QUANTITATIVE SURVEY ANALYSIS
PRECISION MEDICINE AT LEADING HEALTH SYSTEMS

MELISSA STAHL | RESEARCH MANAGER | THE HEALTH MANAGEMENT ACADEMY

The Academy
The Health Management Academy

Executive Summary

Methodology

In August 2017, The Academy conducted a quantitative survey of 43 Leading Health Systems regarding their awareness, integration, and operationalization of precision medicine. With a 49% response rate, 21 Chief Medical Officers (CMOs) and Oncology Leaders responded. Respondents represent health systems with an average Net Patient Revenue (NPR) of $4.1 billion that own or operate 296 hospitals with over 60,000 beds and approximately 2.9 million admissions annually. This report reviews and summarizes the findings of the quantitative survey.

Key Findings

- A majority (60%) of responding health systems indicate developing a precision medicine program is a high (25%) or essential (35%) priority among their organizations' strategic aims.
- An area of transition with rapid growth, 62% of health systems report they are currently implementing a precision medicine program (43%) or implemented a precision medicine program in the last year (19%). 10% of responding health systems implemented a precision medicine program over one year ago.
- Most (80%) Oncology Leaders expect real world outcomes from aggregated de-identified data to be extremely important in guiding physician decision making in complex cases. Reflective of this importance, a majority (60%) of responding health systems are involved in a cancer data sharing collaboration.

Survey Results

The State of Precision Medicine: A High Priority Area with Rapid Growth

- A high priority for a majority (60%) of health systems, 72% of responding health systems report they are currently implementing (43%) or have already implemented (29%) a precision medicine program.
- Precision medicine is primarily focused in oncology, with most (83%) respondents having developed, or expecting to develop, a precision medicine in this area. Oncology leaders overwhelmingly expect precision oncology to improve patient outcomes (89%), patient attraction & retention (89%), and clinical trial accrual (89%).

Precision medicine is a high priority among the Leading Health Systems, with a majority (60%) of responding health systems indicating developing a precision medicine program is a high (25%) or essential (35%) priority among their organizations' strategic aims (Figure 1).

Reflective of this high priority level, engagement in precision medicine is high with almost three-quarters (72%) of responding health systems reporting they are currently implementing (43%) or have already

FIGURE 1. AMONG YOUR ORGANIZATION'S STRATEGIC AIMS, WHAT LEVEL OF PRIORITY IS DEVELOPING A PRECISION MEDICINE PROGRAM?

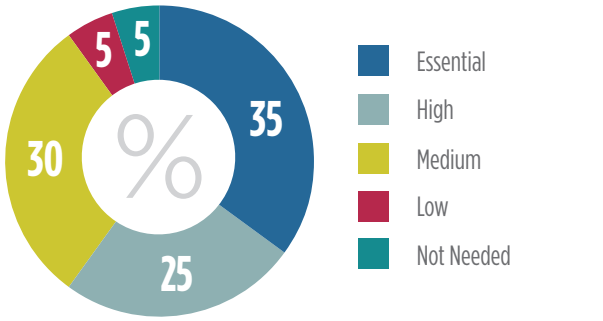
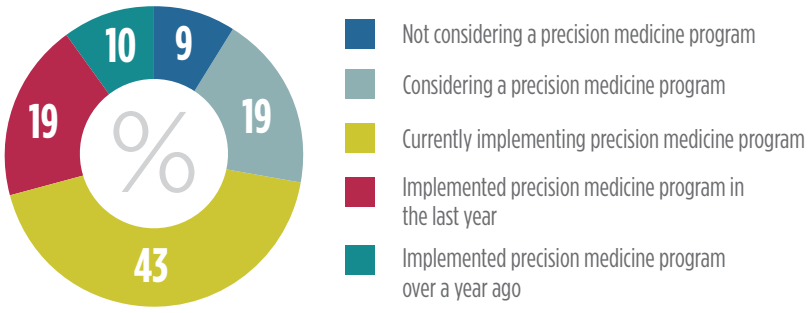


FIGURE 2. WHAT STAGE IS YOUR ORGANIZATION IN DEVELOPING A PRECISION MEDICINE PROGRAM?

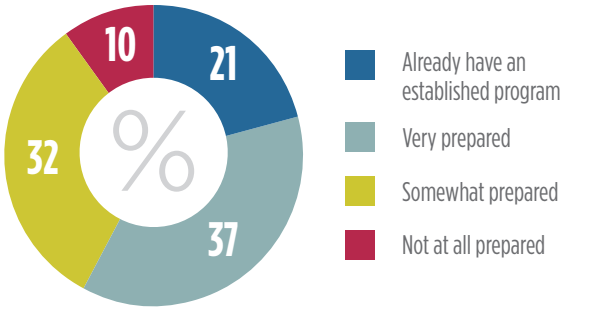


implemented (29%) a precision medicine program (Figure 2). Of those that are not engaged in precision medicine, few (9%) are not considering implementing a program.

Oncology is the most common area in which Leading Health Systems have implemented precision medicine, with 83% of responding CMOs indicating their health system has developed, or expects to develop, a precision medicine program in this area. Other areas of focus for precision medicine include Cardiology (33%), Neurology (33%), Epidemiology (33%) and Prenatal (33%).

Overall health systems are prepared to build a precision oncology program, with over two-thirds (69%) of responding health systems reporting they are very (37%) or somewhat (32%) prepared to build a precision oncology program, including establishing molecular tumor boards, developing common protocols, and educating oncologists (Figure 3).

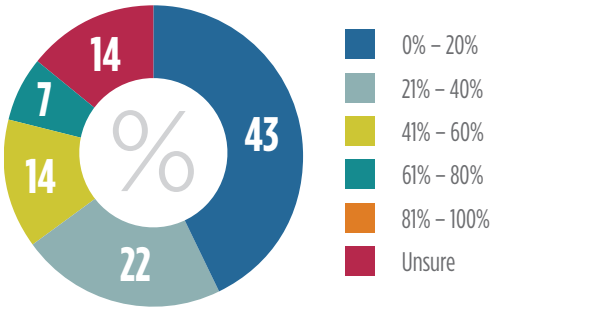
FIGURE 3. HOW WELL PREPARED IS YOUR ORGANIZATION TO BUILD A PRECISION ONCOLOGY PROGRAM (I.E. ESTABLISH MOLECULAR TUMOR BOARD, DEVELOP COMMON PROTOCOLS, EDUCATE ONCOLOGISTS)?



Although health systems feel prepared regarding precision oncology, challenges persist in developing these programs. Most commonly, health systems cite competing priorities (43%) as a top challenge around building a precision oncology program. One Oncology Leader specified, "Marketing resources to help promote the service, as they have competing priorities." Additional challenges include clinician alignment (24%), IT infrastructure/readiness (24%), molecular profiling and sequencing laboratory readiness (24%), clinical and operational leadership engagement (14%), and lack of capital resources/funding (10%). Other challenges health system executives reported include big data needs and payer buy-in.

For all responding health systems, less than half of cancer patients leave to seek care elsewhere. A majority (63%) of responding health systems reported between 0% - 20% of cancer patients leave to seek care elsewhere, while fewer (16%) reported 21% - 40% of cancer patients leave the health system to seek care elsewhere. However, 21% of respondents indicated they were unsure of the percent. The most common factors driving patients to seek cancer care elsewhere include better reputation (38%), access to clinical trials/ experimental treatments (33%), and better marketing (29%). Fewer health systems reported ease of access/ability to schedule appointments (10%), greater affordability (5%), more knowledgeable doctors (5%), and/or more systemized precision medicine programs (5%) as factors driving patients elsewhere. Other factors executives reported include more specialized care and competition with high-quality academic medical centers.

FIGURE 4. WITH WHAT FREQUENCY DO YOUR INSTITUTION'S ONCOLOGISTS ORDER LARGE-PANEL NEXT GENERATION SEQUENCING (NGS) FOR STAGE IV CANCER PATIENTS?

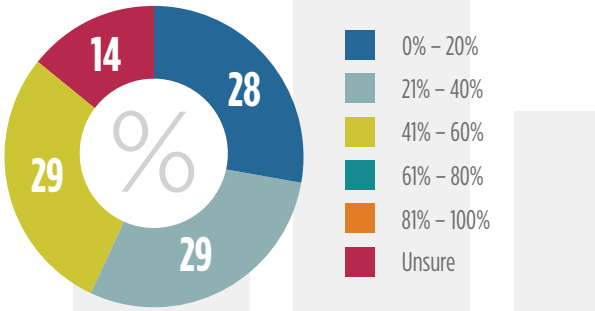


Oncologists at Leading Health Systems do not often order large-panel next generation sequencing (NGS) for stage IV cancer patients, with 65% of Oncology Leaders reporting a frequency of 40% or below (Figure 4). However, at most of these health systems the frequency is increasing. Over two-thirds (69%) of responding Oncology Leaders report the frequency is increasing slowly, while 23% report the frequency is increasing rapidly. 8% of respondents indicated the frequency is staying the same.

Similarly, oncologists at Leading Health systems do not often prescribe molecularly targeted therapies for stage IV cancer patients, while a majority (57%) of Oncology Leaders reporting a frequency of 40% or below (Figure 5). This frequency is also increasing, with almost all (92%) health systems reporting the frequency is either increasing slowly (77%) or rapidly (15%). The same 8% of health systems indicated the frequency is staying the same.

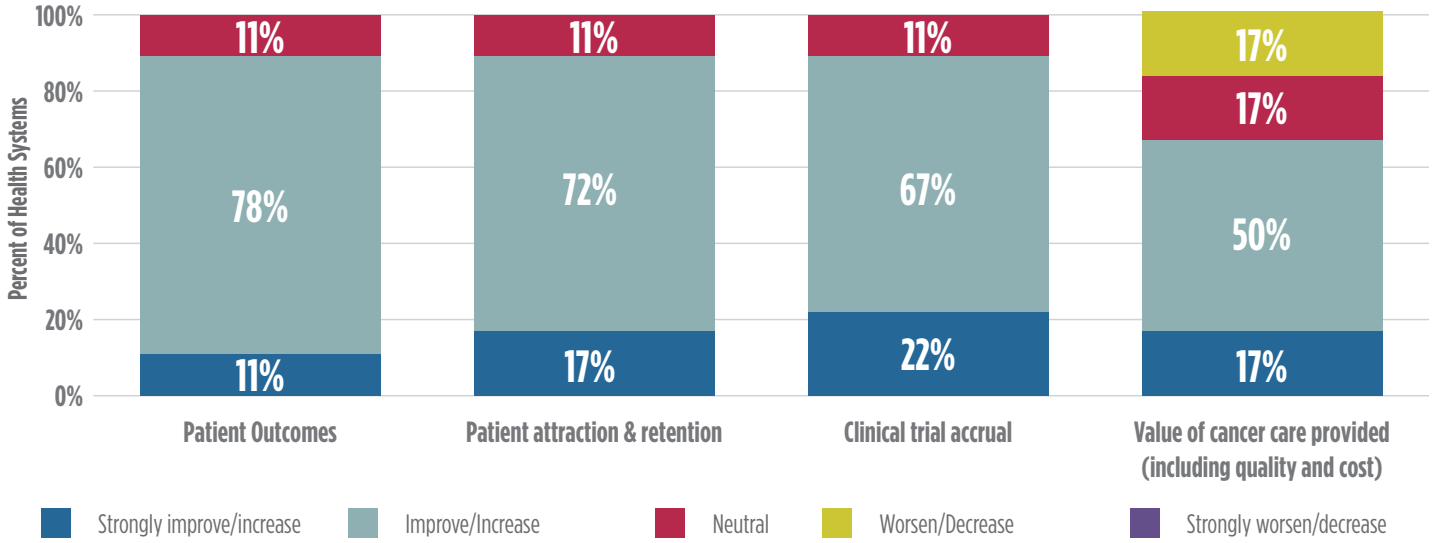
Additionally, most health systems (79%) report the frequency with which oncologists prescribe off-label targeted therapies based on molecular profiles is increasing, while 21% reported the frequency has stayed the same. No health systems reported the frequency has decreased.

FIGURE 5. WHAT IS THE FREQUENCY WITH WHICH YOUR INSTITUTION'S ONCOLOGISTS PRESCRIBE MOLECULARLY TARGETED THERAPIES FOR STAGE IV CANCER PATIENTS?



Health system executives are optimistic about precision medicine programs, with a majority of respondents indicating precision medicine programs have/are expected to improve patient outcomes (89%), patient attraction and retention (89%), clinical trial accrual (89%), and the value of cancer care provided (67%) (Figure 6).

FIGURE 6. HOW MUCH HAS/ WOULD YOU EXPECT A PRECISION MEDICINE PROGRAM TO IMPACT THE FOLLOWING?



Implementing Precision Oncology: Role of Precision Medicine Software and Technology Solutions

- Most (70%) responding health systems believe that they must invest in software to power a precision medicine program; however, less than one-third (30%) have allocated budget for such software (20%) or are in the process of establishing such a budget (10%).
- With 75% of respondents expecting to utilize vendor software to support precision oncology programs, common factors driving vendor choice include clinical trials matching (57%), clinical decision support (57%), molecular tumor board support (43%), data sharing across the network (43%), and/or data warehousing and analytics (43%).

A majority (70%) of responding health systems believe that it is necessary to invest in software to power a precision medicine program (Figure 7). However, few health systems (20%) have a defined budget for precision medicine software solutions, excluding in-house sequencing. While an additional 10% are in the process of establishing a budget, the majority (70%) have no budget for precision medicine software solutions.

Three-fourths (75%) of responding health systems are utilizing or considering utilizing software, beyond the EHR, in support of their precision oncology program, with a majority (55%) utilizing or considering utilizing vendor software only (Figure 8). Health systems that are using, or planning on using, outside software vendor to support precision oncology are most commonly using Syapse (25%), IBM Watson (17%), NantHealth (8%), Tempus (8%), and/or Via (8%). However, 25% of respondents indicated they were unsure which vendor they would use.

FIGURE 7. DO YOU BELIEVE THAT YOU MUST INVEST IN SOFTWARE TO POWER A PRECISION MEDICINE PROGRAM? (NOTE: PLEASE EXCLUDE ANY SOFTWARE NEEDED TO SUPPORT IN HOUSE SEQUENCING ANALYTICS.)

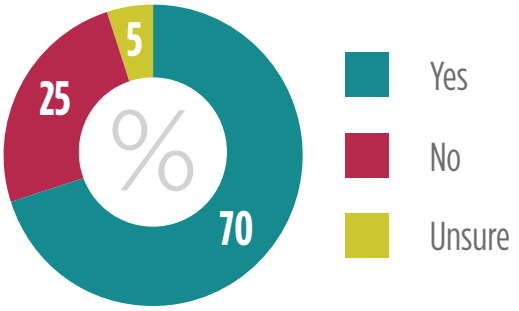
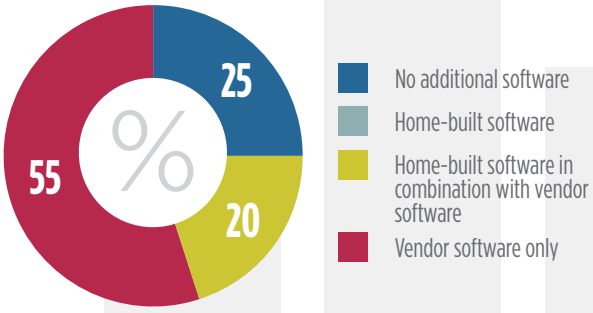


FIGURE 8. WHAT TYPES OF SOFTWARE ARE YOU UTILIZING OR CONSIDERING TO SUPPORT YOUR PRECISION ONCOLOGY PROGRAM BEYOND YOUR EHR (EXCLUDING IN HOUSE SEQUENCING ANALYTICS)?



Among health systems using, or considering using, vendor software to support precision oncology, the most common factors driving vendor choice include clinical trials matching (57%), clinical decision support (57%), molecular tumor board support (43%), data sharing across the network (43%), and/or data warehousing and analytics (43%). Additional factors include data integration (36%), workflow support (36%), cost (36%), references from the peer network (21%), marketing opportunities (14%), pharma partnerships (14%), payor reimbursement (14%), machine learning/artificial intelligence (14%), and/or degree of collaboration (8%).

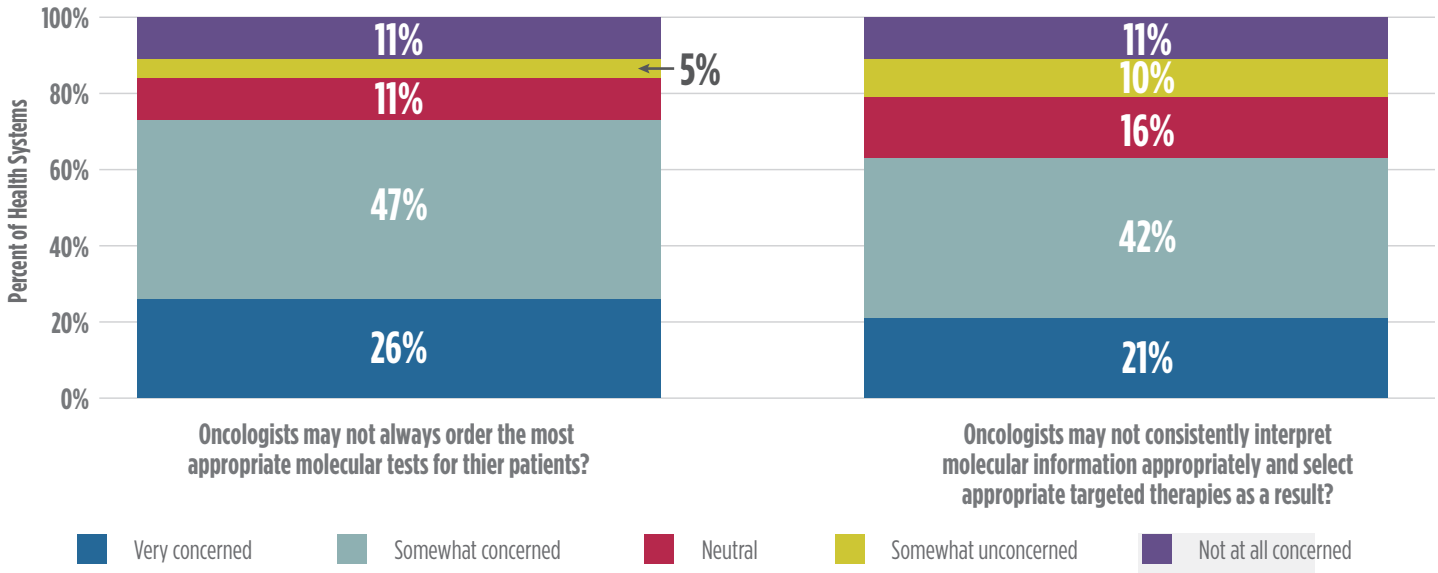
Executing Precision Oncology: Challenges and Opportunities

- A large proportion of oncology leaders have some concern that their oncologists may not always select either the most appropriate molecular tests (73%) or the most appropriate targeted therapies (63%) for their patients. Reflective of this, 84% of respondents believe it is extremely or somewhat important to provide guidance to oncologists to help them navigate molecular diagnostics and targeted therapies.
- Oncology Leaders overwhelmingly believe that real world outcomes from aggregated, de-identified data will be extremely important (80%), and that tools that enable physicians to learn from these outcomes for specific patient cohorts would be extremely valuable (73%). Therefore, a majority of health systems are involved in cancer data sharing collaborations (60%)

All (100%) responding executives reported that it is either important (40%) or very important (60%) for oncologists to have easy and fast access to integrated clinical and molecular information at the point of care. However, 63% of respondents indicated clinical and molecular data is not easily and quickly available to providers at their health systems.

Overall health system executives are concerned that their oncologists may not always order the most appropriate molecular tests for their patients (73%) (Figure 9). Similarly, 63% of executives are somewhat or very concerned that oncologists may not consistently interpret molecular information appropriately and select appropriate therapies as a result.

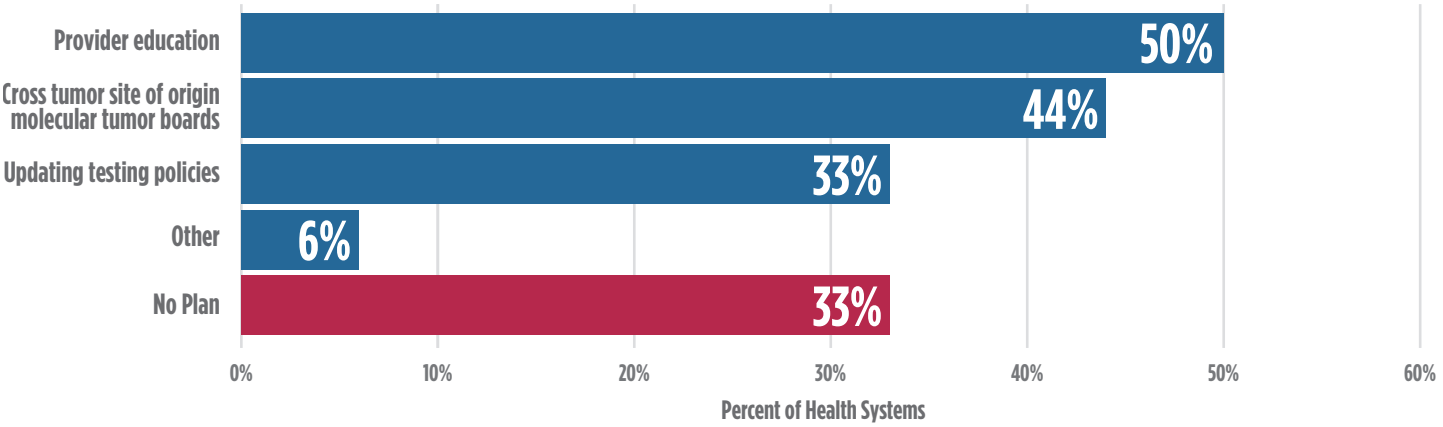
FIGURE 9. HOW CONCERNED ARE YOU REGARDING THE FOLLOWING:



At a majority of responding health systems (67%), oncologists know when their patients are eligible for local clinical trials. Additionally 87% of health systems report their institutions have access to the clinical trials that their cancer patients need. Almost half (46%) of Oncology Leaders report it is either somewhat difficult (33%) or very difficult (13%) to enroll a significant cohort of patients into oncology trials that are open at their institution. One-third (33%) of Oncology Leaders report it is somewhat easy to enroll a significant cohort of patients into oncology trials, and one-fifth (20%) are neutral.

Just over half (53%) of responding health systems have a plan to address changing practice as a result of the approval of the first cancer drug based on the patient's genomic profile independent of tumor site. Health systems most commonly include provider education (50%), cross tumor site of origin molecular tumor boards (44%), and updating testing policies (33%) in their plan for tumor site agnostic drugs (Figure 10). Additionally, health systems plan to adopt standard protocols.

FIGURE 10. WHAT IS INCLUDED IN YOUR ORGANIZATION'S PLAN FOR TUMOR SITE AGNOSTIC DRUGS? (PLEASE CHECK ALL THAT APPLY.)



Providing guidance to oncologists to help them navigate molecular diagnostic and targeted therapies is of high importance to Leading Health Systems, with almost all (84%) of executives reporting it is extremely (63%) or somewhat (21%) important (Figure 11).

Health systems are generally satisfied with the National Comprehensive Cancer Network (NCCN) guidelines as the standard of care for oncology patients, with most (79%) reporting they are somewhat (65%) or completely (14%) satisfied with these guidelines (Figure 12).

Similarly, Oncology Leaders are generally satisfied with the oncology care pathway providers they use, with all respondents indicating they were completely satisfied (27%), somewhat satisfied (40%), or neutral (33%). However, those that are not completely satisfied (73%) commonly cited reasons including not enough molecular specificity (64%), IT systems and pathways decision support tools are cumbersome and/or poorly integrated in workflow (45%), pathways implement payor priorities while not always best for patients (36%), difficult or time consuming to access (27%), and/or do not include appropriate off-label use (27%).

Most (80%) Oncology Leaders expect real world outcomes from aggregated de-identified data to be extremely important in guiding physician decision making in complex cases (Figure 13). Reflective of this importance, A majority (60%) of responding health systems are involved in a cancer data sharing collaboration. One-fifth (20%) are currently involved and live in a collaboration, while 40% are involved but not yet live/implemented. Health systems are most commonly involved in the Oncology Precision Network (OPeN)/Syapse Network (44%). Other networks health systems are involved in include Flatiron, Guardian, and/or NCDB.

Additionally, most (86%) of Oncology Leaders would find a tool that compared real world outcomes across treatment regimens for patients with any combination of molecular and clinical characteristics to be extremely (73%) or somewhat (13%) valuable.

Most health systems report it takes oncologists either less than 1 hour (47%) or between 1 – 2 hours (47%) to prepare a complex case for review by a tumor board, either molecular or indication specific.

FIGURE 11. HOW IMPORTANT DO YOU THINK IT IS TO PROVIDE GUIDANCE TO ONCOLOGISTS TO HELP THEM NAVIGATE MOLECULAR DIAGNOSTIC AND TARGETED THERAPIES

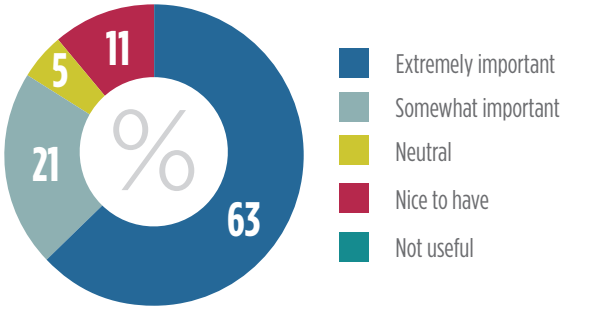


FIGURE 12. HOW SATISFIED ARE YOU WITH THE NATIONAL COMPREHENSIVE CANCER NETWORK (NCCN) GUIDELINES AS THE STANDARD OF CARE FOR ONCOLOGY PATIENTS?

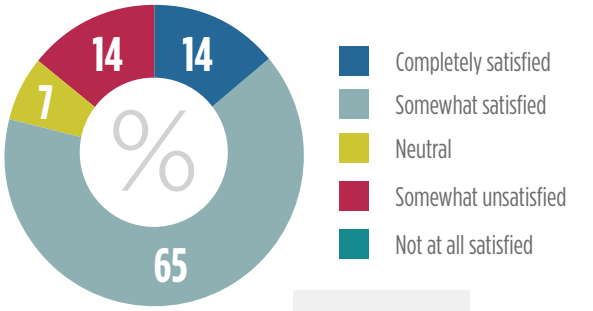
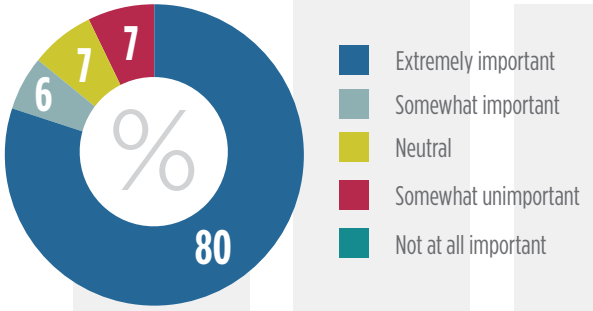
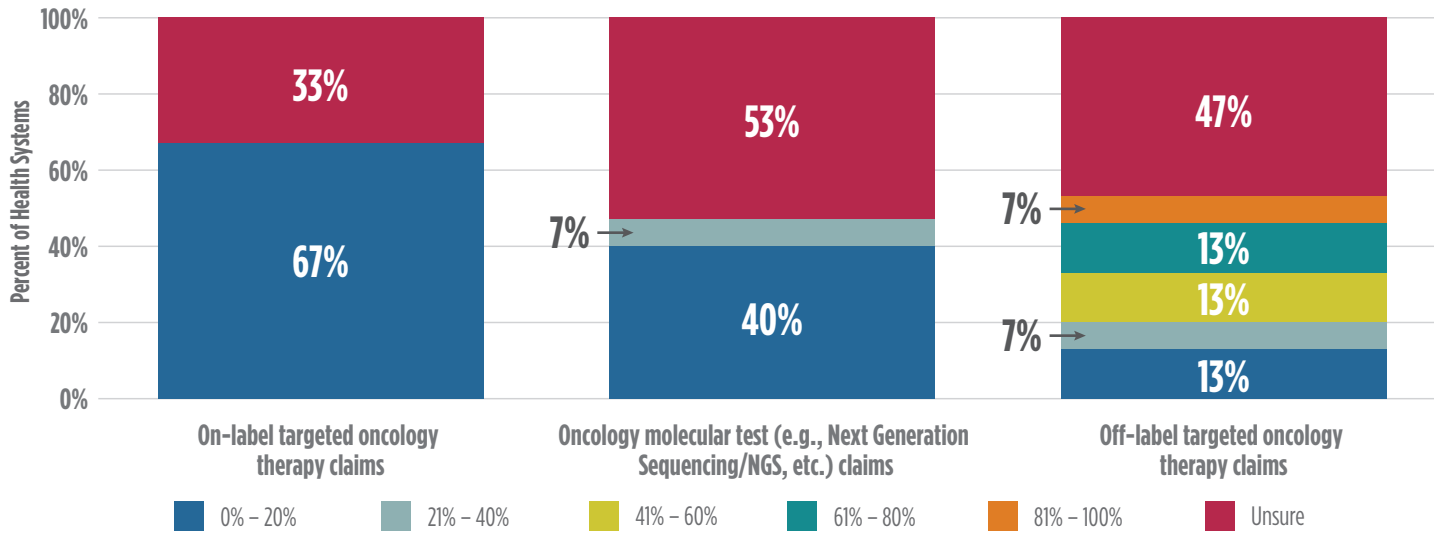


FIGURE 13. IN THE FUTURE, HOW IMPORTANT WILL REAL WORLD OUTCOMES FROM AGGREGATED DE-IDENTIFIED DATA BECOME IN GUIDING PHYSICIAN DECISION MAKING IN COMPLEX CASES?



Off-label targeted oncology therapy claims are denied by payors more commonly than on-label targeted oncology therapy claims or oncology molecular test claims (e.g., Next Generation Sequencing/NGS, etc.), although many respondents were unsure of the frequency (Figure 14). Reflective of this, 75% of responding CMOs report denials of molecular testing and/or specialty drugs do not rise to the level of a top 5 financial priority for their organization.

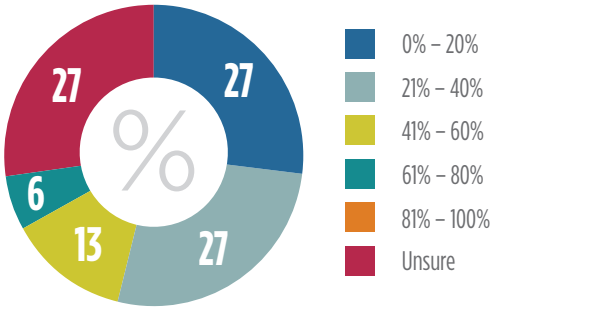
FIGURE 14. HOW FREQUENTLY ARE THE FOLLOWING CLAIMS DENIED BY PAYORS?



Relatively few eligible patients at responding health systems apply for assistance via pharma-sponsored co-pay programs and foundations, with over half (52%) of Oncology Leaders reporting a frequency of 40% or below (Figure 15).

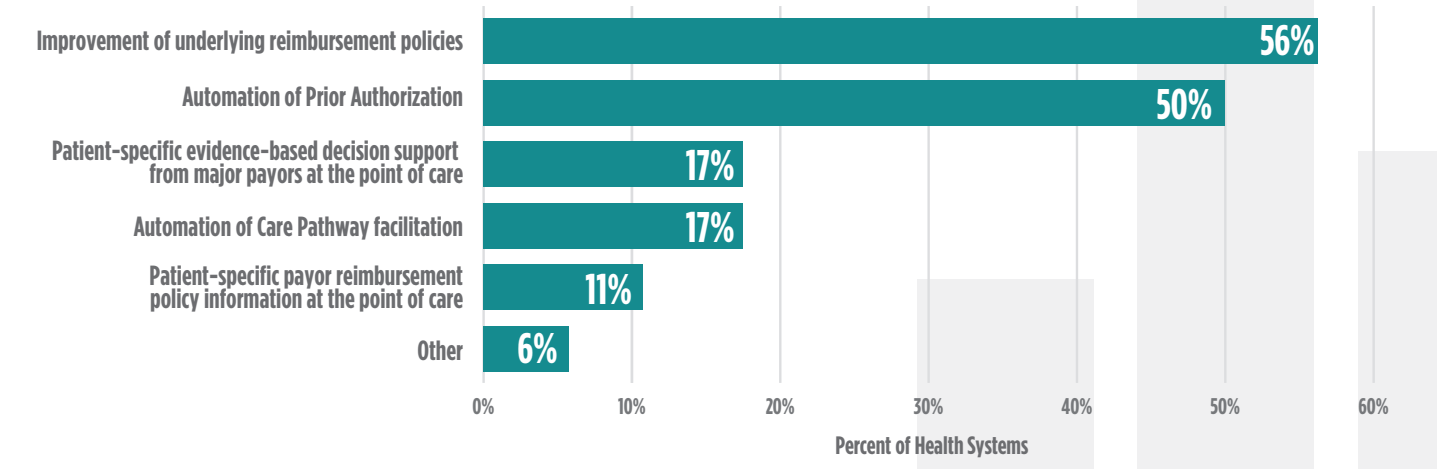
The most common barrier preventing the most eligible patients from receiving access to support via these programs is they are unaware of the program (47%), according to Oncology Leaders. Additional barriers include errors in application (27%), too much time to complete application (27%), did not follow up appropriately after application submitted (13%), applied for the wrong program (13%), assumed did not meet eligibility criteria (13%), and/or the program is not available (7%).

FIGURE 15. WHAT PERCENTAGE OF ELIGIBLE PATIENTS APPLY FOR ASSISTANCE VIA PHARMA-SPONSORED CO-PAY PROGRAMS AND FOUNDATIONS?



The most valuable improvement to payor reimbursement for molecular diagnostics and targeted therapies for Leading Health Systems would be an improvement of underlying reimbursement policies (56%) and automation of prior authorization (50%) (Figure 16). One health system indicated the elimination of prior authorization would be most valuable.

FIGURE 16. WHICH OF THE FOLLOWING IMPROVEMENTS TO PAYOR REIMBURSEMENT FOR MOLECULAR DIAGNOSTICS AND TARGETED THERAPIES WOULD BE MOST VALUABLE TO YOUR ORGANIZATION? (PLEASE SELECT UP TO TWO RESPONSES.)



Participating Health Systems

Advocate Health Care
Aurora Health Care
BayCare
BaylorScott&White Health
Beaumont
Catholic Health Initiatives
INOVA Join the future of health.
Intermountain Healthcare
Lehigh Valley Health Network
Northwestern Medicine
Norton Healthcare
Ochsner Health System
OhioHealth Believe in We
Partners Healthcare
Piedmont Healthcare
SCL Health
SHARP
Spectrum Health
Texas Health Resources
UPMC Life Changing Medicine
Virtua

The Health Management Academy, "The Academy"

The Academy is a leading research and analysis company serving the largest 100 health systems. The Academy provides services to the C-suite, including research, analytics, health policy, consumer research, fellowship programs, and Collaboratives.

The Health Management Academy provides unique, peer-learning and networking opportunities, complemented by highly-targeted research and advisory services, to executives of Leading Health Systems. These services enable health system and industry members to cultivate relationships, perspectives, and knowledge.

In 1998, The Academy created the first knowledge network exclusively focused on Leading Health Systems. This learning model, refined over 19 years of working side-by-side with members, combines peer learning (Executive Forums, Trustee Institute, Collaboratives), research (Health System, Consumer, Health Policy, Advisory), and leadership development (Leadership Programs and Fellowships).

Syapse

Syapse is a market leader in precision oncology solutions. Syapse software helps health systems and providers deliver cutting-edge treatments, resulting in better health outcomes and lower costs. Syapse brings together previously fragmented clinical, molecular, and outcomes data and delivers it within a physician's workflow. In addition, Syapse customers have access to the Syapse network, the largest precision oncology data-sharing consortium in the world. Leading health systems, including Intermountain Healthcare, Providence St. Joseph Health, and Stanford Cancer Institute, have adopted Syapse to manage nearly 1 million active cancer cases across 25 states and in nearly 300 hospitals.

The Health Management Academy extends its appreciation to Syapse for the financial support for this project.

syapse