Vital Signs

Key trends and projections for software testing in healthcare

A Keysight study in collaboration with HIMSS

eBook

KEYSIGHT

Executive Summary

Today's electronic medical records (EMR) system holds the key to a person's health history. But with great responsibility comes great risk — one tiny flaw can derail compliance and put patients in peril. That's why Keysight Technologies commissioned the Healthcare Information and Management Systems Society (HIMSS) to conduct a study of major US healthcare providers about their software testing practices and plans. This report provides vital signs of current challenges and trends in healthcare software testing. It highlights the following:

A paradox that places patients at risk:

Although healthcare providers have zero room for error, **94%** of decision-makers acknowledge that insufficient testing threatens patient lives.

94%

A silent epidemic:

Manual and do-it-yourself (DIY) approaches are hindering **two-thirds** of organizations' scalability in testing.

2/3

A cure in sight:

Test automation platforms improve quality, consistency, and coverage where it matters most. Early adopters achieve satisfaction rates over testing scalability and analytics that are **twice** as high as manual or DIY testing approaches.

2X

A grand ambition:

Predictions are that the adoption rate for automated software testing and advanced test analytics will **triple** in five years.

3X

A wave of new regulations:

Interoperability testing is the most important capability of a test automation tool, according to **76%** of respondents.

76%

About the Study

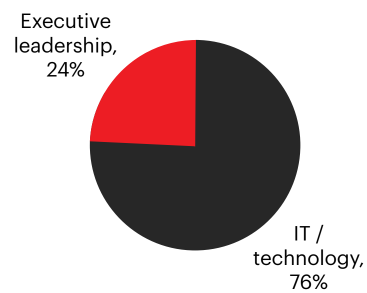
Demographics

The study analyzes the perspectives of individuals who play significant roles in shaping their organizations' software testing strategies.

- Seventy-six percent of the participants work in IT or technology roles
- Eighty-two percent hold positions at or above the manager level.
- Thirty-three percent are primary decision-makers in software testing; the remaining respondents have significant involvement in and influence over decisions.

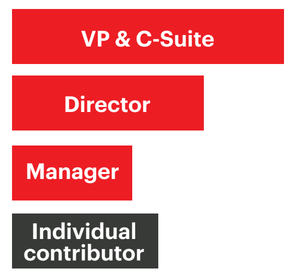
Job role (Q2)

76%
work in IT or technology function



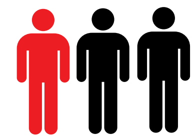
Seniority (Q3)

82%
hold a position at or above the man-ager level



Responsibility (Q4)

33%
are primary decision-makers in software testing



Firmographics

The firmographics of the study encompass the following three aspects.

Firstly, over half of the participants use Epic as their primary electronic medical record (EMR) software vendor, followed by Oracle Cerner (18%) and MEDITECH (15%). This characteristic is consistent with KLAS Research's 2022 report on EMR purchasing activity, which identified Epic, Cerner, and MEDITECH as US healthcare providers' top three EMR choices. [3]

Secondly, forty-seven percent of respondents work at organizations that operate multiple hospitals or healthcare facilities. HIMSS Analytics reports that US hospitals, especially those with affiliated practices, have multiple EMR instances in use.[4] This finding suggests that our study holds relevance for QA teams grappling with numerous systems.

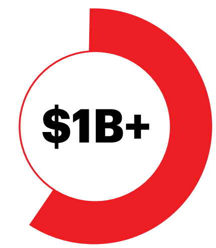
Finally, sixty-two percent of organizations have more than $1 billion in annual net revenue, indicating that the findings include large healthcare organizations.

EMR platform

51%
of the organizations use Epic, 18% use Cerner, and 15% use MEDITECH (Q13)

Worksite

47%
of the respondents are from multi-hospital systems (Q1)



Annual net revenue

62%
of organizations[i] have $1B+ in annual net revenue (Q5)

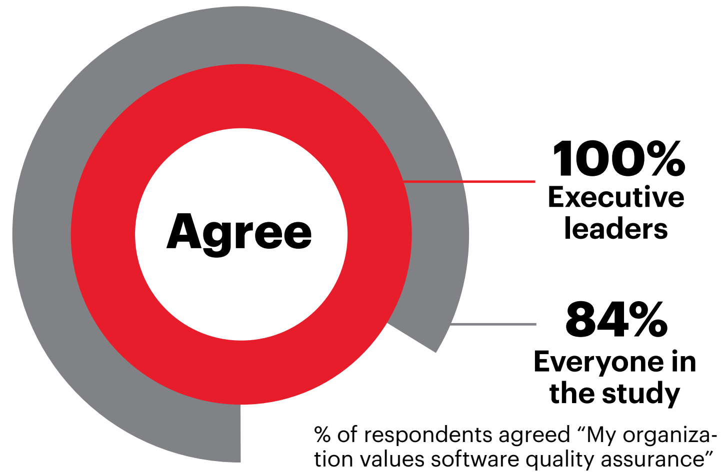
A Paradox Putting Lives at Risk

Healthcare software quality is paramount to quality care and patient safety. However, a troubling paradox exists at the heart of today's healthcare software testing practices.

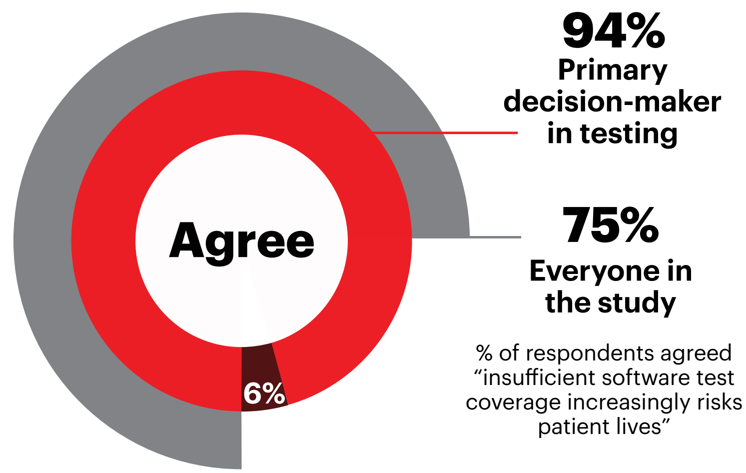
Although 100% of healthcare executive leaders claim software quality assurance is a priority, just 6% of primary decision-makers in testing are confident that testing coverage is sufficient to minimize the risk to patient lives.

> Executive leaders claim quality assurance is a top priority, but only **6%** are confident that their testing practices are thorough enough to minimize patient risks.

A paradox in the field of healthcare software testing (Q7)



% of respondents agreed "My organization values software quality assurance"



% of respondents agreed "insufficient software test coverage increasingly risks patient lives"

Impact goes beyond patients

The reliance of physicians and nurses on healthcare software systems to provide care exacerbates the risks associated with the healthcare software testing paradox.

According to the survey findings, software quality affects physicians and nurses the most. This issue is even more significant at smaller organizations with annual revenue of less than $1 billion, where 52% of respondents indicate that the software they test primarily affects physicians and nurses.

Impact No. 1: EMR-triggered burnout

Studies have shown that EMR functionality and usability issues have a statistically significant positive correlation with physicians' stress and burnout.[7] Given that physicians work long hours, often in stressful situations, the percentage of US doctors experiencing symptoms of burnout reached an all-time high of 63% in 2021.[8] To alleviate the burden of dealing with EMR quality issues, it's crucial to conduct thorough testing for the optimal end-user experience.

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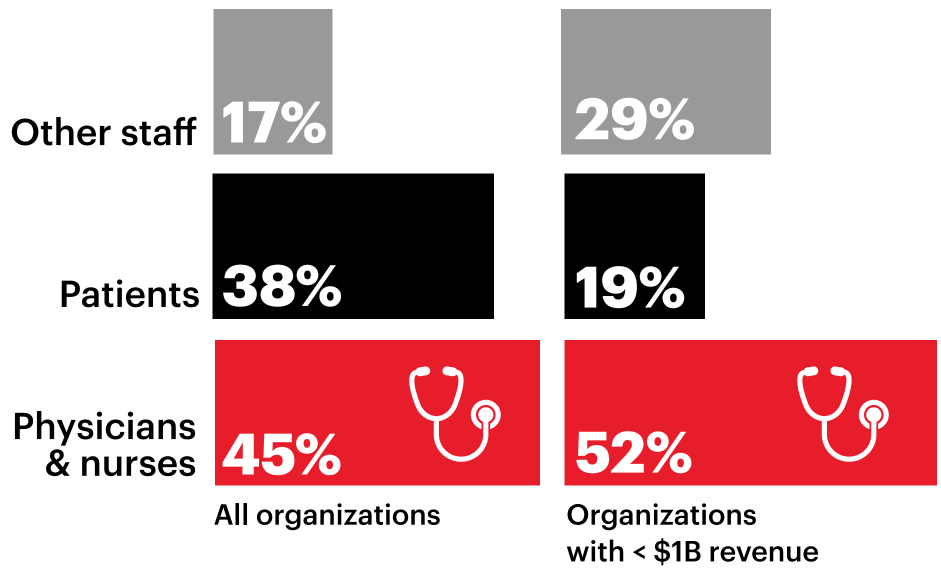
Impact No. 2: Disrupted clinical operations

The impact of inadequate software testing on physicians and nurses goes beyond frustration with the software and lost productivity. Malfunctioning EMR systems or downtime can cause significant disruptions to clinical workflows, resulting in delayed treatment, misinterpretation of data, incorrect diagnoses, and, ultimately, loss of patients' trust in the providers.

% of respondents indicated which users were impacted by the quality of the software they used (Q15)



Appendix

The findings presented in the report draw from an online survey conducted by HIMSS in February 2023.

Methodology

HIMSS collected responses from 55 qualified US healthcare professionals holding positions in IT and technology or executive leadership.

Participants met specific criteria, including holding decision-making or influencing positions in software quality assurance, testing, and testing strategies and working at organizations with more than 1,000 employees or annual revenue exceeding $100 million.

This data collection effort was anonymous, and HIMSS did not disclose Keysight as a research sponsor.

We made every effort to ask the most relevant questions to the software testing community and share the valuable insights we received from their responses. While we do not present this report as scientific research, these findings can provide helpful information and stimulate further discussions and collaborations on continuous improvement and innovation in this area.

References

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3. *US Hospital Market Share 2022*. KLAS Report, April 26, 2022.
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9. *The U.S. Science and Engineering Workforce: Recent, Current, and Projected Employment, Wages, and Unemployment*. Congressional Research Service, 2017.
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11. Healthcare Data Breach Statistics. The HIPAA Journal, 2023.

Endnotes

i. This percentage excludes those who could not disclose their revenue information, but the remainder of the article includes everyone in the study.

ii. This is based on a low base size, for directional use only.

iii. Low base size, insights directional only.

Survey Questions

1. Which of the following best describes your worksite?

a. Academic medical center
b. Integrated delivery network
c. Multi-hospital system
d. Stand-alone hospital
e. Specialty hospital / Children's hospital
f. Clinic / practice setting
g. Ambulatory/outpatient practices (including behavioral/mental health, orthopedics)
h. Long-term care facility/skilled nursing w
i. Other type of acute care or inpatient facility
j. Another worksite type

2. How would you characterize your job role or function

a. IT / Technology
b. Quality Assurance / Testing / Compliance
c. Executive leadership
d. Clinician leadership (e.g., CMO, CMIO, CNIO, CNO, VP Physician Practices, VP Clinical Transformation)
e. Clinician (e.g., physician, nurse, health practitioner)
f. Strategy / Innovation
g. Finance / Procurement
h. Operations
i. Data analytics
j. Quality metrics or reporting
k. Another role

3. What is your current role?

a. MD / DO
b. C-Suite Exec (e.g., CEO, CTO, CIO)
c. EVP / SVP
d. VP / Head
e. System Director / Director
f. Sr. Manager / Manager
g. Individual Contributor (e.g., Engineer, Analyst, Administrator)
h. Another role

4. Which of the following best describes your role in decision making regarding software quality assurance, testing, and testing strategies at your organization?

a. I am the primary decision maker or part of a group making decisions
b. I have significant involvement in and/or influence over decisions
c. I have visibility into decision-making, but have no influence over decisions
d. None of the above, I am not involved

5. What is your organization's annual net revenue?

a. Less than $100 million
b. $100 million to $250 million
c. $251 million to $500 million
d. $501 million to $1 billion
e. $1.1 billion to $3 billion
f. $3.1 billion to $5 billion
g. $5.1 billion to $10 billion
h. Greater than $10 billion
i. Don't know / Can't disclose

6. **Please tell us the total number of employees in your organization.**

a. Less than 1,000
b. 1,000 – 2,499
c. 2,500 – 7,499
d. 7,500 – 14,999
e. More than 15,000

7. **Please rate your level of agreement with each of the following statements:**

1. Strongly disagree
2. Somewhat disagree
3. Neutral
4. Somewhat agree
5. Strongly agree

a. Time and money spent on software testing have increased compared to 1-2 years ago.
b. My organization values software quality assurance
c. Insufficient software test coverage increasingly risks patient lives
d. I don't think my team has enough resources (time, budget, or talent) to scale software testing

8. **Which of the following best describes the approach your organization uses today for software testing? Which best describes your organization's goal for its approach to software testing in the next 1-2 years? What about in 5 years?**

1. Manual
2. Manual with some automation
3. Half automation & half manual
4. Automation with some manual
5. Fully automated
6. Don't know/Unsure

a. Today
b. In the next 1-2 years
c. In 5 years

9. **Which of the following best describes the method your organization uses to manage test analytics today? Which best describes your organization's goal for managing test analytics in the next 1-2 years? What about in 5 years?**

1. No aggregation of analytics
2. Ad-hoc analytics
3. Managed with dashboards
4. Automated real-time analytics
5. Advanced analytics and/or Artificial Intelligence (AI)
6. Don't know/Unsure

a. Today
b. In the next 1-2 years
c. In five years

10. **How satisfied are you with your organization's capabilities in each of the following areas?**

1. Very dissatisfied
2. Somewhat dissatisfied
3. Neutral
4. Somewhat satisfied
5. Very satisfied

a. Scalability of current platform(s) to meet emerging testing requirements
b. Ability to meet all test requirements prior to product releases
c. Ability to develop test coverage across all devices and/or browsers
d. Ability to automate workflows to increase QA team's job satisfaction and productivity
e. Generation of clear and actionable testing data

11. Below are some potential benefits software testing automation may have on IT teams in healthcare organizations. Which of the following, if any, do you see as most relevant to your organization today? Please rank up to three items from the list below or write in your own response.

a. Software with fewer defects
b. Reduced time-to-release
c. Decreased testing costs (i.e., budget)
d. Freeing up staff time and resources
e. Enhanced data security
f. Enhanced data compliance
g. More agile development cycles
h. Something else – please explain

12. In considering a test automation tool, which of the following features would be most important for your organization? Please rank up to three top features.

a. Low-code testing
b. Cross-platform testing
c. Non-invasive testing
d. API testing
e. Mobile testing
f. Performance (load) testing
g. Data compliance assessments
h. Data security assessments
i. Interoperability testing
j. Something else – please explain

13. What is your organization's primary EHR (electronic health records) platform?

a. Allscripts
b. Athenahealth
c. Cerner
d. CPSI
e. eClinicalWorks
f. Epic
g. GE Healthcare
h. McKesson Corporation
i. MEDHOST
j. MEDITECH
k. NextGen
l. Another EHR, please specify

14. What testing solution is your organization using today?

a. Manual
b. A DIY approach
c. Third-party test automation platform
d. Something else – please explain.

15. Who will be primarily impacted by the quality of the software you test?

a. Patients
b. Physicians or nurses
c. Administrators / Back-office staff
d. Something else – please explain.