Precision Cancer Care Comes to Intermountain

Intermountain Healthcare uses Syapse software to improve patient outcomes without increasing costs

Intermountain
Healthcare
Healing for life®

CUSTOMER PROFILE

Headquarters	Salt Lake City, Utah
Type	Not-for-profit, integrated health system
Hospitals	22
Physicians	1,200

CHALLENGES

- Physicians at Intermountain needed assistance in ordering appropriate molecular diagnostic tests and taking action based on test results.
- Intermountain's IT systems were incapable of capturing structured molecular data, making integrated queries of patient clinical and molecular data for decision support and quality improvement impossible.
- Procurement rates of targeted therapies from specialty pharmacies were very low, blocking delivery of potentially lifesaving drugs to patients in need.

SOLUTIONS

- Intermountain used Syapse software to power its precision medicine clinical workflow, enabling community oncologists to make treatment decisions informed by genomic data and track these decisions' clinical impact.
- Using Syapse software, Intermountain empowered a Molecular Tumor Board to provide decision support to clinicians by recommending targeted therapies & clinical trials.
- Through Syapse's streamlined drug procurement workflow, Intermountain increased its drug procurement rate 5-fold.
- Syapse software enabled Intermountain to scale its precision medicine program and improve outcomes over time, increasing progression-free survival of advanced cancer patients by 92% with no increase in cost.

Intermountain Healthcare – A Leader in Health IT

Intermountain Healthcare, an internationally recognized not-for-profit system of 22 hospitals and more than 180 physician clinics, has been a leader in health information technology for more than half a century. Physician-researchers at Intermountain pioneered the use of computers for clinical decision support in the 1950s and built one of the United States' first electronic medical record systems in the 1970s.

Recognizing the growing use of genomic information to tailor treatment to cancer patients' individual molecular profiles, Intermountain's leadership believed that they had a medical duty to rigorously study the clinical utility and cost effectiveness of precision medicine. From its unique position as a leader in evidence-based medicine, Intermountain made an enterprise-wide commitment to formalize the practice of precision oncology and measure clinical outcomes and costs. The Intermountain Precision Genomics service was launched in July 2013 at a single site, with the intent that the program would be rolled out system-wide only if it demonstrated both clinical and cost-effectiveness.

Intermountain's leadership understood that building a formal precision medicine program would require a fundamentally different approach to information management, clinical workflow, and decision support than their EHR system or data warehouse could provide. Intermountain decided to partner with Syapse and use Syapse Precision Medicine Platform℠ as a foundation for its information architecture.

With Syapse's help, Intermountain implemented a comprehensive precision oncology service that included tumor sequencing, Molecular Tumor Board case review, interactive clinical decision support, and drug procurement. In addition to streamlining Intermountain's clinical workflow, the centralized integration of clinical, molecular, treatment, and outcome data in Syapse Precision Medicine Platform℠ enabled Intermountain to demonstrate that its systematic application of precision oncology doubled progression-free survival without increasing total cost of care.

Barriers to Implementing Precision Oncology

Intermountain identified several barriers that would need to be addressed before precision medicine could be made a routine part of cancer care. Its physicians wanted to use tumor sequencing to identify molecularly targeted therapies for cancer patients, but were ordering inadequate, inappropriate, and duplicative tests from multiple send-out labs. Many physicians were not equipped to make clinical decisions based on genomic data. Even when a clinician did order a targeted therapy based on test results, the drug procurement rate was poor. Test results were stored in the EMR as scanned faxes or PDFs and could not be used to drive clinical decision support or for quality improvement. Below are details on how Syapse software enabled Intermountain to overcome each of these challenges and scale its precision medicine program across their network of community oncology providers.

> "We really couldn't order testing, we couldn't generate reports, we couldn't deliver test reports to ordering physicians without the IT platform that comes from Syapse."
>
> *Lincoln Nadauld, MD, PhD*
> *Medical Director, Cancer Genomics*

Inappropriate, inadequate, and duplicative testing. As with many health systems, utilization of tumor sequencing by Intermountain's physicians was highly variable, with tests ordered from many different labs, or not used by some physicians at all. Intermountain's leadership decided to implement a best-practice standard—that all metastatic cancer patients who failed first-line therapy should receive tumor profile testing. In addition, Intermountain observed that many commercially available tests lacked either actionability or reimbursement coverage, and many test vendors would not return test results in structured format, preventing a software-enabled approach to clinical decision support. To address these shortcomings, Intermountain developed its own in-house tumor profiling test, the "ICG100".

Intermountain chose Syapse Precision Medicine Platform℠ as the IT infrastructure to support clinical use of the ICG100 test. Both Intermountain clinicians and external affiliates use the Syapse web application to order ICG100 tests and to receive test results and interactive clinical decision support. Using Syapse software, Intermountain has been able to increase adoption of molecular testing across its employed and affiliated oncology groups, extending the reach of the ICG100 test beyond Intermountain's traditional borders to physicians and patients across the nation.

Conventional chemotherapy
Precision cancer medicine

Figure 1. Progression-free survival of advanced cancer patients is 92% higher in patients receiving precision cancer medicine, compared to patients receiving conventional chemotherapy.[2]

Physician need for decision support in the face of complex, genomic results and evolving clinical evidence. Intermountain realized that even with an in-house test and electronic ordering and results delivery, interpretation of genomic results still presented a barrier to widespread adoption by clinicians. Historically, oncologists have struggled to incorporate molecular profiling into their routine workflows and treatment decisions, due to the complexity of genomic results and the continually evolving nature of clinical utility evidence for on-label, off-label, and investigational drug use.

To address this knowledge gap, Intermountain created a collaborative Molecular Tumor Board (MTB) composed of experts in cancer genomics from Intermountain and collaborating institutions. Meeting twice weekly to review standard cases and every other week for complex ones, Intermountain's MTB serves two purposes—educating community providers about genomics and providing an expert treatment planning consult service.

Using the case review workflow in Syapse Oncology℠, MTB members review ICG100 test results alongside a patient's full clinical history. The MTB then formulates a consensus opinion on appropriate drugs or clinical trials and documents these recommendations in the Syapse application. Recommendations are automatically delivered to clinicians through Syapse Oncology℠ along with the ICG100 test results, and physician adherence to these recommendations is tracked. MTB recommendations are captured in the Syapse knowledge-base manager, enabling the MTB to easily access prior guidance and address a larger volume of cases. Since implementing Syapse Oncology℠, the Intermountain MTB's case volume has increased 4-fold.

Low drug procurement rates. Even when actionable genomic data and clinical guidance are available, the inability to procure and pay for targeted therapies remains a barrier to the practice of precision medicine. Academic medical centers who have extensive experience with precision medicine, such as MD Anderson Cancer Center, report that "only 10% to 20% of patients with actionable mutations end up on a drug or in a trial."[1]

Intermountain recognized that inefficient workflows, unstructured data, and a lack of software interoperability stood between a tumor profile result and the delivery of a potentially lifesaving drug to a patient—but that these barriers could be addressed by streamlining the drug procurement workflow through Syapse Oncology℠.

In the Syapse Oncology℠ application, recommendations for molecularly targeted therapies are accompanied by a drug order button, enabling Intermountain physicians to easily order the

[1] "Study Sparks Debate on Accuracy of Genome Tests for Cancer Patients," *Wall Street Journal*, April 15, 2015. http://on.wsj.com/1ywNCfw

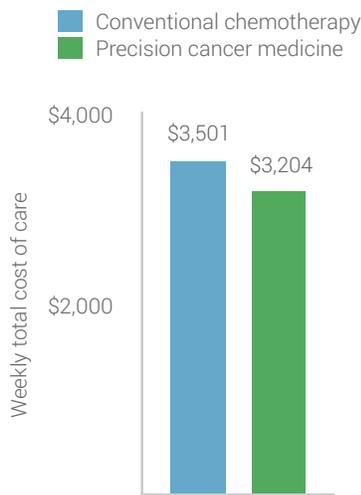| GOAL	CHALLENGE	SOLUTION
Sequence tumors for all advanced cancer patients to inform targeted treatment options.	Commercially available tumor sequencing tests were inadequate or inappropriate, and physicians often ordered duplicative tests.	Intermountain developed the in-house ICG100 test with web-based ordering and reporting through a Syapse-powered web portal to empower physicians and patients nationwide.
Empower physicians with confidence to act on molecular test results.	Complexity of genomic data and continually evolving biomedical knowledge discouraged physicians from ordering and using molecular tests.	Syapse provided case review workflow software for Intermountain's collaborative Molecular Tumor Board to review ICG100 results and recommend targeted therapies.
Perform quality improvement and outcomes research using aggregated patient clinical and molecular data.	Existing hospital IT systems we re incapable of capturing structured molecular data, making integrated queries of patient clinical and molecular data impossible	The Syapse platform enabled Intermountain to capture ICG100 test data and patient clinical history, treatment, and outcomes data in a central data store for quality improvement and outcomes research.
Ensure that targeted therapies are procured for the appropriate patients.	The workflow for ordering targeted therapies from specialty pharmacies was manual and inefficient, slowing or preventing procurement to patients.	Syapse helped Intermountain streamline drug procurement with interactive therapeutic decision support in ICG100 reports linked to automated downstream drug procurement workflow.

Figure 2. There is no increase in total cost of care for advanced cancer patients receiving precision cancer medicine, compared to those receiving conventional chemotherapy. Total cost of care includes the cost of hospitalizations, readmissions, treatments, and ancillary care.[2]

recommended therapies. Clicking the order button initiates a drug procurement workflow, transmitting the patient's clinical and molecular data to Intermountain's in-house specialty pharmacy to accelerate completion of procurement and prior authorization forms, and routing the prescription request to the appropriate fulfillment organization. As part of Intermountain's program, a dedicated specialty pharmacy team conducts the appeals process, using Syapse Oncology℠ for chart review. Syapse and Intermountain have thus eliminated a critical bottleneck, speeding the delivery of potentially lifesaving drugs to patients.

Inability to measure clinical utility or perform quality improvement.

Because of its commitment to improving patient outcomes, Intermountain understood that an effective quality improvement program would require the ability to capture and query its patient population's clinical, molecular, and outcomes data on a regular basis and deliver any updates to best practices to physicians in a scalable way. These requirements were difficult to meet with Intermountain's existing IT systems. In addition, external testing labs would return results as faxes scanned into the EMR or as PDFs, resulting in unstructured molecular data, incapable of being queried.

With its semantic data store, best-practice data specifications, and expressive semantic queries, Syapse Precision Medicine Platform℠ was ideally suited to be the central platform for capturing and interrogating the diverse range of data types involved in precision oncology. The Syapse Oncology℠ application captures structured molecular data reported by the ICG100 test, along with key elements of a patient's clinical history, such as tumor type, histology, and staging. When an oncologist receives MTB guidance, orders a drug, and subsequently captures patient outcomes such as performance status—all within Syapse Oncology℠—each new piece of

information is linked to the patient, building a chain of longitudinal, real-world evidence. This continually growing evidence base can be queried by clinicians and MTB members to view previous patients' treatments and outcomes, and by clinical leadership to understand effectiveness of molecular testing and targeted therapies.

Intermountain's Precision Oncology Improves Survival

By harnessing Syapse's ability to systematize precision medicine, Intermountain has been able to demonstrate substantial improvement in outcomes for patients with advanced cancer. In addition to streamlining the Intermountain Precision Genomics workflow, Syapse enabled Intermountain to query clinical, molecular, treatment, and outcomes data for quality improvement and outcomes research. Based on high-quality data assembled from the Syapse platform, Intermountain came to the conclusions below.

92% increase in progression-free survival. The progression-free survival of patients in the precision oncology program was 23 weeks, compared to 12 weeks for those receiving standard chemotherapy.[2] (See Figure 1.)

No increase in total cost of care. The total cost of care per week was $3,204 for patients in the precision oncology program compared to $3,501 for those receiving conventional chemotherapy. In addition to the cost of molecular testing and drugs, this cost calculation included clinic visits, hospitalization and readmission due to adverse events, labs, imaging, and other ancillary costs.[2] (See Figure 2.)

5-fold increase in drug procurement rate. Intermountain was able to procure targeted therapies for 155 of 188 patients with an actionable mutation—an 82% procurement rate compared to the ~15% reported as an industry average.[3] (See Figure 3.)

4-fold increase in MTB throughput. Using Syapse Oncology℠ to streamline MTB case review enabled the Intermountain MTB to increase its throughput from 7 to 29 cases reviewed per month.

Intermountain submitted the above findings on progression-free survival, total cost of care, and drug procurement rate to the American Society of Clinical Oncology 2015 annual meeting, where they were published as abstracts.[2,3]
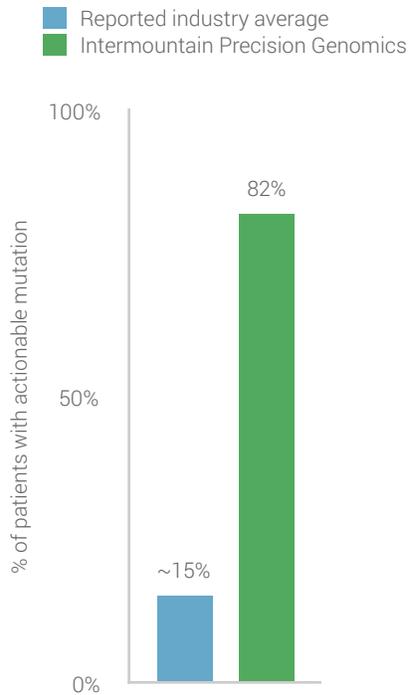

Figure 3. Intermountain was able to successfully procure targeted therapies for 82% of patients with an actionable mutation, compared to the 10–20% of patients with an actionable mutation who are given a drug or enrolled in a trial.[3]

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[2] Nadauld et al. Precision medicine to improve survival without increasing costs in advanced cancer patients. *J Clin Oncol* 33, 2015 (suppl; abstr e17641). http://meetinglibrary.asco.org/content/152750-156

[3] Nadauld et al. Implementation of a precision cancer program in an integrated health care system. *J Clin Oncol* 33, 2015 (suppl; abstr e17647). http://meetinglibrary.asco.org/content/152375-156

Implementing Precision Medicine: Lessons Learned

Syapse and Intermountain Healthcare worked closely throughout the project, from software deployment to assembling data for outcomes research. Below are key takeaways from the partnership with Syapse, identified by the Intermountain Precision Genomics leadership.

Syapse makes precision medicine part of patient care. "Syapse has really enabled our efforts to clinically implement genomic medicine," says Lincoln Nadauld, MD, PhD (Medical Director, Precision Genomics). "Using clinical cancer genomics to guide treatment for patients has identified treatment options and given hope to patients that didn't have treatment options and didn't have hope. It's given physicians confidence when they didn't have confidence about next steps. All of that is enabled by the Syapse system."

> "Now I can extend my program beyond the Intermountain walls…to the region and the nation because of Syapse."
>
> *Jason Gillman, MSPH*
> *Director, Precision Genomics*

Precision medicine offers great potential to cancer patients. "The results of our initial research are very promising," says Dr. Nadauld. "We anticipate making precision oncology standard for all cancer patients, not just advanced cancer patients, and Syapse will help us extend and scale our service."

Syapse expands Intermountain's reach and affiliate network. "Everything that we're able to do grows from our ability to work through Syapse," says Jason Gillman, MSPH (Director, Precision Genomics). "I can extend my program beyond the Intermountain walls…to the region and the nation because of Syapse."

Syapse software is straightforward to deploy. "One thing that I was really worried about was the implementation of all the software that we would need," says Dr. Nadauld. "I have to say that ended up being very easy because of the team at Syapse."

syapse

Transforming patient care through precision medicine.

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