

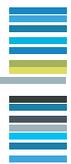


TRENDS

in Precision Medicine

ADOPTION

Research Report



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INTRODUCTION

While the healthcare and life sciences communities have embraced the concept behind precision medicine — using the molecular makeup of patients in order to improve the diagnosis and treatment of disease — the degree to which organizations in this market have implemented formal precision medicine initiatives, and the implementation status of those initiatives, has not been clear. This prompted GenomeWeb, with sponsorship from Oracle, to conduct research in the fall of 2017 to explore if and where precision medicine programs actually stand. For this study, GenomeWeb surveyed its readers who work in organizations most likely to have precision medicine activities to gain insight into adoption and implementation of precision medicine approaches.

The research revealed some fascinating insight. Key findings include:

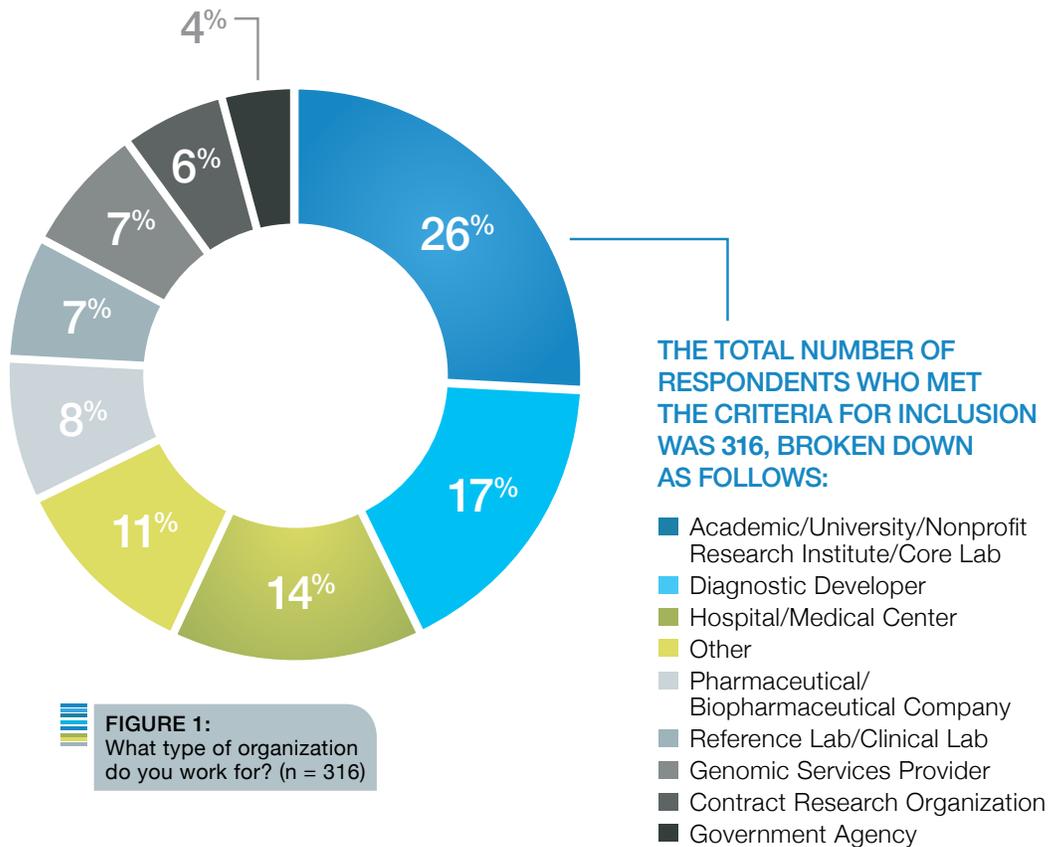
- **The industry is active in translational research** – sixty-two percent of survey respondents said they currently participate in research activities to drive biomarker discovery or translational research, while another 12 percent would like to participate or are planning to do so in the next 12-24 months
- **Nearly everyone has a precision medicine initiative** – across all organization types (see Methodology), the vast majority either have an active precision medicine initiative in place or they are planning on implementing one
- **Precision medicine is moving in-house** – when asked what approach they take for generating/completing precision medicine testing, the majority of respondents said they take a fully in-house, or an in-house and commercial providers hybrid approach
- **Datasets are getting more complex** – there is a growing interest in additional data types, including more complex next-generation sequencing (NGS), whole genome sequencing, and other omics data types, that will add both value and complexity to analysis and data management challenges
- **Precision medicine goes beyond cancer** – although oncology is still considered the disease area where precision medicine will have greatest impact, respondents also believe precision medicine will benefit several other disease areas
- **Precision medicine is a competitive advantage** – among those with no plans for a formal precision medicine initiative, the majority (56 percent) feel that such a program would be a competitive advantage for their organizations

RESEARCH METHODOLOGY

This research was conducted in the fall of 2017 by GenomeWeb. The research was conducted through an online survey sent to GenomeWeb readers who work in organizations most likely to have some precision medicine activities. These organizations included:

- Academic/University/Nonprofit Research Institute
- Hospital/Medical Center
- Diagnostic Developer
- Government Agency
- Pharmaceutical/Biopharmaceutical Company
- Contract Research Organization
- Reference Lab/Clinical Lab
- Genomic Services Provider

In terms of job function, respondents were mainly scientists or researchers, followed by people in executive or corporate management positions. The survey garnered 316 qualified respondents, representing a significant voice of the market.



The survey consisted of 29 multiple choice questions that explored the status of current and planned precision medicine initiatives, associated challenges, and thoughts on the future impact of the discipline.

For the purposes of the survey we defined precision medicine as the following:

A discipline that considers individual variability in genes and other biomarkers for the treatment and prevention of disease. This includes biomarker validation, molecular reporting for clinical decision support, and outcomes-based patient monitoring.

RESULTS

Participation in Precision Medicine

Precision medicine is a topic of interest across the spectrum of patient care. The interest in applying data-driven insights spans from translational research and patient care in healthcare, to clinical research by pharmaceutical and biotechnology companies. The vast majority of survey respondents indicated that they are either currently supporting or developing translational research initiatives, which supports the direct connection between precision medicine and translational research in this developing field.

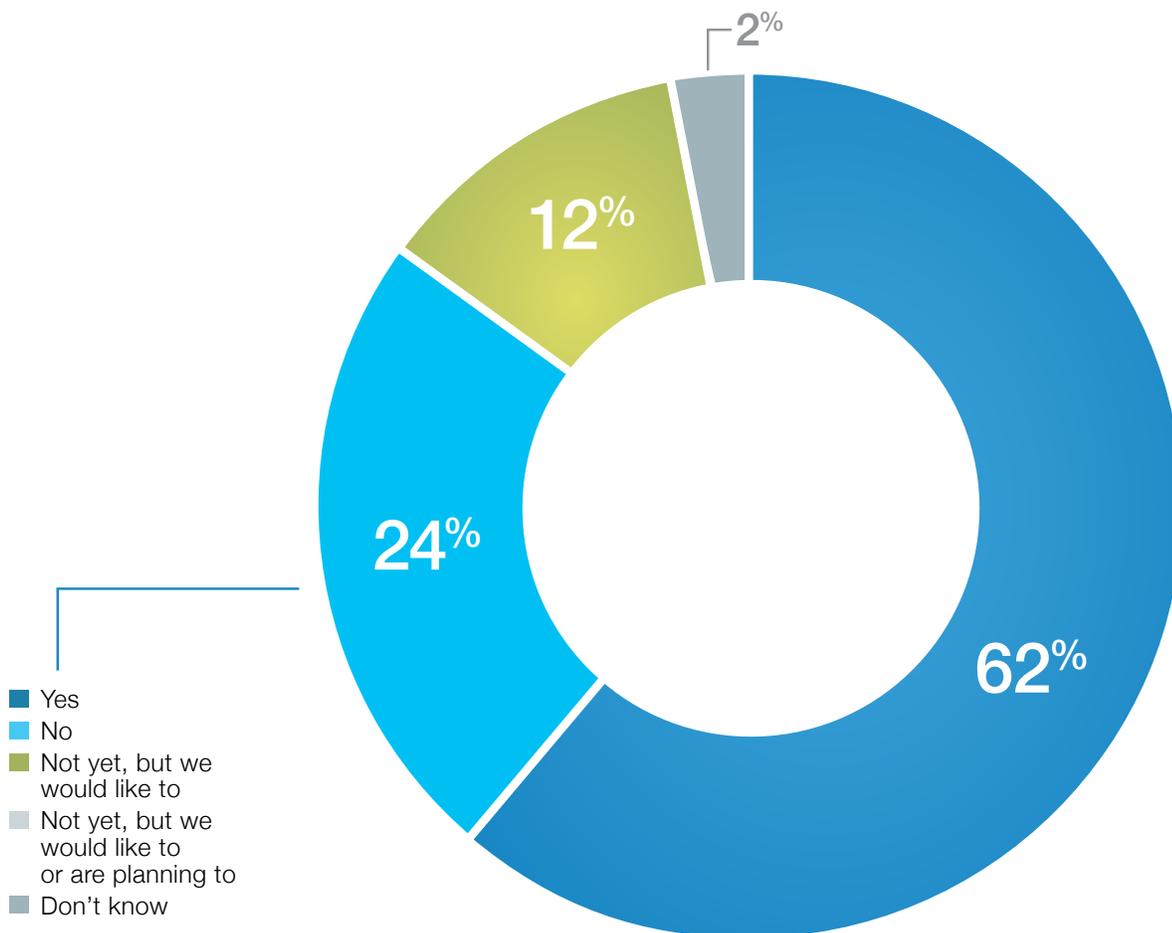


FIGURE 2:
Does your organization participate in research activities to drive biomarker discovery or translational research?
(n = 303)

Biomarker discovery has traditionally been driven by academic research staff. Of particular interest is the high level of clinical involvement in biomarker research. This is a trend that has become more common as research findings are being applied to the clinic more rapidly.

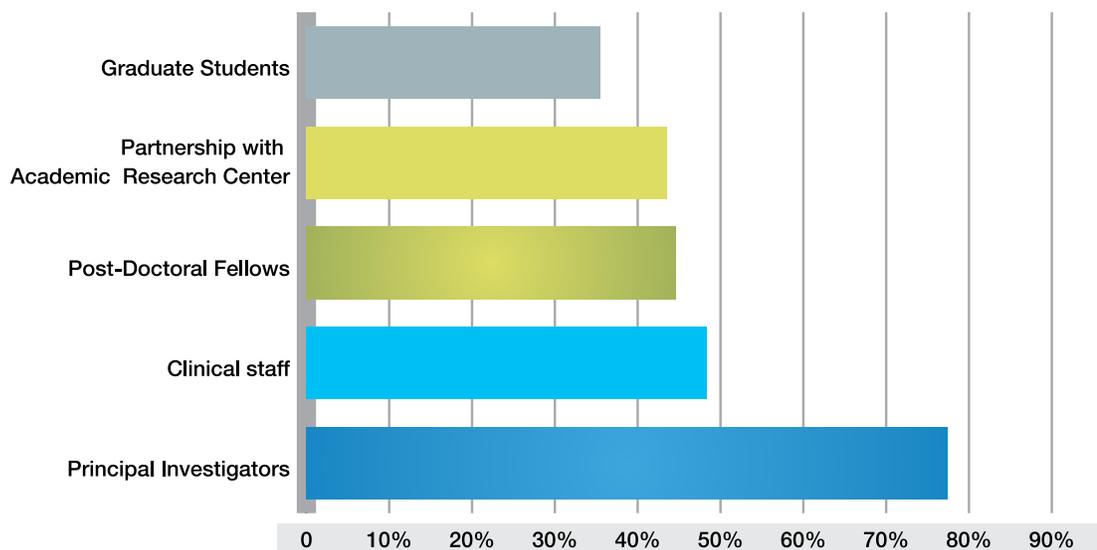


FIGURE 3:
Who in your organization is conducting biomarker discovery or translational research? (Check all that apply; n = 186)

Across all organization types, the vast majority either have an active precision medicine initiative in place or they are planning on implementing one. Of the respondents, genomic service providers are the most active in precision medicine with 75 percent indicating they have an initiative in place, 15 percent with an initiative in process and only 10 percent with no initiative planned.

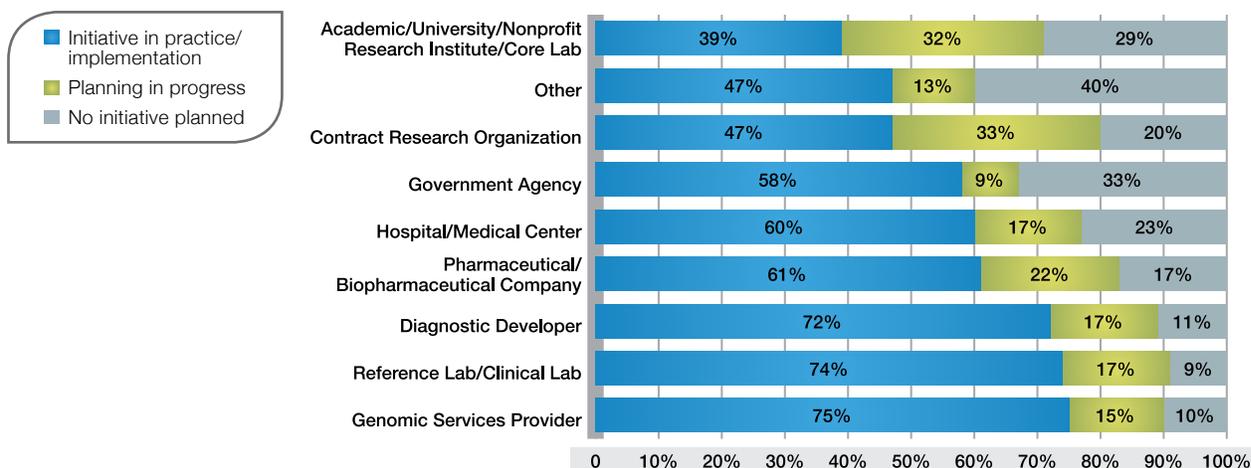
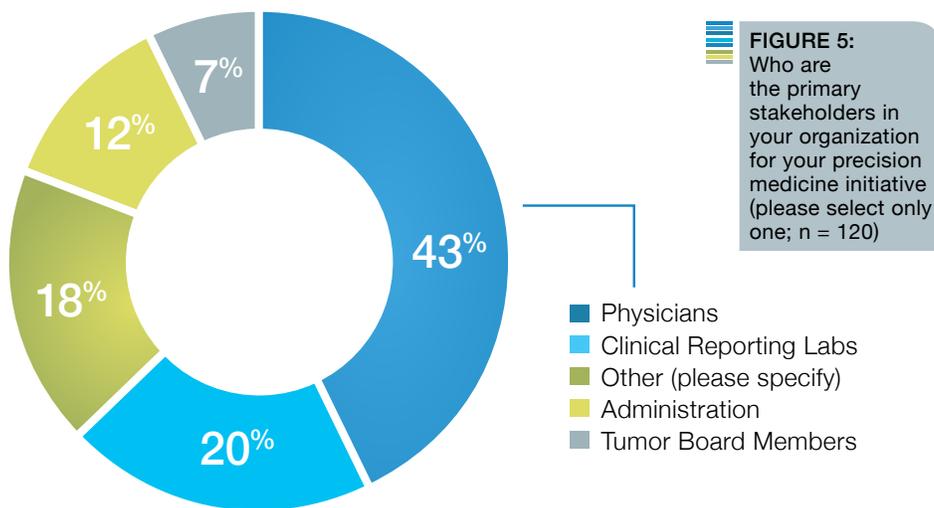


FIGURE 4:
At what stage would you classify your organization's Precision Medicine initiative? Responses by organization type (n = 286)

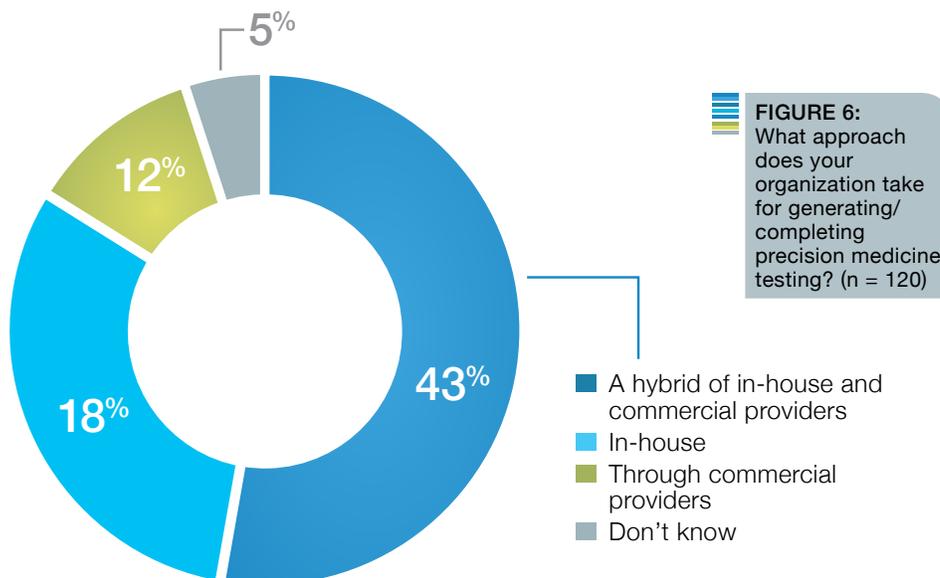
RESULTS

How Precision Medicine Initiatives are Being Implemented

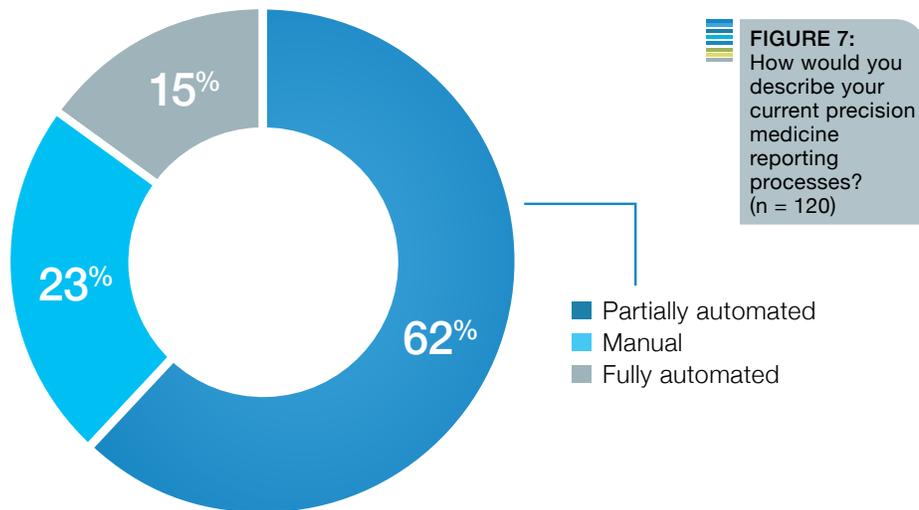
Among organizations with existing precision medicine initiatives, the primary stakeholders are physicians/clinicians, followed by clinical reporting labs. The most common “other” responses were patients, researchers, and research and development teams.



Early initiatives in precision medicine focused largely on commercial partners to generate their testing and results. There is now a shift for institutions to bring much of this functionality in-house. The hybrid approach to genomic testing represents this transition.



The vast majority of precision medicine workflows remain partially or fully manual. This reflects the fact that while technology can currently automate process and data management, there are certain elements of the precision medicine application that require human analysis and judgement.



However, the industry is looking to artificial intelligence (AI) and machine learning innovation to further automation and efficiency. When asked whether their organization had plans to incorporate AI and machine learning into their precision medicine initiative, over half of respondents said it was either already a part of their program or they were considering it. The top two benefits expected from leveraging AI and machine learning are the ability to identify new insights and improve treatment recommendations using large, aggregated data sets, and the ability to increase efficiency in mining large data sets for treatment decision support reporting.

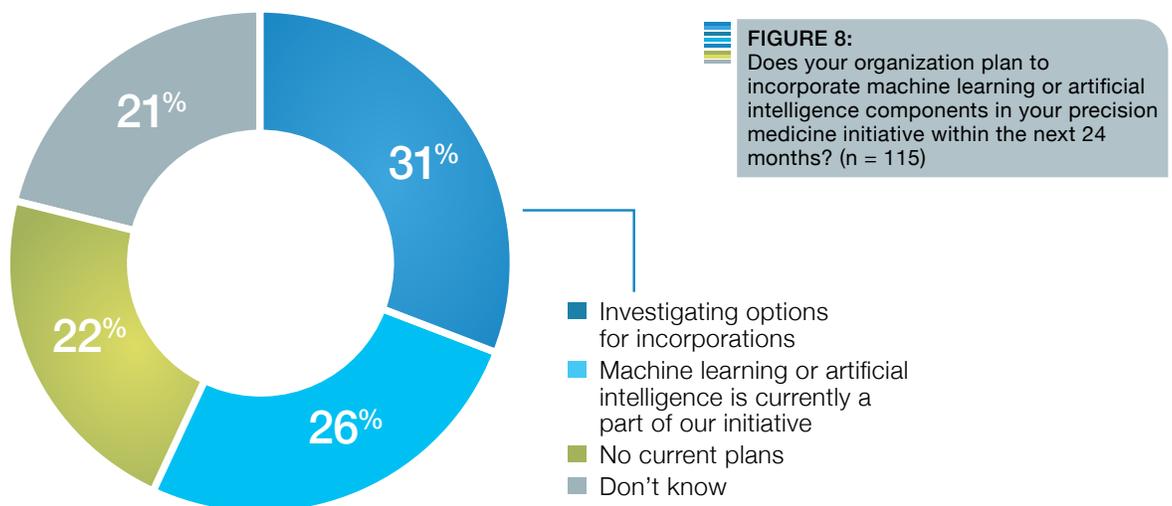
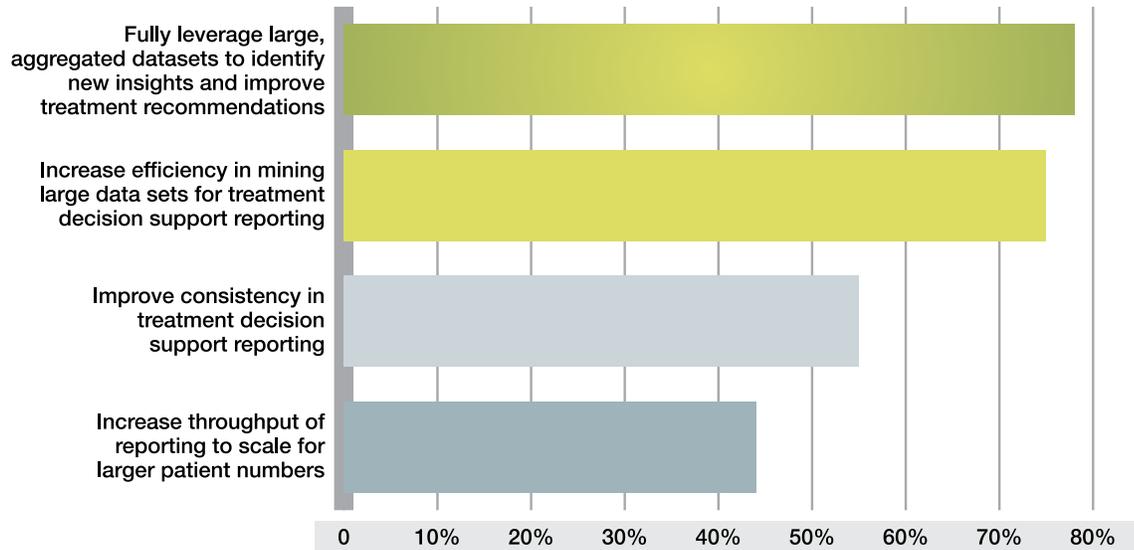


FIGURE 9:
What are you hoping to achieve with the addition of AI to your Precision Medicine initiative? (Check all that apply; n = 65)



When asked what they considered to be the main obstacles in meeting the goals of their precision medicine initiatives, using a scale of 1 to 5 (with 1 not being an obstacle at all and 5 being a major obstacle), respondents ranked “limited reimbursement for precision medicine testing” as the greatest obstacle, followed by the others listed in Figure #10. Reimbursement for precision medicine testing is an obstacle that is out of the hands of organizations; however, progress is being made and the expectation is that this obstacle will eventually go away. The other obstacles represent challenges that organizations should plan for ahead of time to ensure their precision medicine initiatives are well-positioned to grow and scale.

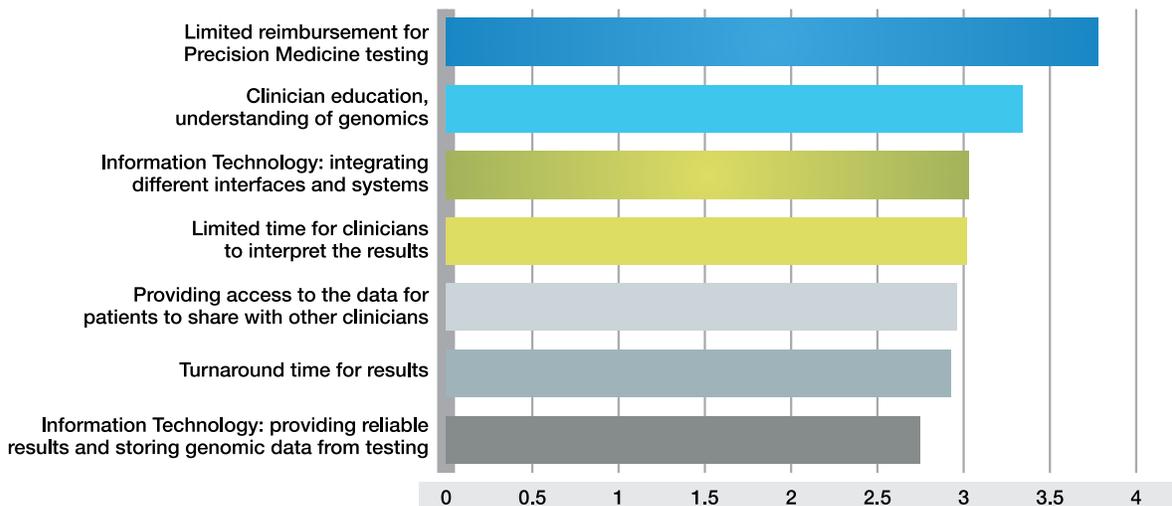


FIGURE 10:
What are the prime obstacles to achieving the goals of your precision medicine initiative? (1 = this is not an obstacle at all, 5 = this is a major obstacle; n = 120)

Next-generation sequencing (NGS) panels continue to be the leading technology in use, largely based on cost and turnaround time for analysis. However, there is a growing interest in additional data types, including more complex NGS, whole genome sequencing, and other omics data types. This will continue to add both value and complexity to analysis and data management challenges.

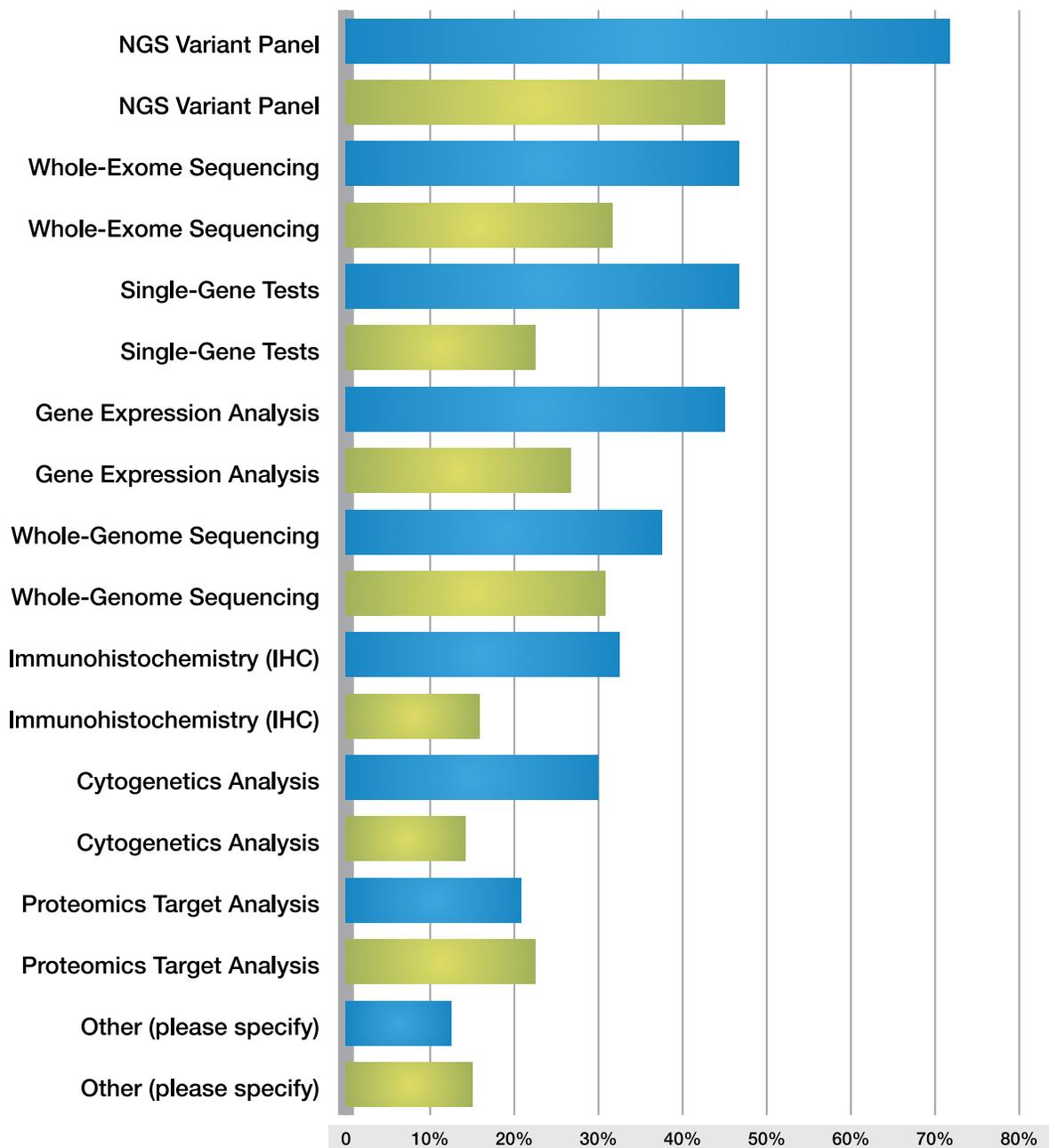


FIGURE 11:

- What testing methods are currently included in your precision medicine initiative? (Check all that apply; n = 120)
- What testing methods do you plan to integrate into your Precision Medicine workflow in the next 24 months? (Check all that apply; n = 120)

RESULTS

The Impact of Precision Medicine

Although oncology is still considered the disease area where precision medicine will have greatest impact, respondents also believe precision medicine will benefit several other disease areas. There is a tremendous amount of interest in applying these practices to additional areas of patient care.

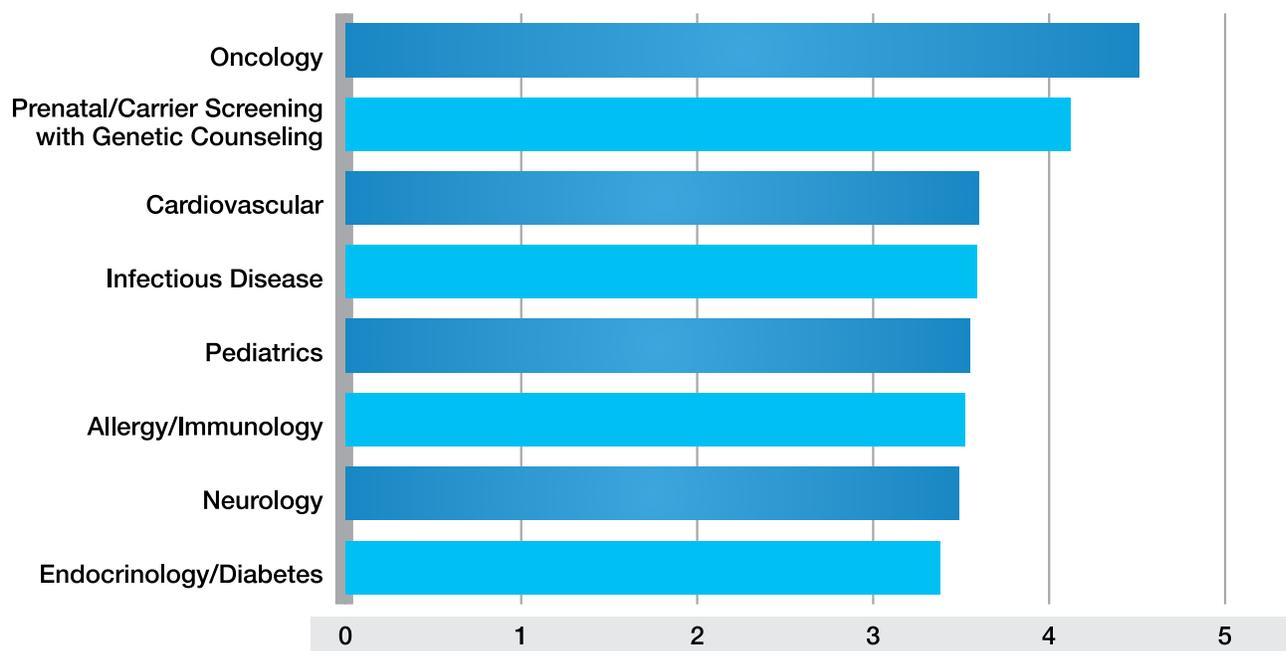


FIGURE 12:
In your opinion, how will Precision Medicine impact the following disease areas over the next 5 years? (1 = no benefit at all, 5 = dramatic improvements in treatment or prevention; n = 202)

Again, there is a wide interest in applying what we have developed in oncology precision medicine programs to additional clinical disease groups to improve patient outcomes.

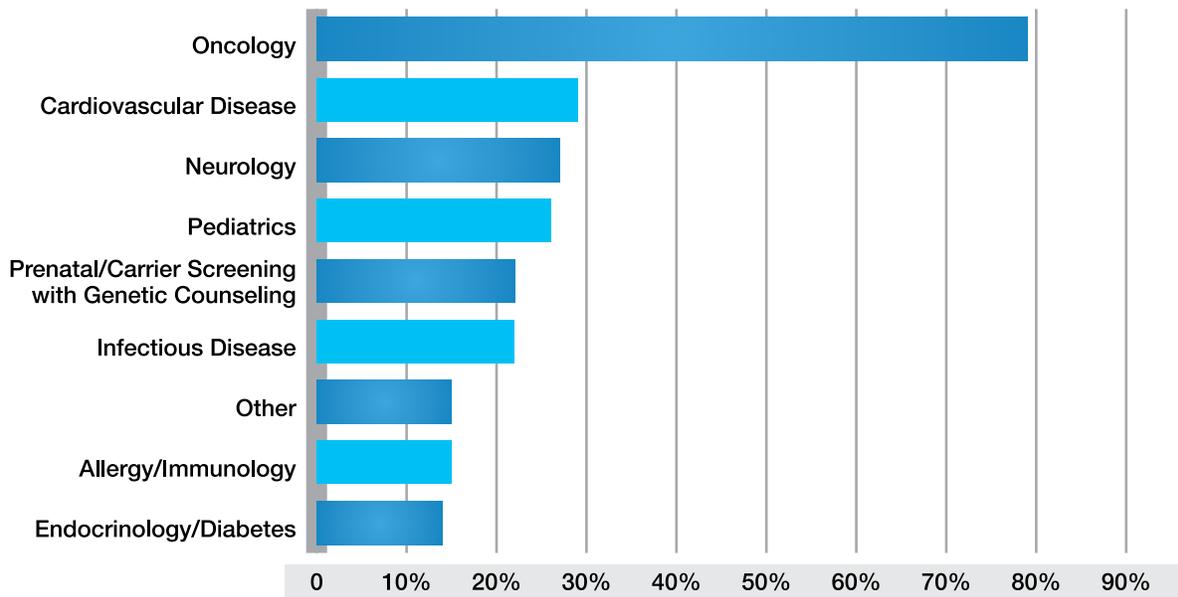


FIGURE 13:
Which subspecialties are included in your organization's precision medicine initiative? (Check all that apply; n = 120)

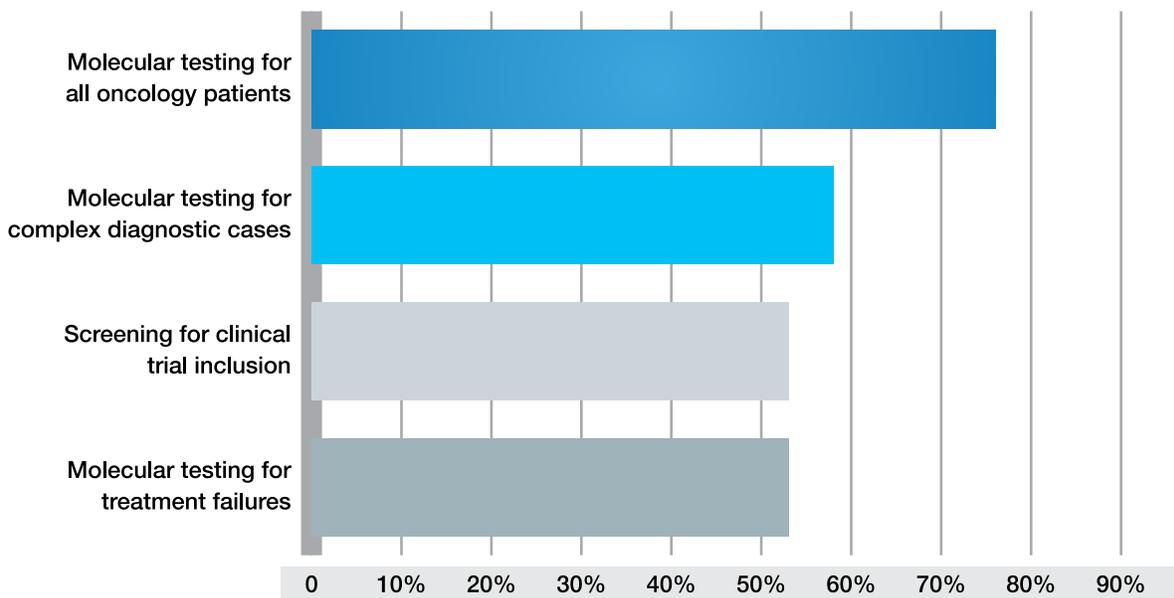
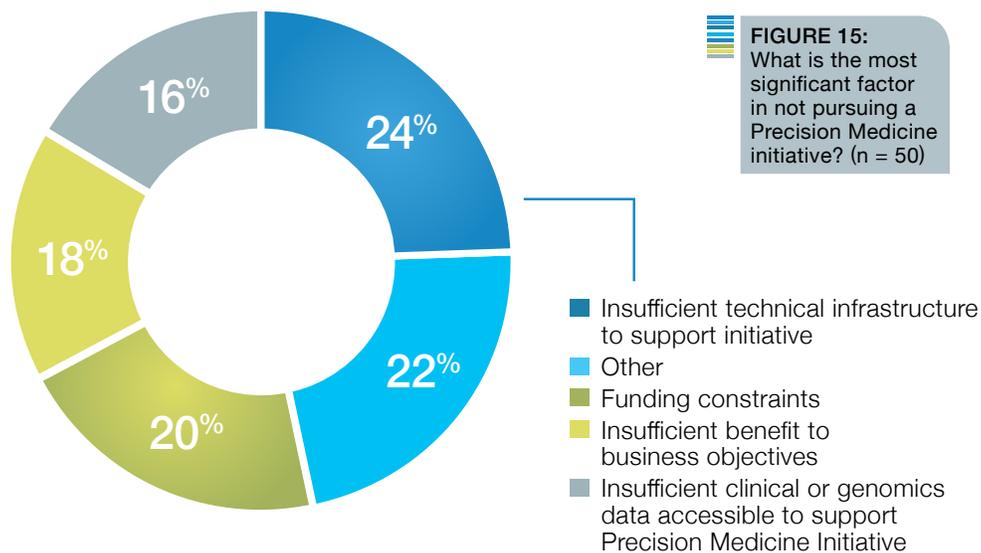
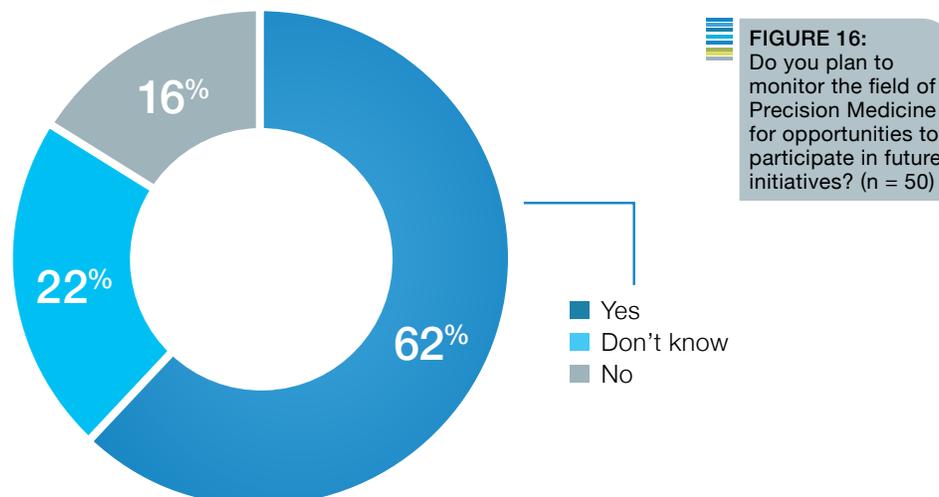


FIGURE 14:
Within the area of oncology, which of the following do you intend to include within your precision medicine approach in the next three years? (Check all that apply; n = 89)

Despite a variety of challenges in developing a precision medicine initiative, the vast majority of respondents who are not currently planning such an effort indicate that they would see a benefit in pursuing one, given the opportunity. Only 18 percent of the respondents indicated an insufficient benefit to their business.



Even amongst those respondents that stated that they have no plans for a precision medicine initiative, there is an interest in monitoring the field for future opportunities to participate. There is a wide acceptance of the value of these programs in a patient care setting.



CONCLUSION

Support of the concept of precision medicine has been widespread in the healthcare and life sciences communities, but the degree to which organizations have launched precision medicine initiatives has been unclear.

This research revealed that not only are the majority of organizations of all types active with precision medicine initiatives or planning to implement precision medicine initiatives, they are also interested in applying it to a broader spectrum of disease areas. Where the focus used to be solely in oncology, we are now seeing tremendous interest in applying it to other areas of patient care. Related, the survey also found that the majority of respondents currently participate in research activities to drive biomarker discovery or translational research. This connection/link between translation research and clinical application of insights through precision medicine is essential for continuing to drive innovation.

With regard to how organizations are actually implementing and pursuing precision medicine, the survey uncovered some shifts in the market. While healthcare and life sciences organizations used to rely primarily on commercial providers for generating/completing precision medicine testing, the majority of respondents indicated that their model is now either fully in-house, or a hybrid of in-house and commercial providers. This shows a growing interest in organizations becoming more hands-on in their precision medicine initiatives. The survey also revealed that there is a growing interest in additional data types, including more complex NGS, whole genome sequencing, and other omics data types. This data becomes most valuable in guiding patient care when combined with relevant clinical data to drive specific patient insights. This diversification of datasets will add both value and complexity to the analysis, as well as introduce new data management challenges. The industry will need to look toward technology to help create an integrated data stream to guide precision medicine initiatives.

Clearly, organizations in the healthcare and life sciences communities have not only embraced precision medicine in theory, but have embraced it by implementing active programs. There are obviously numerous benefits expected from such programs, which is why adoption and implementation has increased. In fact, in probing those respondents with no plans for a formal precision medicine initiative, the majority believe that a precision medicine initiative would be a competitive advantage for their organizations.

Considering the results of this survey, it is clear that precision medicine is not just a promise, it is a real practice generating true value that is impacting patient care and outcomes today.

For More Information

To learn more about how **Oracle Health Sciences** is supporting Precision Medicine initiatives in the Healthcare and Life Sciences industry, please email healthsciences_ww_grp@oracle.com or call + 1 800 633 0643.

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