Building a Personalized Medicine Program

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As a non-university research program based in Seattle, Wash., the Swedish Cancer Institute (SCI) has a long history of providing the nurturing care of a community-based hospital while giving patients access to the latest cancer therapies. In 2013 we took on the question of how to integrate personalized, genomic medicine into our program.

Getting Started

Personalized medicine has a dual meaning at SCI. First, it means using genetic and molecular information from patients or their tumors to pinpoint the genetic alterations that cause cancerous cells—and then using targeted therapies, when applicable, to disarm them. Second, it means providing holistic, supportive care for each patient's unique psychological, social, and spiritual needs (see Figure 1, page 24).

Our challenge was to decide to what extent to adopt personalized approaches at a time when many key questions—from which genes to sequence to how to secure reimbursement from third-party payers—remain. A nine-month strategic planning process led to the conclusion that personalized medicine was essential to SCI's vision. Our planning team included more than 100 providers and staff. Some made thoughtful arguments that we should proceed slowly until personalized medicine was more established, while others advocated for making a substantial commitment to personalized medicine now.

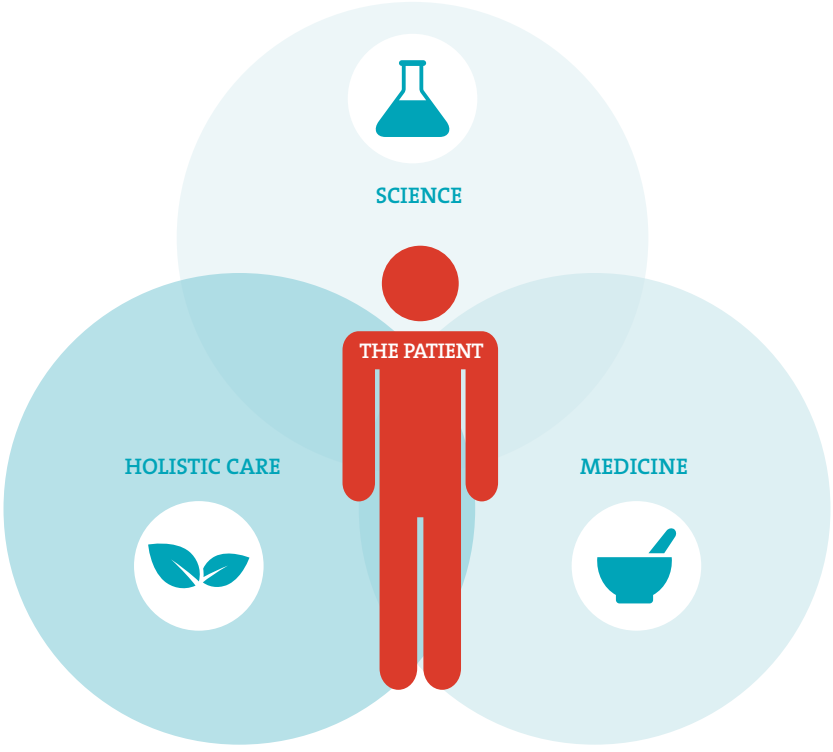
Our final decision was driven by a core belief that perfection should not be the enemy of progress. SCI feels a responsibility not only to improve our patients' access to advanced care, but also to contribute to research that makes care fundamentally better across the U.S. and abroad. With that in mind, our team decided to create a Personalized Medicine Program and make it a cornerstone of SCI.

Developing a Gene Alteration Panel

One key clinical challenge was deciding how to conduct genomic sequencing to pinpoint the alterations and/or mutations that help a particular tumor grow. While several commercial gene alteration panels are available—including a number of labs that conduct sequencing and analysis—we elected to create our own panel in partnership with our exclusive anatomic pathology partner, CellNetix Pathology and Laboratories. Our goal was to develop a next generation sequencing (NGS) panel that is targeted and highly actionable, and one that would enable our team to select the most promising therapies for an individual patient.

In collaboration with our pathology partner, we recruited Anna Berry, MD, then head of molecular pathology at the University of California-San Francisco Medical Center, to our team. With input from SCI clinicians, she and Danbin Xu, MD, PhD, developed an initial, 68-gene panel that sequences the genes most relevant to known cancer treatments. The pathology partnership

Figure 1. SCI Care Model



enables us to quickly expand the panel when new alterations and treatments are discovered. We are currently working on the panel's next iteration, which will include more than 160 gene alterations, a hematologic gene fusion panel, and a gene copy number. In the future, we anticipate including RNA sequencing, proteomics, etc.

The partnership also lets our physicians work hand-in-hand with pathologists to optimize specimen collection, evaluate test results, confirm diagnoses, and identify the most promising treatments and clinical trials for each patient; collaboration that would be much more difficult if we outsourced the testing to a larger commercial lab.

To make the panel results easy for providers to understand and use, we created a new, electronic report. The report:

- Details findings on each available gene
- Explains which alterations are present in a patient's tumor
- Indicates which drugs might be effective against those alterations
- Includes hyperlinks to literature that provides context for the findings
- Provides links to clinical trials that might be viable options for the patient. (As of July 2014, SCI was participating in 76 clinical trials of new cancer therapies, including 50 personalized therapy trials.)

Creating a Research Protocol

As SCI prepared to start offering the panel to patients in 2014, we realized that the line between personalized treatment and research remains blurry. Treatments aimed at particular gene alterations often involve investigational agents or off-label usage of medications. For that reason, we ask all patients in our Personalized Medicine Program to consider enrolling in an IRB-approved registration protocol. This research protocol allows for the collection, organization, and analysis of molecular phenotypic data in the context of the patient's medical history, laboratory, anatomic pathology, and radiology data. To reach the most diverse population possible, we translate the consent form into multiple languages commonly spoken in our region, including Spanish, Chinese (Cantonese and Mandarin), Korean, Russian, and Vietnamese.

SCI has taken the approach of offering the NGS panel to patients when they arrive at SCI for care. We do not reserve its use for those patients who have failed first- or second-line therapies, which is currently a common practice. Our goal is to identify unexpected alterations that may impact treatment decisions from the start and avoid selecting therapies which may have little benefit to the patient.

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Data Mining to Improve Personalized Medicine

Patients who enroll in the protocol give SCI permission to collect key information, including:

- Type of cancer
- Molecular testing results
- Laboratory, pathology, and imaging studies
- A detailed personal medical history.

Over time, our team will gather details about how the patient's tumor was treated at SCI and whether that treatment was effective.

The database, which SCI is building in partnership with Syapse, enables the use of large-scale genomic and clinical data to support the whole patient over the arc of his or her treatment experience, including prevention, diagnosis, and well-being (survivorship). This precision medicine data platform (www.syapse.com) integrates with SCI's enterprise electronic health record (EHR) and allows the treatment team to mine patient data and research results to identify which treatments work best for tumors with particular gene alterations.

The database will ultimately include profiles of thousands of individual tumors, making it one of the largest databases of its kind. We will review each study participant's data every year and inform physicians and/or participants when we learn of commercially-available therapies or clinical trials that could benefit them.

Approximately 5,000 newly-diagnosed patients enter the SCI network each year and we hope to enroll 9,000 patients in the study by the end of 2017. The ultimate goal is to routinely publish results from this database, and help physicians and researchers across the globe find better ways to diagnose, treat, and stop cancer.

Making Cancer Treatment More Cost-Effective

SCI launched its Personalized Medicine Program and started offering the panel to a subset of patients in April 2014, based on medical necessity. One of the main challenges we have faced relates to reimbursement for the panel.

Next generation sequencing is progressing so quickly that it is difficult for third-party payers to keep up with the latest advances. This leaves the reimbursement criteria in flux and makes it hard to know when payers will reimburse for the panel, or how much they will pay. Fortunately, there are signs that the payment landscape will stabilize in the relatively near future.

For example, the Centers for Medicare & Medicaid Services (CMS) is working with Palmetto Health to define a unique code for each company's molecular tests, including the one offered by CellNetix. This will give third-party payers a specific description of our assay and make the reimbursement decision process more straightforward.

New challenges will surely arise, and we believe we can overcome them by being flexible and finding innovative solutions.

For instance, SCI will partner with the Hutchinson Institute for Cancer Outcomes Research (HICOR) to evaluate the health outcome impacts and cost effectiveness of NGS and our Personalized Medicine Program; that is, to evaluate the value proposition of this program. This evaluation reflects the idea that genomic medicine will enable our clinicians to know which therapies work best for particular tumors and particular patients. Helping physicians and patients avoid therapies that are costly but ineffective illustrates how genomic testing, while expensive, can ultimately help control costs.

Expanding our Social Work Team

SCI's strategic planning process underscored our core value that psychosocial services and supportive care are integral to cancer care and personalized medicine. This reflects the reality that cancer is more than a medical crisis—it's a personal crisis that affects all aspects of a patient's life.

SCI started one of the nation's first supportive care services programs in 2003 with a range of services to include:

- Outpatient palliative care and symptom management
- Genetic counseling
- Survivorship services
- Psychological counseling

- Naturopathic care
- Social services
- Nutritional counseling
- Touch therapies
- Art therapy
- Music therapy.

Some of these supportive care services are also available to patients' families and caregivers. For instance, family members can receive counseling to help them cope with a loved one's diagnosis and to help them support the patient throughout treatment and beyond.

SCI's social work team, led by Sandra Johnson, MSW, LICSW, is the linchpin of our supportive care program. Our social workers assess patients, direct them toward the services they need, and deliver everything from emotional support to financial counseling (see box on right). Unfortunately, our patients' needs for social work services have traditionally exceeded our team's capacity. Our team's budget, and therefore its size, has been limited by the fact that social work is not reimbursed by payers and does not generate direct revenue.

As SCI designed its Personalized Medicine Program, we set the goal of making a social worker available to every patient. We expanded our social work budget and now plan to add 10 social workers to our team—which currently includes 11 full-time social workers—over the next two years. This staffing increase will enable us to embed a social worker in each of our clinics, ensuring patients easy access to social work services, whether it's for a quick check-in or a weekly counseling session.

Future Challenges

Within three years, SCI anticipates that our Personalized Medicine Program will begin accruing approximately 5,000 patients a year. Taking a personalized, genomic approach to these patients will necessitate a shift in the way we think about their tumors and their treatment. Instead of approaching patients based on which organ their cancer originated in, physicians will base their approach on the individual genetic and molecular characteristics of the patients and their cancers.

SCI has learned first-hand that this transistion can be difficult for physicians, who are often not familiar with the detailed molecular pathways that drive oncogenesis, or with thinking about cancer in terms of its molecular mechanisms. To overcome this challenge, we are actively involving molecular pathologists, genetic counselors, and pharmacists to collaborate with our physicians in understanding the molecular changes at hand, and the agents meant to target these changes. For instance, we have created a "molecular tumor board;" a multidisciplinary group of expert clinicians that review patients' NGS results and help physicians decide on the best course of action. The recommendations are then relayed to the primary cancer provider for discussion with the patient.

Taking on this and other challenges will help SCI chart a path toward personalized treatment and find solutions that help all cancer centers make treatment fundamentally better, improve outcomes and quality of life, and deliver extraordinary care. OI

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References

1. Ramsey S, Blough D, Kirchhoff A, Kreizenbeck K, et al. Washington State cancer patients found to be at greater risk for bankruptcy than people without a cancer diagnosis. *Health Affairs*. 2013;32(6): 1143-1152.

Helping Patients Overcome Financial Challenges

Financial stress is one of cancer care's most common—yet least discussed—challenges. Those diagnosed with cancer are more than twice as likely to experience bankruptcy as compared to those who do not suffer from the disease.[1] SCI's supportive care program offers financial counseling to our patients to help them absorb and manage cancer's financial demands.

In our experience, the top three sources of patients' financial stress are lack of insurance, lack of financial resources, and loss of work hours or employment. When patients' distress screens indicate that they are under financial stress, one of our social workers meets with them to discuss their financial challenges and any other stresses they may face.

Our social workers, who often work together with a staff financial advocate, help patients find insurance and develop strategies for overcoming financial problems. Sometimes this means finding ways to help them afford transportation costs related to their treatment. It could mean connecting patients with financial assistance from the Swedish Medical Center Foundation so they can afford co-pays for pharmaceuticals. Or it may mean helping them enroll in programs that deliver income while the patient is out of work.

This helps SCI minimize the financial cost of uncompensated care. More importantly, it helps reduce patients' financial stress so they can focus on treatment and getting better.