Giving pediatric cancer patients hope for the future

Neuroblastoma and Medulloblastoma Translational Research Consortium transforms patient outcomes with precision medicine and help from partners like Dell.

“We’ve gone from treating every child exactly the same way to being able to develop individualized therapies. We’re now able to stop the progression of cancer in 60 percent of our patients, and today some are cancer-free.”

Dr. Giselle Sholler, Chair of the NMTRC and Director of the Pediatric Oncology Research Program at Helen DeVos Children’s Hospital

Customer profile

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Business need

Physicians wanted to improve outcomes for patients battling diseases including neuroblastoma and medulloblastoma, but this required the development of new treatments.

Solution

A team of oncologists, pediatricians, geneticists and patient families established the Neuroblastoma and Medulloblastoma Translational Research Consortium (NMTRC) to treat patients using precision medicine.

Benefits

- Achieves remission in patients previously deemed incurable
- Improves long-term health outcomes for cancer survivors
- Increases scientific understanding of cancer and genes
- Gathers big data that can facilitate medical breakthroughs
- Shows organizations how to implement precision medicine

Solutions at a glance

- Big Data
- High-Performance Computing
Every year, thousands of children are diagnosed with cancer. Organizations such as the Neuroblastoma and Medulloblastoma Translational Research Consortium (NMTRC) are working to improve outcomes for these children. Their efforts have led to the creation of more effective, personalized treatments developed using insights from each child’s genome. To help more patients benefit from precision medicine, these organizations need funding, FDA approvals and high-performance IT.

The NMTRC is a collaborative organization that includes 25 universities and children’s hospitals working to develop innovative clinical trials to treat neuroblastoma and medulloblastoma — cancers that typically strike children under the age of 6. Explaining how the NMTRC was established, Dr. Giselle Sholler, chair of the NMTRC and director of the Pediatric Oncology Research Program at Helen DeVos Children’s Hospital, says, “My first patient was a 5-year-old boy, Tyler, with neuroblastoma. After six months of chemotherapy, we knew he was going to die. His mother asked me to speak to his 9- and 13-year-old brothers and explain what was happening to Tyler. Here were two adorable little boys wanting to know why we couldn’t make their brother better and that was when I decided I needed to come up with different treatment options.”

Serendipitous connections helped establish the NMTRC
After extensive research, Dr. Sholler learned about a promising new drug that inhibited the growth of neuroblastoma cells. She presented her findings at a conference, and three parents contacted her right away. “All three had children who had relapsed from neuroblastoma, and they asked if they could get this new drug for their children.”

Dr. Sholler wanted to help but could not treat the children with the new medication without first obtaining FDA approval. Because the children were dying, the FDA granted an exception known as a “compassionate use Investigational New Drug” (IND) approval. Dr. Sholler treated two of the children but then the FDA said she could not continue treating more patients under compassionate use. Moving forward required starting a Phase I clinical trial and significant funding. “The families who had initially approached me at the conference called and donated the money to make the first Phase I trial.
“With the support we’ve received from patient families and organizations like TGen and Dell, we’ve been able to go beyond helping just a handful of kids with neuroblastoma to helping kids internationally who are suffering from all kinds of pediatric cancers.”

**Dr. Giselle Sholler, Chair of the NMTRC and Director of the Pediatric Oncology Research Program at Helen DeVos Children’s Hospital**

happen,” explains Dr. Sholler. “That was really the conception of the NMTRC.”

**Recognizing the need for precision medicine**

At about the same time, Dr. Jeffrey M. Trent, president and research director of the Translational Genomics Research Institute (TGen), joined the NMTRC. TGen geneticists and NMTRC oncologists began collaborating to identify connections between certain genes and cancer outcomes. “We were giving our neuroblastoma patients the same chemotherapy, surgery and radiation,” says Dr. Sholler. “But in studying the tumors of patients with the same kind of cancer, we identified differences in patients’ tumor cells. That told us that we shouldn’t treat all of our patients the same way. Instead of blindly treating patients using the same processes, we wanted to be able to rationally understand and treat each of our patients in a way that would give them the best outcome.”

**Obtaining the high-performance computing required for precision medicine**

To develop customized treatments fast enough to help patients with very limited intervention time frames, the NMTRC needed a high-performance computing (HPC) platform that could rapidly sequence genomes and make sense of disparate big data. “One day, Dr. Trent told me that Dell was interested in helping to treat pediatric cancers, and he thought that our program would be a perfect fit,” Dr. Sholler explains. “I can’t tell you how excited I was. We met with some Dell representatives. They asked if we could take similar steps to help with other incurable pediatric cancers. We said, ‘With your help we can.’” Dell has since worked closely with the NMTRC, helping TGen build an HPC cluster with Dell servers, storage and networking equipment.

**Gaining FDA approval for using RNA sequencing in a clinical trial**

Before the NMTRC could develop and use custom treatments on patients, the FDA had to approve the entire process. This involved finding a genomic lab that complied with the Clinical Laboratory Improvement Amendments (CLIA) and obtaining an FDA Investigational Device Exemption (IDE) to analyze patients’ genomes using RNA sequencing.

TGen’s lab was already CLIA-certified, so NMTRC hospitals would use it to analyze patients’ tissue samples. To obtain the IDE, TGen and the NMTRC had to demonstrate the reproducibility and benefits of RNA sequencing. Dr. Sholler says, “The IDE approval process was so challenging, ethically, because I could see what I’d do differently to help the patients, but I couldn’t modify treatments yet.” Ultimately, the NMTRC obtained the IDE. However, the NMTRC could use RNA sequencing to develop custom treatments only for pediatric patients deemed incurable after undergoing traditional therapies.

**Accelerating insight and collaboration by days**

Today, when a pediatric patient comes to a participating NMTRC hospital for treatment, a surgeon biopsies the child’s tumor and ships the tissue overnight to TGen for genetic sequencing. TGen stores the data on its Dell cluster, but it also sends the data back to a Dell cluster at the Helen DeVos Children’s Hospital using a third-party data transfer tool. There, the NMTRC team analyzes the data and creates a custom treatment plan.

To help expedite analysis and data sharing, Dell recently worked with TGen to update its HPC cluster and network. “We’ve seen huge advancements over the past two years in data transfer times using the Dell cluster at TGen,” Dr. Sholler explains. “We used to ship hard drives between our team members to share information. Now we can send data electronically within a couple of hours.”

**Achieving remission in some patients previously deemed incurable**

To date, the NMTRC has treated 70
patients. “Over the last five years, we’ve gone from treating every child exactly the same way to being able to develop individualized therapies,” says Dr. Sholler. “We’re now able to stop the progression of cancer in 60 percent of our patients, and today some are cancer-free.”

These more effective, customized treatments sometimes include creative applications of existing medications. Dr. Sholler explains, “We learned that a drug used for treating Parkinson’s patients inhibits tumor growth in neuroblastoma and medulloblastoma in the lab models. We applied to the manufacturer, Valeant Pharmaceuticals, for a grant to conduct a Phase I clinical trial using the drug and it was approved, so we’ll be moving forward with that.”

Helping pediatric cancer survivors enjoy a full life
By using precision medicine, the NMTRC is also helping children who survive cancer to lead longer, healthier lives. “Our work with TGen and Dell is helping us identify which medications a patient absolutely needs and which ones they don’t, which is important to improve the long-term health outcomes of pediatric cancer survivors,” says Dr. Sholler. “That’s because some of the treatments we use cause heart failure, kidney issues and cognitive issues. If we don’t have to use all of the medications that we’ve used in the past, that’s a good thing.”

Giving more children hope for the future
The NMTRC has recently received approval to begin a study that may enable it to someday, begin treating patients immediately after diagnosis. The organization also hopes that in the future, it can obtain tumor data from blood tests to minimize biopsies and view how a tumor is evolving with treatments via computer-generated animation. The NMTRC would also like to see a shared data warehouse established for research. “We know that the Dell Cloud Clinical Archive is HIPAA-compliant and secured, so it’s a solution that we’d like more hospitals to use. We have not compared our genomic data with other groups yet, but I think that data sharing will be critical for us to learn more.

“With the support we’ve received from patient families and organizations like TGen and Dell, we’ve been able to go beyond helping just a handful of kids with neuroblastoma to helping kids internationally who are suffering from all kinds of pediatric cancers. We never would have been able to get to the point where we are today without Dell. We have what we need to improve outcomes for more patients. Moving forward will be like putting the puzzle together — but at least today, we have all the pieces we need.”

Dr. Giselle Sholler, Chair of the NMTRC and Director of the Pediatric Oncology Research Program at Helen DeVos Children’s Hospital