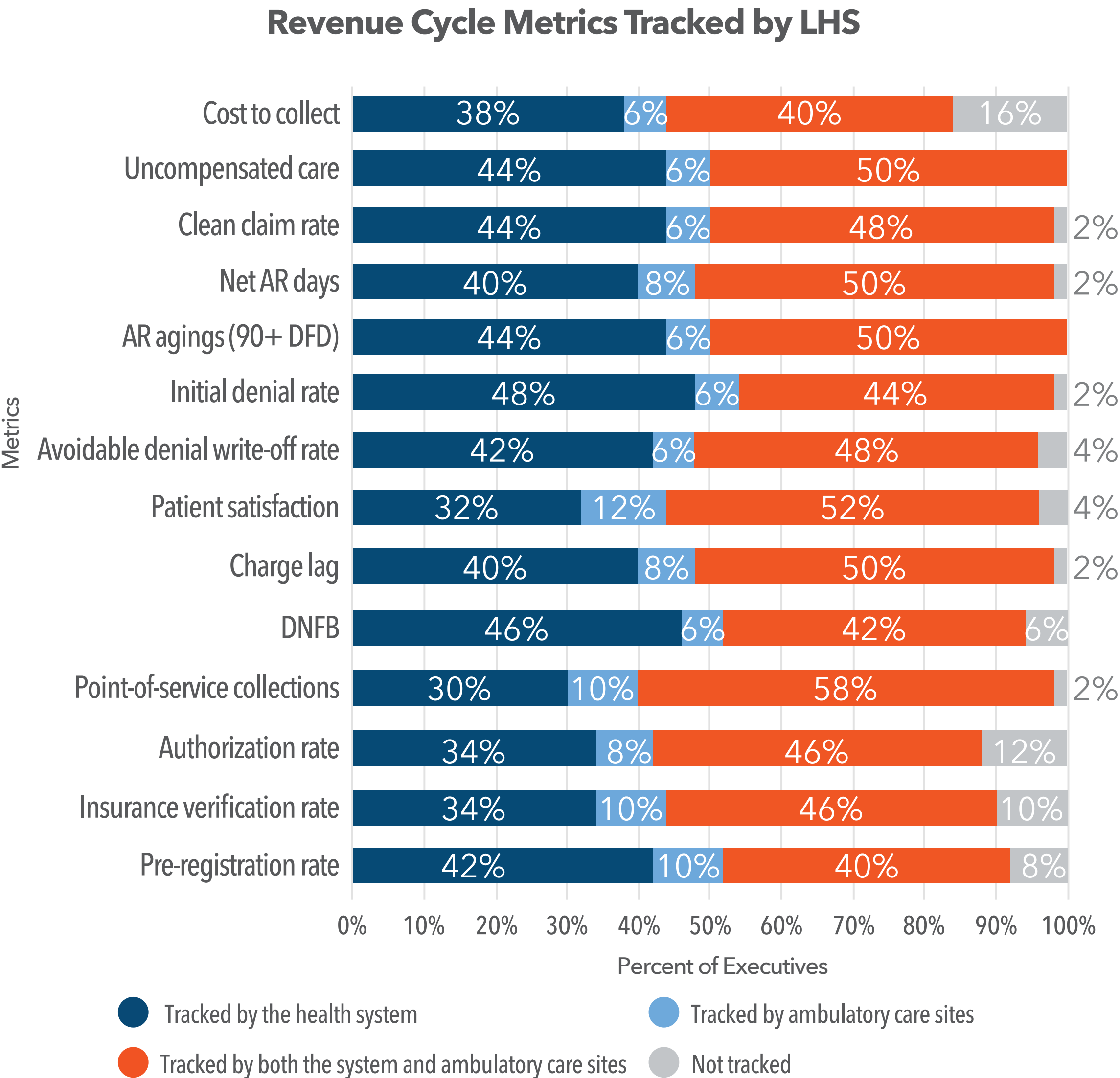
Section 3:
Revenue Cycle Metrics

Centralized Tracking of Revenue Cycle Metrics Not Yet Universal

While just over 50% of LHS have fully centralized tracking of revenue cycle metrics across their health system, there isn't universal consensus on how or what to track. Approximately 1/3 of LHS report their medical group tracking as separate from the rest of the system, and another 10% are completely de-centralized.

Centralized versus De-Centralized RCM

- 52 Fully centralized at the system-level
- 34 Centralized at the system-level except medical groups
- 10 De-centralized
- 4 Other

Most LHS are tracking 10 or more revenue cycle metrics with variability in the specific metrics. Only two metrics are universally tracked: uncompensated care and accounts receivable (90 days and older).

Interestingly, 16% of LHS do not track cost to collect. This metric is important in assessing the cost efficiency of the revenue cycle. Without cost to collect, it's difficult to accurately calculate the ROI of an organization's revenue cycle management approach. This lack of data may impact an organization's ability to fully understand the return on investment for RCM technologies, including RPA/AI capabilities.

Revenue Cycle Metrics Tracked by LHS

Metrics	Tracked by the health system	Tracked by ambulatory care sites	Tracked by both the system and ambulatory care sites	Not tracked
Cost to collect	38%	6%	40%	16%
Uncompensated care	44%	6%	50%	
Clean claim rate	44%	6%	48%	2%
Net AR days	40%	8%	50%	2%
AR agings (90+ DFD)	44%	6%	50%	
Initial denial rate	48%	6%	44%	2%
Avoidable denial write-off rate	42%	6%	48%	4%
Patient satisfaction	32%	12%	52%	4%
Charge lag	40%	8%	50%	2%
DNFB	46%	6%	42%	6%
Point-of-service collections	30%	10%	58%	2%
Authorization rate	34%	8%	46%	12%
Insurance verification rate	34%	10%	46%	10%
Pre-registration rate	42%	10%	40%	8%

Percent of Executives

- Tracked by the health system
- Tracked by ambulatory care sites
- Tracked by both the system and ambulatory care sites
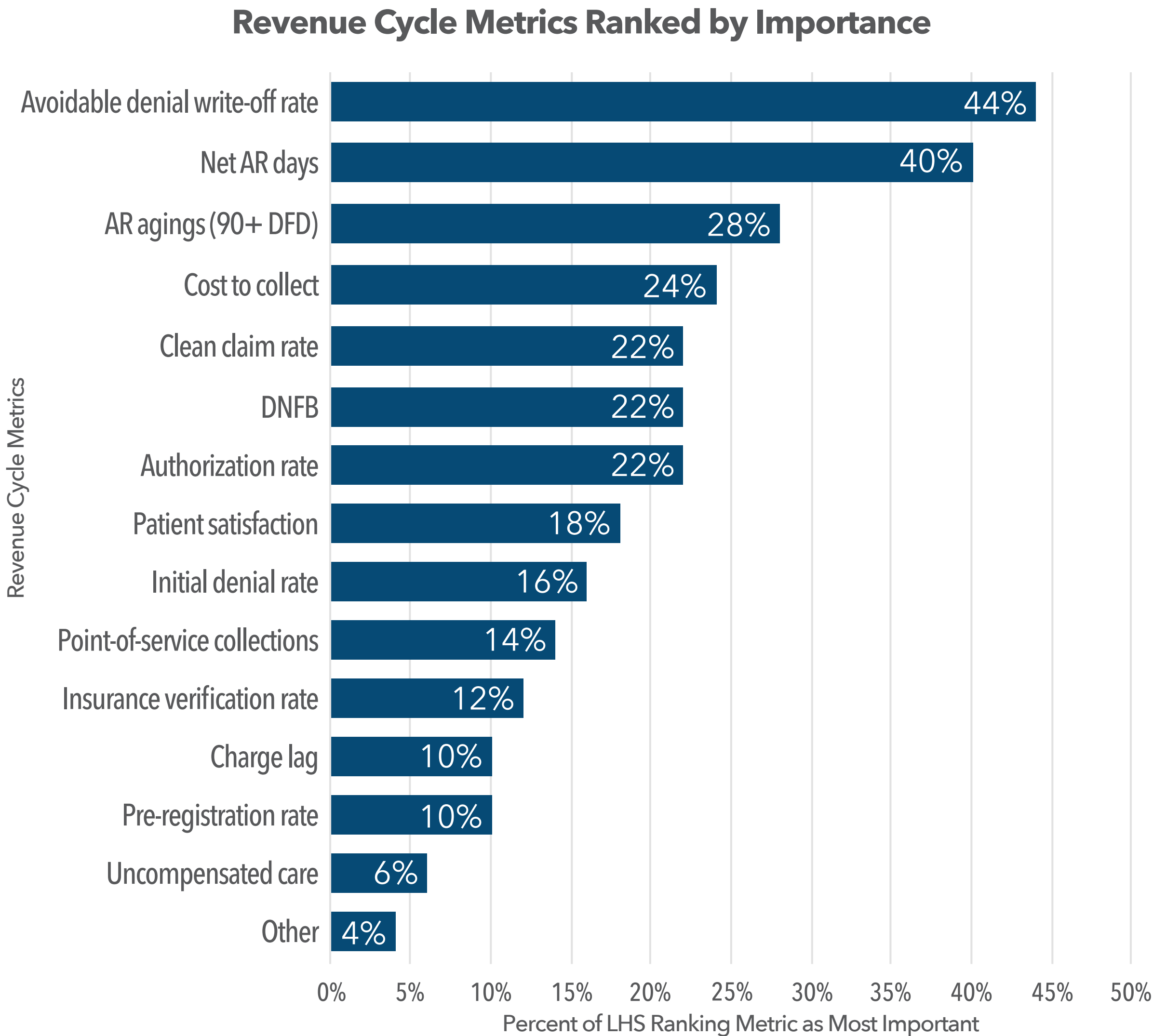- Not tracked

LHS Prioritize Revenue Metrics over Efficiency Metrics

There isn't consensus on the most important revenue cycle metric to track—with no metric able to garner 50% support from LHS. However, the metrics selected as most important by LHS all measure financial performance (rather than efficiency or other outcomes). For example, avoidable denial write-off rate was ranked the most important metric followed closely by net accounts receivable days. Both are back-end metrics that tie directly to revenue for the health system. Given that most LHS (82%) indicated their top reason for investing in RPA/AI as improving financial performance, it makes sense that LHS are prioritizing these metrics.
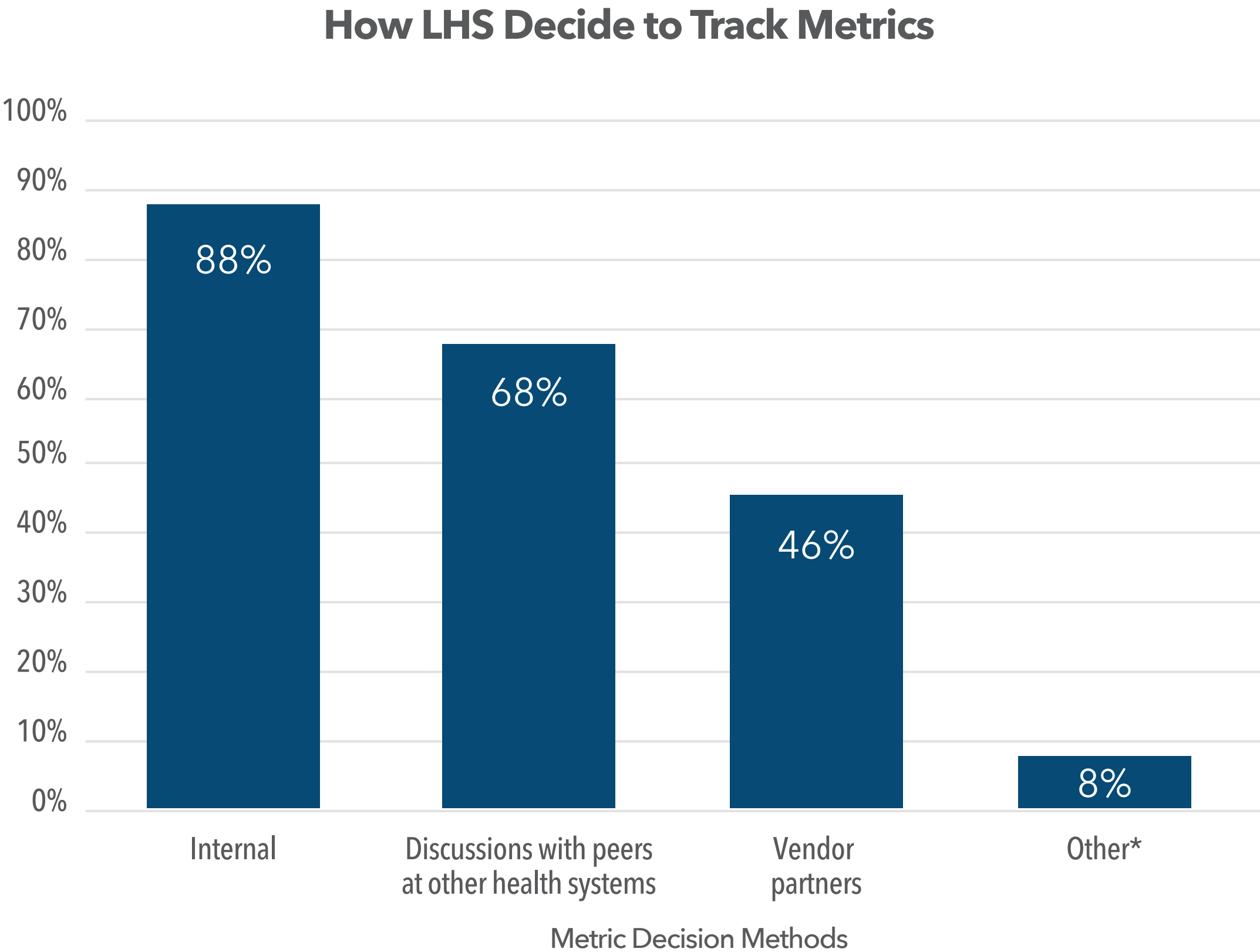
There continues to be variation in metric ranking when considering demographic factors, such as LHS size (measured by net patient revenue). At largest organizations (NPR exceeds 5 billion), patient satisfaction was ranked in the top three. Conversely, in smaller organizations (NPR of 500 million to 1 billion) patient satisfaction ranks in the middle of the list. While the n was too small to analyze top metrics by RPA/AI status, additional data cuts (in the appendix) support a similar finding— there is some variation in the top metrics but an overwhelming focus on financial outcomes.

Top Metrics by Organization Size

NPR Exceeding 5 Billion in NPR	NPR of 500 million to 1 Billion
1. Avoidable denial write-off rate	1. Net accounts receivable days
2. Net accounts receivable days	2. Authorization rate
3. Patient satisfaction	3. (Tie) Avoidable denial write-off rate & Net accounts receivable days (more than 90 days)

Revenue Cycle Metrics Ranked by Importance

Revenue Cycle Metrics (y-axis)

Metric	Percent
Avoidable denial write-off rate	44%
Net AR days	40%
AR agings (90+ DFD)	28%
Cost to collect	24%
Clean claim rate	22%
DNFB	22%
Authorization rate	22%
Patient satisfaction	18%
Initial denial rate	16%
Point-of-service collections	14%
Insurance verification rate	12%
Charge lag	10%
Pre-registration rate	10%
Uncompensated care	6%
Other	4%

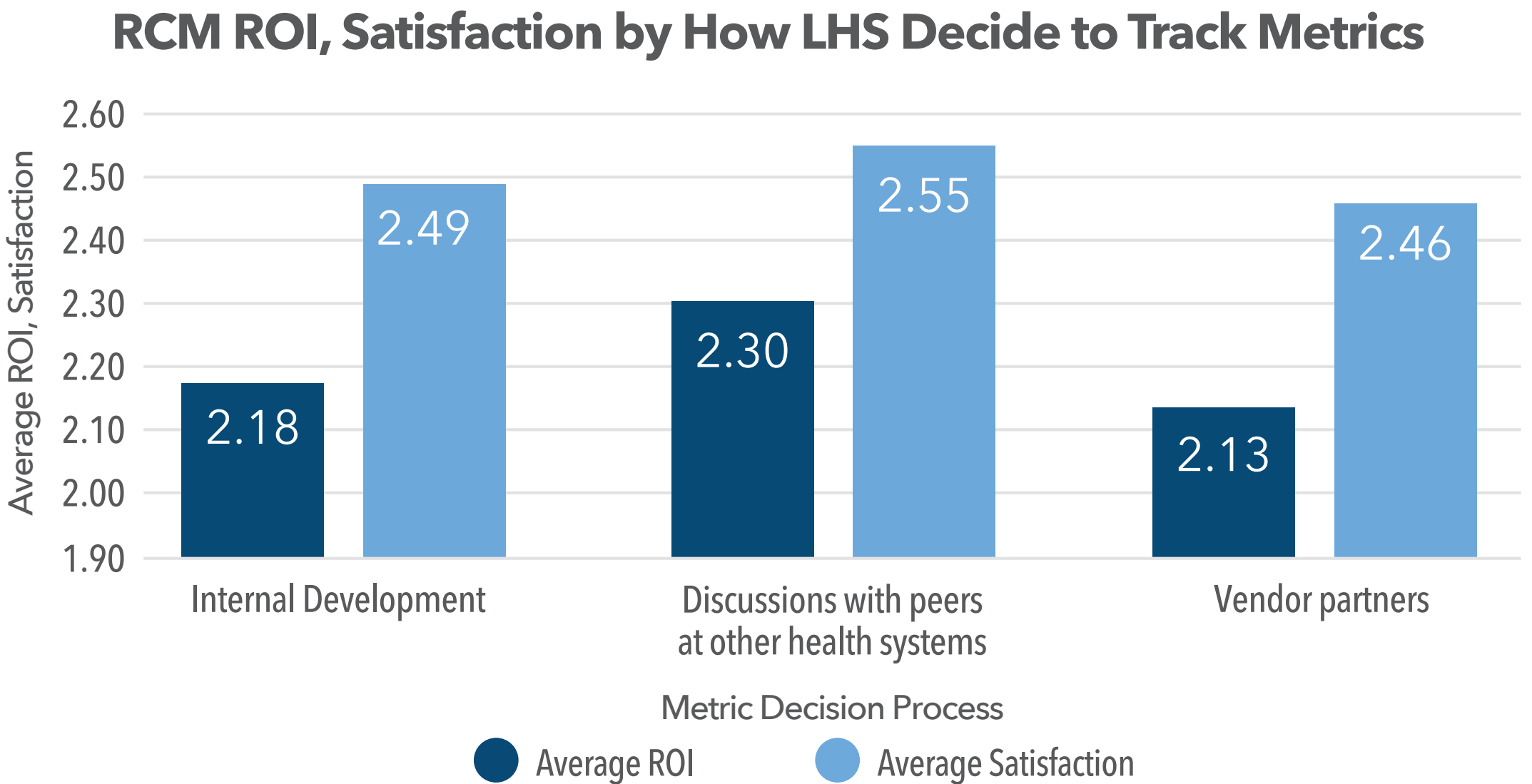Percent of LHS Ranking Metric as Most Important

Revenue Cycle Metrics Ripe for Standardization

When deciding which revenue cycle metrics to track, LHS primarily look internally to revenue cycle and financial leaders. However, many supplement with other methods, including 68% looking to peers, 46% to vendors, and 8% noting other sources, including industry benchmarks available through organizations like Healthcare Financial Management Association and Healthcare Business Insights.

LHS who choose their RCM metrics based on internal development or vendor partners report marginally lower ROI and satisfaction than LHS who choose metrics by seeking outside opinions from peers. Notably, seeking input from vendor partners is used less frequently than peer input and results in slightly lower ROI and satisfaction.

Regardless of method, there is ample room to develop standard revenue cycle metrics to help organizations better track efficiency, ROI, and other outcomes such as patient and staff experience. Researchers, professional organizations, and vendors should play a role to help standardize this as well as determine additional metrics that will help organizations understand the broader impact of RPA and AI in RCM, such as: patient financial experience, staff engagement, and compliance.

How LHS Decide to Track Metrics

RCM ROI, Satisfaction by How LHS Decide to Track Metrics

Other: Individual expertise, consultants, Industry or HFMA/HBI benchmarks.

21

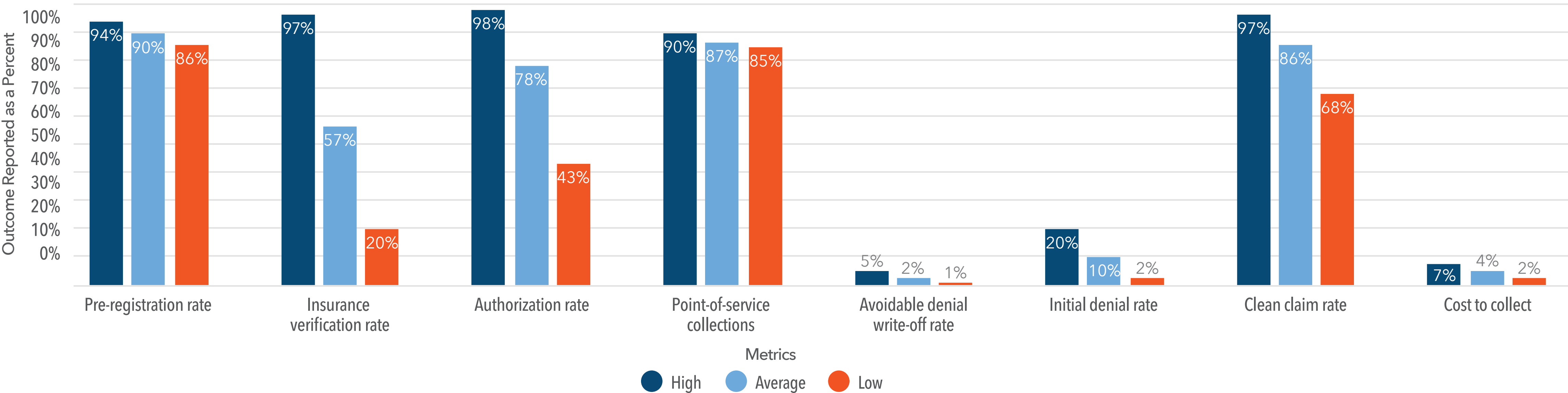# Revenue Cycle Outcomes Less Consistent on Back-End

Reported revenue cycle outcomes were relatively consistent for some metrics, while others varied widely between the lowest and highest reported outcome. For example, net accounts receivable had 28 days between the highest and lowest outcome reported. Alternatively, point-of-service collections only had a 5% difference between the highest and lowest reported outcome metric.

LHS were not required to enter outcomes data and were not required to provide a calculation for each metric. Therefore, additional cuts by RPA/AI use, LHS size, or other demographic area were not possible due to number of respondents for each metric.

LHS Revenue Cycle Outcomes Reported in Days			
Metric	High	Average	Low
Discharged, not final bill	80	16.8	2
Charge lag	10	7.3	5
Net accounts receivable	65	24.6	13
Accounts receivable (more than 90 days)	60	49.4	37

LHS Revenue Cycle Outcomes Reported in Percent

Section 4:
Future of RPA and AI in RCM

Automation Likely to See Faster Short-Term Growth Than AI

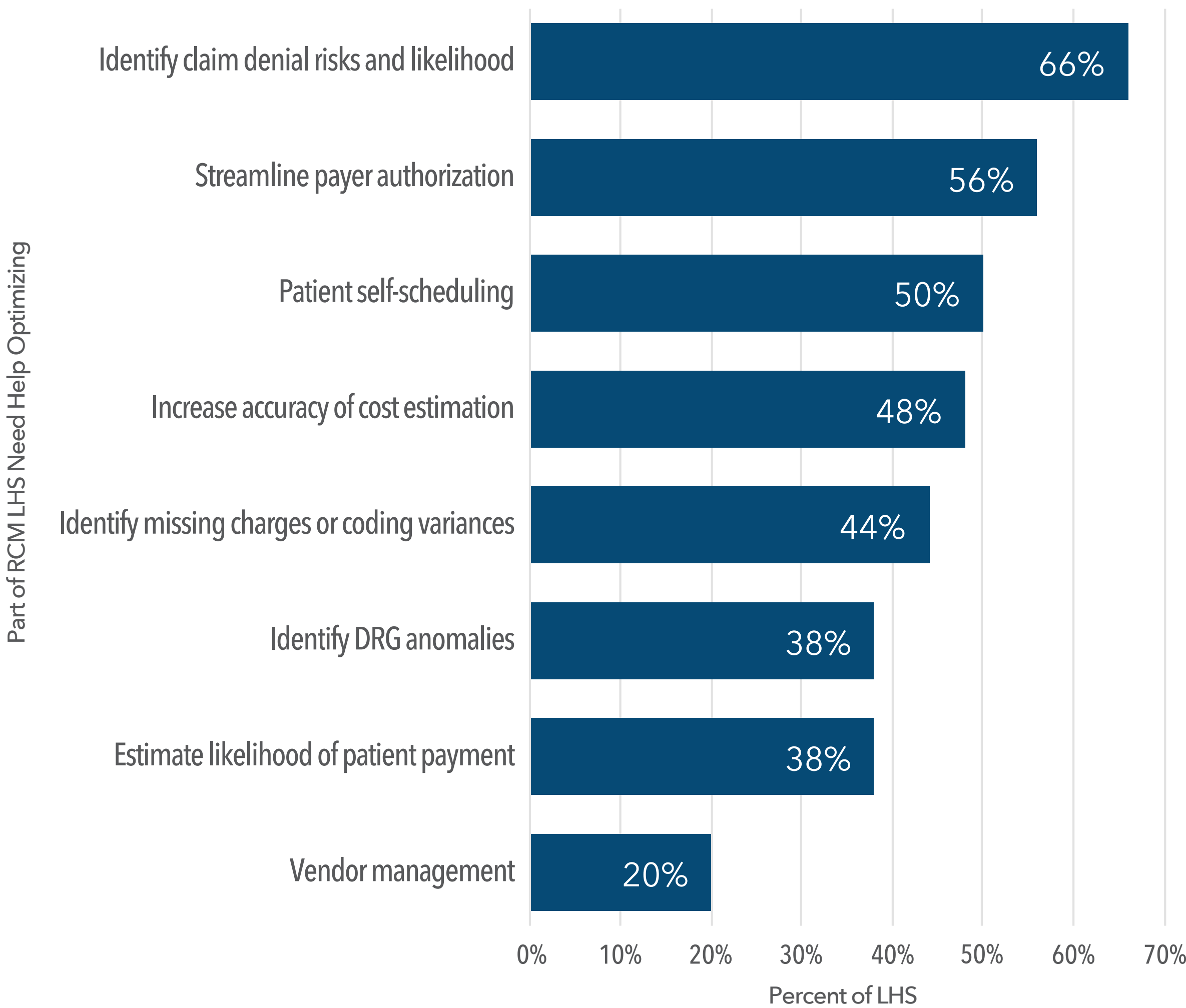## Growth of RPA/AI in RCM Near Certain

The majority of LHS who participated in this research reported either using RPA/AI for RCM (22%) or are actively considering it for the future (64%). Historically, the primary driver of investment in RPA/AI has been financial pressure. Given continued financial strain, it's reasonable to assume that LHS will follow-though on planned investments, resulting in substantial growth in RPA/AI use across the coming decade.

Automation More Common Now, AI Holds Future Potential

Beyond financial pressures, most LHS are looking to increase workforce efficiency by leveraging RPA to reduce repetitive tasks. Of those organizations currently using RPA or AI, most were limiting these capabilities to tasks that are repetitive in nature, such as eligibility verification and coding. Conversely, those areas of RCM that are more aligned with AI capabilities, such as denials management, currently have lower rates of reported RPA/AI use.

While not conclusive, this indicates that few LHS are fully leveraging AI for RCM. For example, when looking at diagnosing denials, only 38% of those who use RPA/AI technologies reported using predictive analytics to identify risk and the problem. This is understandable as AI in the revenue cycle is still in its infancy. That said, there is eagerness for help in this space, as 66% of LHS reported this as their top area for improvement in RCM. Furthermore, as technology and data capabilities evolve, AI for RCM will become more sophisticated and able to more quickly deliver on ROI. While growth across both RPA and AI are expected, it's likely that LHS will first invest in automation and then consider AI.

Parts of Revenue Cycle LHS Most Need Help Optimizing

Part of RCM LHS Need Help Optimizing

Category	Percent of LHS
Identify claim denial risks and likelihood	66%
Streamline payer authorization	56%
Patient self-scheduling	50%
Increase accuracy of cost estimation	48%
Identify missing charges or coding variances	44%
Identify DRG anomalies	38%
Estimate likelihood of patient payment	38%
Vendor management	20%

Percent of LHS

Beyond Budget, Perceptions of Technology are a Major Barrier

As Expected, Budget is Top Barrier to Investment

Budget or cost can be daunting barriers to LHS particularly when many are evaluating RPA/AI due to financial pressure. LHS will ultimately have to decide whether the cost of the technology and implementation is worth the investment. It's important to note that strong ROI cases are needed for RPA/AI, as a number of respondents noted the lack of ROI as a major barrier (other 14%).
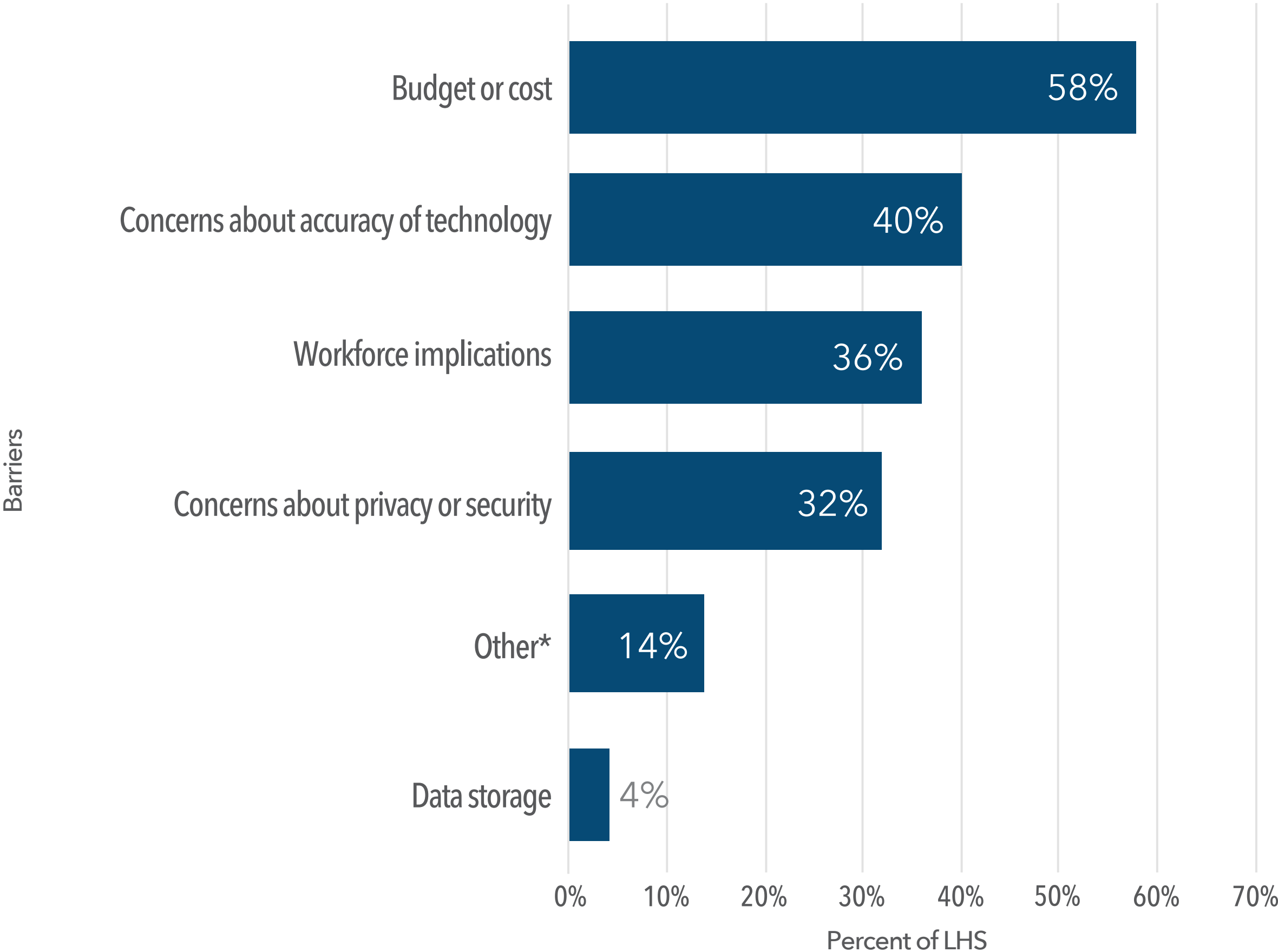
Perceptions of Accuracy, Security are Alarming

The perceptions of RPA/AI technologies also play a role around accuracy, privacy, and workforce implications. Forty percent of LHS cited concerns about the accuracy of the technology, which may stem from general mistrust of automation and AI, lack of understanding, or limited data. Like other software, RPA and AI are only as good as the instructions and data that support them. A LHS with cutting edge software may not be able to yield meaningful insights if the data they input into the program is insufficient.

Notably, only 4% of LHS are concerned about data storage. It is possible that LHS are already successfully managing large amounts of RCM data. But it's also likely that LHS do not currently have data storage issues because they are not collecting the detailed revenue cycle data required for AI programs. This barrier may increase as more LHS invest in AI.

While these barriers are valid concerns, perceptions of the technology's accuracy and security can be the hardest to overcome. To start, revenue cycle leaders who are interested in investing in RPA or AI technologies need to understand these perceptions among leaders and staff and strategize how they can influence successful implementation of the technology.

Barriers to Investing in RPA/AI for RCM

Bar chart — Barriers (y-axis) vs. Percent of LHS (x-axis):
- Budget or cost: 58%
- Concerns about accuracy of technology: 40%
- Workforce implications: 36%
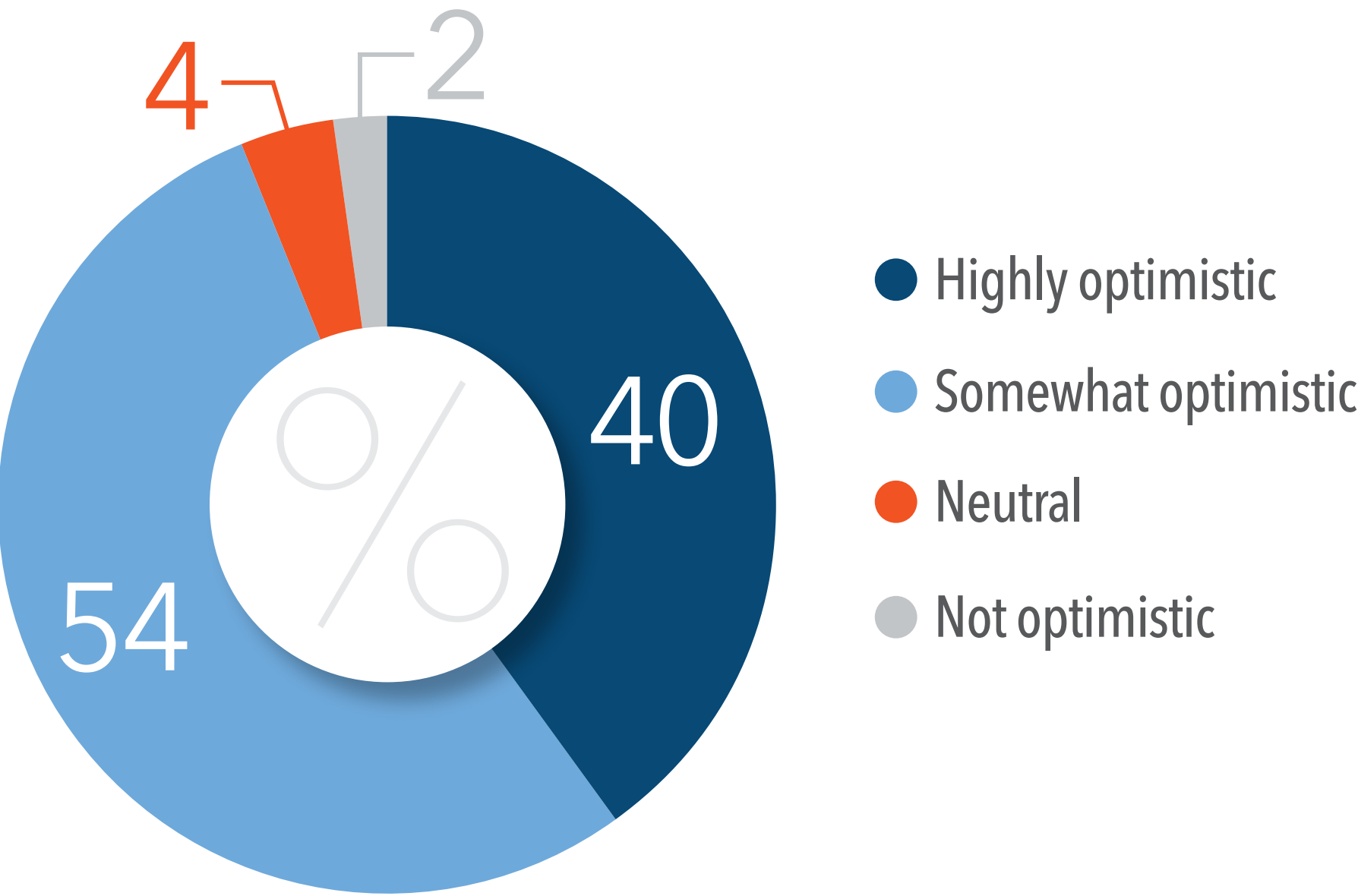- Concerns about privacy or security: 32%
- Other*: 14%
- Data storage: 4%

Other includes: ROI, inability to prove value, prioritization, integration and implementation, internal IT resource constraints, challenges with execution.

Setting the Groundwork for the Future of RPA and AI

Despite barriers, there is a future for RPA and AI in revenue cycle. Overwhelmingly, health system leaders are interested in automation and optimistic about AI at their organization—with 94% either highly or somewhat optimistic. Given this, revenue cycle leaders should start or continue setting the groundwork for future investment, whether that comes this year or in 5-10 years.

Health System Leaders' Optimism about the Future of AI at their Organization

- **40** ● Highly optimistic
- **54** ● Somewhat optimistic
- **4** ● Neutral
- **2** ● Not optimistic

How to Set the Groundwork for RPA, AI

Educate Leaders and Staff on Automation and AI

Currently, understanding of automation, AI, and machine learning among healthcare executives, providers, and staff is widely variable. Often, the terms are used interchangeably. One of the best steps revenue cycle leaders can take now to support future investments in technology is education—including capabilities, limitations, and "myth-busting" misplaced perceptions. Ideally, education would come from a subject matter expert fluent in both AI and RCM, which means some LHS may need to bring in outside experts.

Be Clear on Technology Capabilities and Limitations

Currently, there is a disconnect between what many LHS believe they will get from RPA or AI investments and reality. For example, the technology may be great but there isn't the volume of data needed, the implementation process may be longer than expected, or workflows and workforce may need to change to see true ROI. Revenue cycle leaders need to be clear upfront on what they are and are not getting with these technologies to make informed decisions about investment.

Gain Efficiency and Early Wins with Automation

There are many components of the revenue cycle that are repetitive and can be automated, freeing up some or even all of the workforce to do higher level work while reducing errors. By aiming for efficiency gains over financial performance in the first year of implementation, revenue cycle leaders can build trust and buy-in with the technology.

Methodology

Methodology

In June 2021, The Health Management Academy conducted a quantitative assessment of Leading Health System executives regarding their strategic approaches to robotic process automation (RPA) and artificial intelligence (AI) in the revenue cycle.

The 50 quantitative survey responses represent 50 unique health systems and 50 total executives.

Respondent roles included: VP of Revenue Cycle, VP of Finance, Chief Financial Officer, and IT Executives

Academy Project Team

Study Authors

- **James Cheung,** Analyst, Research & Advisory

- **Anne Herleth,** Senior Director, Research & Advisory

- **Tomi Ogundimu,** Executive Director, Research & Advisory

TheAcademy

Trusted Partner to Leading Health Systems and Industry Members

The Academy brings together Leading Health System (LHS) and industry executives to collectively address healthcare's biggest challenges and opportunities.

Leading Health Systems by the Numbers

150 Health Systems

500+ C-suite Executives

1,600+ Health System Leaders

80%
Inpatient Admissions

77%
Outpatient Admissions

75%
Total Physicians

77%
Total Operating Revenue (TOR)

How We Serve Members

Convene exceptional peer groups that facilitate meaningful relationships and knowledge exchange

Create world-class leadership development designed to prepare next generation healthcare leaders

Produce original research leveraging member insights on healthcare's greatest challenges and opportunities

Deliver custom insights and actionable intel supporting new partnership growth between industry and health systems

Facilitate high-impact partnership arrangements between health systems and industry

About Waystar

Waystar's market-leading technology simplifies and unifies healthcare payments. Our cloud-based platform removes friction in billing processes, streamlines workflows and improves financials for healthcare providers in every care setting.

Learn more at waystar.com

The Academy extends its appreciation to Waystar for the financial support for this report.

Data Appendix

RPA/AI Impact on Revenue Cycle Workforce

LHS Reduction in RCM Workforce due to RPA/AI Investment

Bar chart — Percent of LHS:
- Other: 3%
- No: 18%
- Re-allocated staff to different roles: 62%
- Eliminated vacant RCM positions: 47%
- Eliminated active RCM positions: 18%

Percent Reduction in RCM Workforce After RPA/AI Investment

Legend:
- Not reported
- 1 to 2%
- 3 to 5%
- 5 to 10%
- 10 to 20%
- 20 to 30%
- 30 to 40%
- 40 to 50%
- More than 50%

Categories: Eliminated vacant positions, Eliminated active positions, Re-allocated staff to different roles

Reasons for RPA, AI Investment

Reasons for LHS Investment in AI/RPA for RCM

Reasons for Investment (y-axis)

Percent of LHS (x-axis)

Reason	Percent of LHS
Improve financial performance	82%
Address workforce efficiencies	79%
Fix specific RCM pain points (i.e., authorization denial)	62%
Better leverage an AI or technology partnership that already exists	32%
Better support value-based care reimbursement	32%
Gain competitive advantage	24%
Other (please specify):	9%

Benefits of Investing in RPA/AI for RCM

Benefits of Investing in RPA/AI for RCM

ROI by RCM Approach Across the Revenue Cycle

1=low ROI; 5=high ROI

ROI by RCM Approach Across the Revenue Cycle

Legend: Internally built technology · Using vendor technology · Manage through people/processes · Manage through HIS/EMR
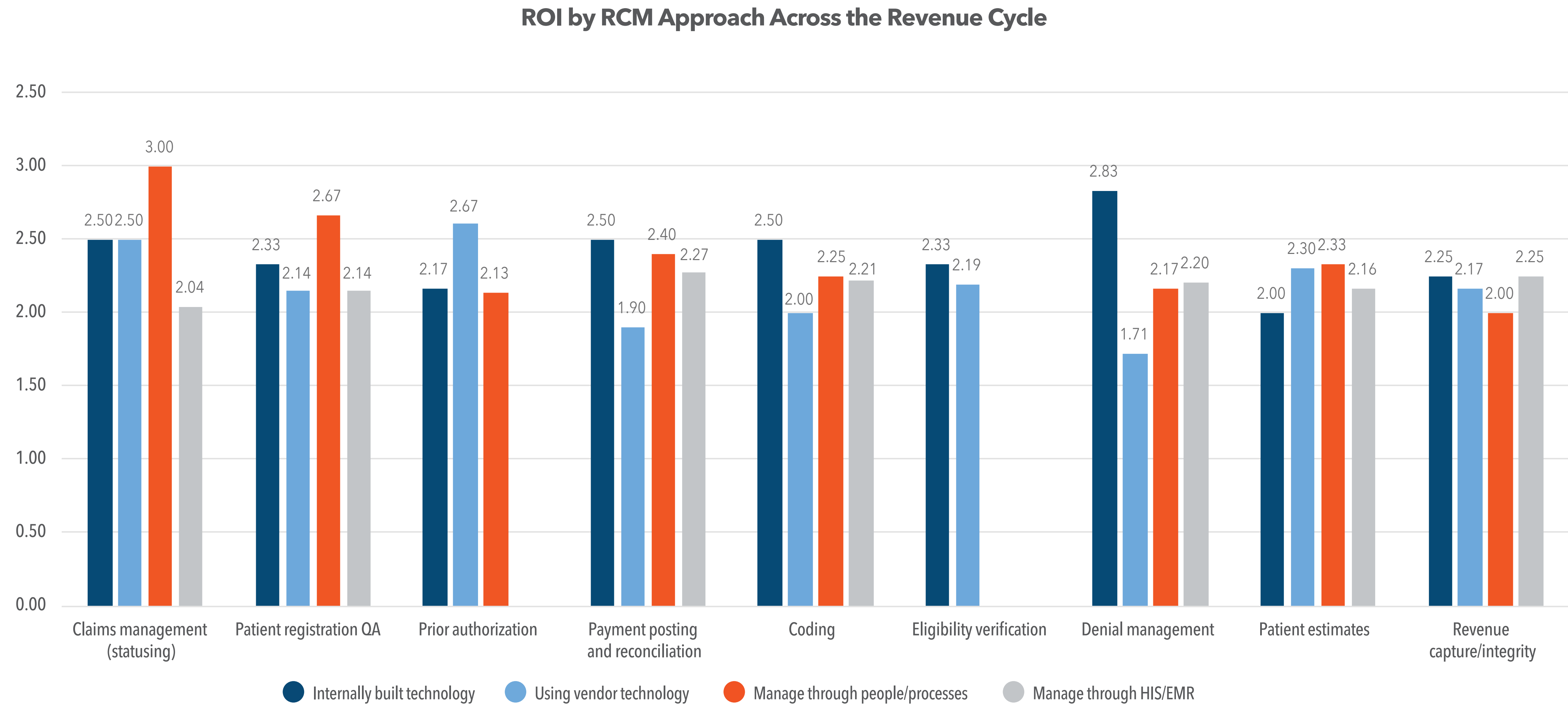
35

ROI of RCM Approach by RPA/AI Status

1=low ROI; 5=high ROI

ROI of RCM Approach by RPA/AI Status

Legend:
- Currently using RPA/AI
- Currently evaluating RPA/AI solutions or vendors
- Considering RPA/AI in 1-3 years
- Considering RPA/AI in more than 3 years
- Not considering RPA/AI

RPA/AI Impact on Revenue Cycle Workforce

RCM Technology ROI by EHR Vendor

Legend:
- Epic
- Cerner
- Other

ROI of RCM Approach by Workforce Changes

Categories:
- Yes, we eliminated active RCM positions
- Yes, we eliminated vacant RCM positions
- Yes, we re-allocated staff to different roles
- No
- Other

LHS Satisfaction with Approach to RCM

1=low satisfaction; 5=high satisfaction

LHS Satisfaction with Approach to RCM

38

LHS Satisfaction with Approach to RCM

1=low satisfaction; 5=high satisfaction

LHS Satisfaction with Approach to RCM by RPA/AI Status

39

LHS Satisfaction with Approach to RCM by EHR Vendor

1=low satisfaction; 5=high satisfaction
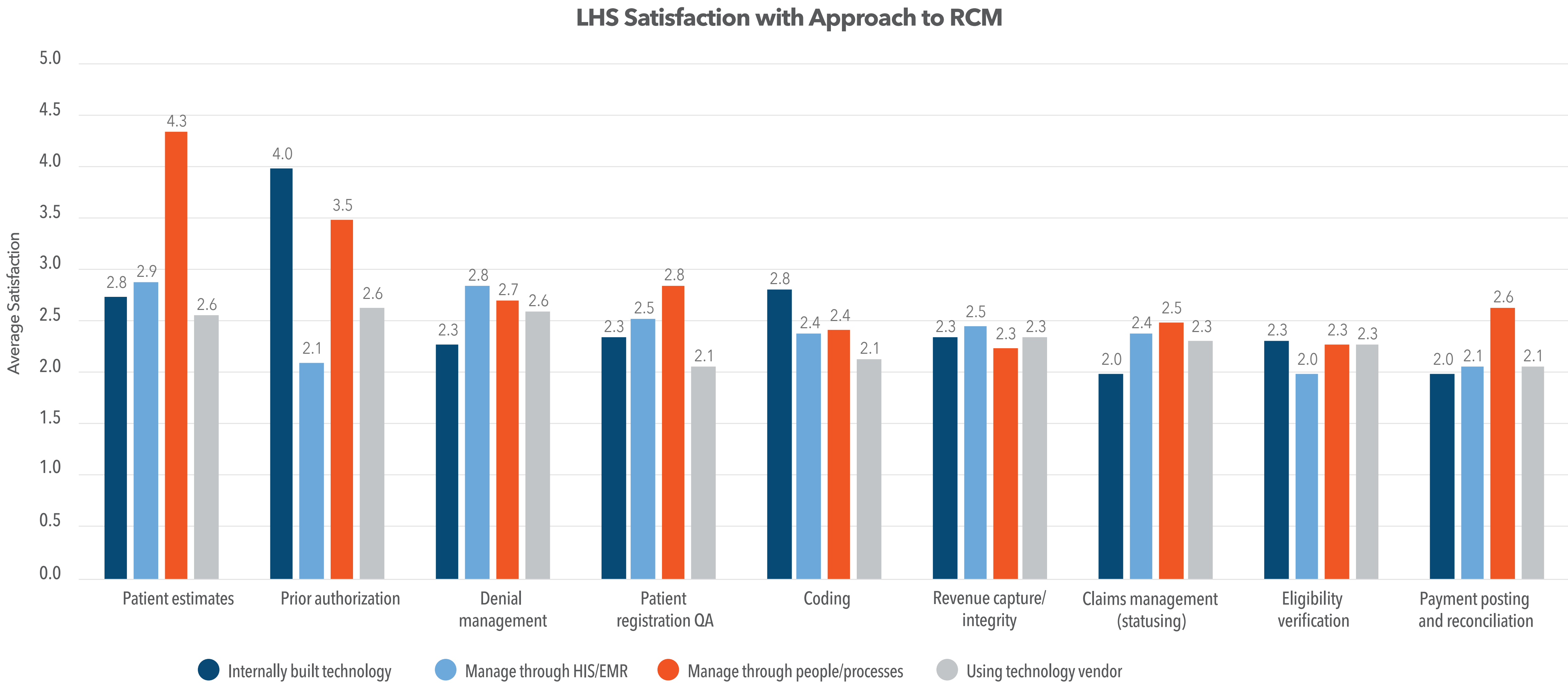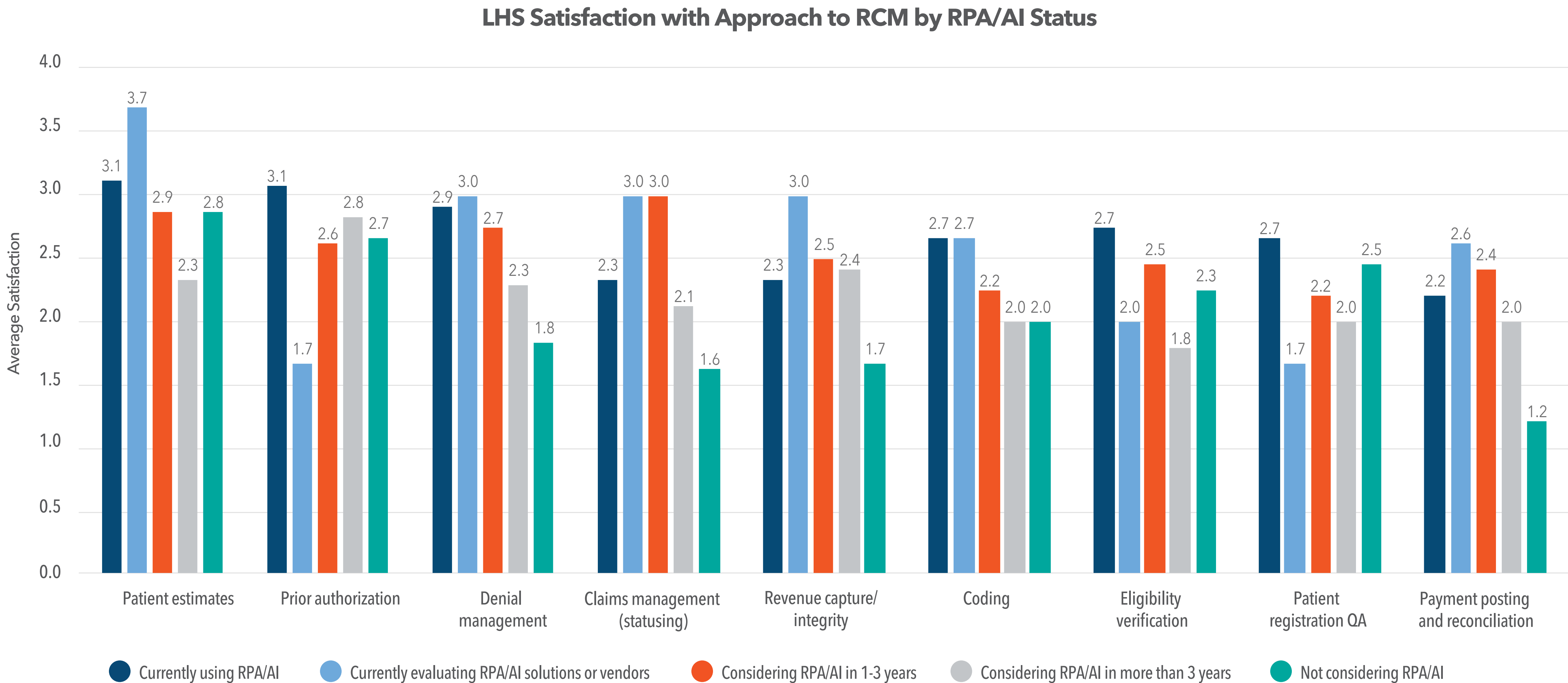
LHS Satisfaction with Approach to RCM by EHR Vendor

Category	Epic	Cerner	Other
Patient estimates	3.0	2.8	3.2
Prior authorization	2.8	2.7	3.0
Denial management	2.8	2.6	2.8
Revenue capture/integrity	2.4	2.2	3.0
Patient registration QA	2.4	2.3	3.2
Eligibility verification	2.4	2.1	3.0
Claims management (statusing)	2.5	2.2	2.8
Coding	2.3	2.3	2.4
Payment posting and reconciliation	2.2	2.1	2.4

Legend: ● Epic ● Cerner ● Other

Top RCM Metrics by LHS Size

Most Important RCM Metrics by LHS Size

Legend:
- **$1 to 3B** (dark blue)
- **$3 to 5B** (light blue)
- **$500M to $1B** (orange)
- **Exceeds $5B** (gray)

Metric	$1 to 3B	$3 to 5B	$500M to $1B	Exceeds $5B
Avoidable denial write-off rate	10%	8%	8%	18%
Net AR days	12%	4%	16%	8%
AR agings (90+ DFD)	4%	10%	8%	6%
Cost to collect	4%	8%	6%	6%
Clean claim rate	6%	8%	4%	4%
DNFB	6%	6%	6%	4%
Authorization rate		6%	12%	4%
Patient satisfaction	4%		6%	8%
Initial denial rate	6%	4%	4%	2%
Point-of-service collections	4%	0%	6%	4%
Insurance verification rate	6%		4%	2%
Charge lag	4%			6%
Pre-registration rate		4%	4%	2%
Uncompensated care			2%	4%
Other		2%	2%	

Top RCM Metrics by EMR Vendor

Most Important RCM Metrics by LHS Size

Use of Predictive Analytics to Identify Risk and Diagnose Denials

LHS Use of Predictive Analytics to Identify Risk and Diagnose Denials

- Yes
- No
- Other

2

38

60