Expanding Our Reach

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How our neuro-oncology team provides next-generation cancer care

Multidisciplinary teams are rapidly becoming the optimal way to manage the care of cancer patients.[1-3] So, how did the Center for Cancer Prevention and Treatment at St. Joseph Hospital, Orange, Calif., take its neuro-oncology program to the next level? We leveraged existing resources to develop a joint partnership with our sister hospital, St. Jude Medical Center, Fullerton, Calif. With strategic planning and support from the hospitals' administration, the two hospitals came together to establish a vibrant next generation neuro-oncology team. Specifically, the two hospitals combined their cancer conferences and used video technology to facilitate and improve provider collaboration between institutions. Several challenges and many encouraging successes marked our journey. Today, our working model evaluates and addresses current needs while allowing room for additional program growth, having a positive impact on the lives of patients and increasing engagement of physicians within our local community. Here's how we did it.

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The Team Comes Together

For more than 80 years, St. Joseph Hospital has been one of the largest community hospitals serving Orange County. Currently the hospital has 463 beds, an inpatient oncology unit, and an outpatient cancer center that offers access to the latest in prevention, diagnosis, treatment, and clinical trials. The cancer program at St. Joseph Hospital is accredited by the American College of Surgeons, Commission on Cancer, and has a robust oncology research team housed in the Center for Cancer Prevention and Treatment. St. Joseph Hospital is one of 15 hospitals, or ministries, within the St. Joseph Health System. Our closest sister hospital is St. Jude Medical Center, a 320-bed facility located 12 miles away.

The Center for Cancer Prevention and Treatment has nine disease-site cancer programs, one of which is the neuro-oncology program. The neuro-oncology program was established in 2010, under the leadership of Lars Anker, MD, program director, and Lawrence D. Wagman, MD, FACS, executive medical director. Since its inception, the neuro-oncology program has met monthly for cancer conference, as well as to discuss administrative and programmatic strategies. The goal of the program is to provide every neuro-oncology patient access to multidisciplinary care, clinical trials, and treatment tailored to their specific needs.

In 2014 St. Joseph Health administration encouraged greater collaboration among the 15 hospitals that make up the St. Joseph Health network of care. The overall goal of these collaborative efforts was to keep our community's patients in network by providing greater access to care, including cancer services and novel treatments, leading to patient retention. In this way, the health system can serve the healthcare needs of a much larger number of patients. The creation of the joint St. Joseph Hospital and St. Jude Medical Center neuro-oncology program was in response to this directive. It was a win–win collaboration because some providers were already familiar with both hospitals. For example, several of our St. Joseph Hospital neurosurgeons were regularly performing surgery at both hospitals. Additionally, the radiation oncologists at both sites belong to the same medical group.

A Combined Cancer Conference

In 2014 St. Joseph Hospital and St. Jude Medical Center had their first combined neuro-oncology cancer conference and program meeting. This monthly meeting is unique because physicians and staff members come together for a lively and interactive conference using audio-visual technology. A 2013 survey by Bold and colleagues found similar success when a university partnered with community-based cancer providers using virtual tumor boards.[4] Researchers showed that the physicians found the virtual tumor boards beneficial in the treatment decisions and management of their patients.[4] In our model, each hospital maintains its own radiologist and pathologist at each conference and prepares for its own patient cases accordingly. Physicians, nurses, and ancillary staff attend at their hospital or whichever site is most convenient on the meeting day. Each hospital purchased audio-visual equipment for high-resolution video conferencing, allowing radiology films and pathology slides to be viewed with the same clarity at both institutions.

Preparation for the joint neuro-oncology cancer conference entails a fair share of planning and collaboration each month compared to our other disease-site conferences. The neuro-oncology team leaders meet a few days before the conference, either in person or via conference call. This team consists of the program director, nurse navigators, and research department staff from both hospitals.

At the pre-conference meeting, potential and current neuro-oncology patients are discussed in light of treatment, changes in condition, and relationship to research studies or as potential research candidates. The team also discusses programmatic and administrative issues. Based on nominations from participating physicians, a case list is finalized, and each hospital is afforded equal opportunity to present cases. Importantly, once a finalized case list is generated each month, each facility's Radiology and Pathology Department is given the opportunity to prepare slides and images as needed for the conference.

An audio-visual pre-conference check is completed the day before to ensure the equipment is in good working order. If there are any difficulties, hospital information technology (IT) departments are available to make adjustments. Though not identical, the equipment at each facility is compatible and allows for a quality conference and discussion. St. Joseph Hospital has two large viewing screens, one to display the pathology and radiology images and one to see the conference room at St. Jude Medical Center. St. Jude Medical Center has one very large screen to view pathology and radiology images with a smaller view of the conference room at St. Joseph Hospital. The ability to visualize is a key element and has been previously reported as a challenge to overcome for efficient case review in neuro-oncology.[4] Our meetings are enhanced by the opportunity to see the images being discussed in detail, as well as by being able to see who is speaking, allowing everyone to feel more connected.

A full neuro-oncology cancer conference is held each month with an average of six patient cases presented (Table 1, right). After the cancer conference, a short program meeting is held to review (Table 2, page 39):

- The latest news about the program
- Updates to National Comprehensive Cancer Network (NCCN) guidelines
- Available and upcoming clinical trials
- Patient recruitment, accrual, and retention data
- Other research updates necessitating team review.

Members of the Next Generation Neuro-Oncology Team

The neuro-oncology team includes multidisciplinary members from both hospitals and all staff are invited to attend. Brain tumors are highly complex neoplasms, and prior research has noted the importance of gathering expertise from several staff members involved in neuro-oncology patient care.[5,6] To understand the complexity of this disease, strong cooperation by all individuals on the team is necessary to provide meaningful therapeutic care for patients using both a multidisciplinary and interdisciplinary approach to care.[7] From diagnosis to pathology and treatment decisions in primary and recurrent central nervous system (CNS) neoplasms, it is the patients who benefit from a harmonized approach by their care team.

At most meetings, there is adequate representation from neurosurgery, medical oncology, radiation oncology, radiology, and pathology. Nurse navigators, clinical researchers, and a geneticist are also present. Ancillary staff and physician support are also available as their schedules allow. For relevant cases, invitations are made to specialty physicians and other support staff directly involved with the cases being presented. Figure 1, right, shows the variety of staff members that enrich our monthly case discussions.

Overcoming Logistical Challenges

The idea of a joint neuro-oncology program and all its potential benefits was not without challenges. Alongside funding and collaboration issues, the largest hurdles were logistics and physician buy-in.

Logistics were a hurdle; however, the challenge proved not to be as large as anticipated. Our physicians expressed concern about space availability, equipment options, and compatibility between sites. Asking questions and directing these questions to knowledgeable staff helped overcome this challenge. Dr. Lars Anker, neuro-oncology program director, took the lead in asking these pivotal questions, but it was truly a roundtable team response from both hospitals through research, administration, navigation, and practitioners to get the answers needed. For example, we learned that St. Joseph Hospital already had audio-video equipment in an obscure boardroom used only by administration on the other side of the campus, which was easily accessible and already linked to a conference room at St. Jude Medical Center. Thus, video conferences could commence in a relatively short time, eliminating the need to purchase new equipment and retrofit rooms. To meet our evolving needs, funding was sourced from the Neuro-Oncology Department and additional funds were supported by St. Joseph Hospital's The Center for Cancer Prevention and Treatment administrative funds dedicated to programmatic development. These funds helped to upgrade equipment, purchase microphones, and outfit conference rooms. Currently, mild logistical challenges remain and still require constant vigilance as the IT world is in a constant state of change and improvement.

Coordination between sites can be a challenge. Scheduling times that work for physicians and staff at two busy hospitals is not an easy task. However, overall, the collaboration between the two sites proved more fruitful than first anticipated.

Obtaining Buy-In

Another big challenge was gaining physician and staff buy-in. Identifying a common goal for St. Jude Medical Center and St. Joseph Hospital was important because each hospital had its own priorities, ideas, and resources. The 2014 St. Joseph Health directive included both St. Jude Medical Center and St. Joseph Hospital as part of the health system's efforts to establish a closer working relationship among hospitals. Both sites received acknowledgement by working together—not only for the benefit of our patients but for the benefit of the entire health system. Positive outcomes were shared with physicians at both sites and then again at multiple levels, including the health system central administrative structure. In 2014 St. Jude Medical Center did not have an established neuro-oncology program, whereas St. Joseph Hospital had a working model with room to grow. The opportunity for patients to benefit was also heavily promoted. Most physicians hear from patients that they want their cases presented at a cancer conference. Patients want physicians from all disciplines to weigh in on their cancer treatment. In a survey of 1,421 urologic cancer patients, there was an increase in physician teamwork and ability to reach patient treatment decisions when cases were

Table 1. Neuro-Oncology Cancer Conference Case Review Process

1	History: Medical Oncologist or Specialist
2	Imaging: Radiologist
3	Main Findings: Pathologist
4	Clinical and Pathology Staging: Medical Oncologist and Pathologist
5	NCCN Guidelines: Team review as needed
6	Treatment Plans: Team review as needed
7	Clinical Trials: Team review of applicable studies
8	Cancer Genetics: Insights on current perspective and request for referrals
9	Rehabilitation: Insights are considered as needed
10	Family support and psycho-social needs assessment

Figure 1. Members of the Next Gen Cancer Care Team

presented at multidisciplinary tumor boards.[1] The addition of St. Jude Medical Center to our neuro-oncology program nearly doubled the physician input to these patient cases.

The idea of patient retention also resonated with physicians. At St. Joseph Hospital, physicians sign conditions of participation within each program. The neuro-oncology program is no different. Physicians get referrals within the program, but they must meet requirements that include participation at cancer conferences.

Thankfully, administration at both hospitals fully backed the joint program, and medical directors (Dr. Lawrence Wagman, St. Joseph Hospital and Dr. David Park, St. Jude Medical Center) encouraged physician participation. Administrative support is an important motivator behind any big change and because the St. Joseph Health directive was implemented by system leadership, it encouraged local hospital leaders to endorse the program.

Another administrative boost was a change in the HMO structure within the St. Joseph Health Network (which included St. Jude Medical Center and St. Joseph Hospital as well as others within the entire Orange County and High Desert region). This regional HMO approach allowed for greater patient access to any ministry hospital within the region, allowing our physicians to refer patients to other hospitals within the St. Joseph Health System and broadening our network of care. This change also made for a more seamless transition for patients. Finally, there is also an agreement between physicians that patients are not lost to the referred site after treatment is complete. Physicians encourage patients to return to their original doctor after care is complete and when appropriate.

The increase in patient referrals allowed for an increase in patient access to local community-based clinical trials offered at the two hospitals. Along with increased patient benefits, these changes increased access to research studies for local oncologists and radiation oncologists, who could now participate as principal investigators on clinical trials. Access to trials has been measured in a telemedicine survey, which found that community physicians were increasingly familiar with research studies as a direct result of their participation in virtual multidisciplinary case conferences.[4] Because most physician offices are not equipped to handle the workflow of clinical studies, integration with our research team is critical to successful patient recruitment, enrollment, and retention.

The Research Department's regulatory team manages Internal Review Board approvals, protocols, and documentation updates in an efficient and streamlined fashion. Admittedly, a significant challenge on the regulatory side is addressing the lengthy timeline for approval of complex trials. The Research Department currently works approximately six months in advance from point of identifying a study of interest to actual site initiation, allowing studies to open for patient accrual. The department also works within the larger health system to integrate services and join various startup tasks, such as Internal Review Board approval, regulatory documents, and budget and other clinical trial agreements.

The Successes and Benefits of a Joint Program

The joint neuro-oncology program has enjoyed many successes during the last four years. Monthly multidisciplinary attendance has increased to an average of 21 participants, up from 12 participants in 2013. In 2015 the joint neuro-oncology program had 93 analytic cases for brain and other CNS cancers. Throughout 2016, a total of 68 cases were presented in the neuro-oncology program's monthly cancer conference. Compared to analytic case numbers in 2013, the joint program has grown by 56 percent with regard to the number of brain and CNS case evaluations.

At St. Joseph Hospital alone, our overall analytic cases since the start of the neuro-oncology program in 2010 are sufficient to support clinical trials. Since program inception, the Center for Cancer Prevention and Treatment has maintained an annual average of 1,606 analytic cases between 2010 to 2016, with some fluctuation in case load of approximately 0.2 percent to 6 percent from year to year. Enrollment accrual to clinical trials during this same time period averages 24.8 percent or 65 patient consents across all oncology research studies.

By partnering with other hospitals in our health system, we have been able to cast a wider net and offer trials to more patients. We screen more people, obtain second opinions quickly, and have greater access to clinical trials at various sites. In fact, our first two successful studies conducted together with a satellite site were both neuro-oncology trials, which also included communication across multiple disease-site programs (e.g., patients with lung cancer and brain metastases), which ensures that our team considers every possible patient for research. Additional details about our research efforts are described below.

Successful Clinical Trial Experiences

Clinical trial activities have increased substantially since development of the joint neuro-oncology program between St. Joseph Hospital and St. Jude Medical Center. Over the past several years, the Research Department at St. Joseph Hospital has facilitated strong participation in research, demonstrating that clinical trials for brain tumors can be successfully carried out at a comprehensive community cancer center. Patients have access to studies in partnership with National Cancer Institute cooperative groups, as well as industry-sponsored and investigator-initiated trials. By securing industry-sponsored neuro-oncology studies, we were fortunate to be selected as a site for 10 research studies since 2013. Table 3, right, lists the eight high-grade glioma treatment trials that the neuro-oncology program has accrued patients to from 2013 to 2015.

Across these eight trials, we evaluated 58 eligible patients with a diagnosis of high-grade glioma, who were discussed at the joint neuro-oncology cancer conferences and neuro-oncology program meetings. Between Jan. 2012 and Dec. 2015, 50 percent of individuals (n = 29 of 58 total) signed a consent as shown in Figure 2, right. This included 52 percent males (n = 15, mean age = 65 years) and 48 percent females (n = 14, mean age = 58 years). Notably, we had a 100 percent success rate in harvesting biospecimens from glioblastoma patients as required for their DCVax-L (Northwest Biotherapeutics studies 0202EA and 020211). By

Table 2. Neuro-Oncology Program Meeting	
1	Review of minutes
2	NCCN Guidelines updates
3	Clinical trial updates
4	Genetics updates
5	Marketing updates
6	Upcoming events
7	Special announcements

comparison, national statistics indicate that only 20 percent of adults with cancer qualify for a clinical trial and a small 3 to 5 percent agree to study participation.

In Figure 3a, page 40, we show that more than half of the 29 total research participants completed their study protocol, 14 percent received partial treatment, and 31 percent screen-failed during initial study phases. Nationally, the drop-out rate is higher, with nearly 30 percent of patients leaving a clinical trial, whereas our voluntary withdrawal rate was only 3 percent (n = 1 of 29). Focusing on the 19 patients who completed screening procedures and received at least one dose of study agent in Figure 3b, page 40, we concluded that 79 percent (n = 15 of 19) of participants completed their treatment and 21 percent received partial treatment of one or more doses of study drug.

The analysis of our clinical trial participation demonstrates a successful experience, facilitated by the collaborative efforts of our next-generation cancer care team across hospital sites. Through acquisition of complex neuro-oncology trials and high patient enrollment and retention, as well as effective study management, our patients are able to stay with their existing medical team and experience minimal financial and travel burden. We continue striving for personalized care, and our research efforts include site selection and participation in multicenter trials for patients with:

- Recurrent glioblastoma (Tocagen, Tg511-15-01)
- Brain metastases from non–small cell lung cancer (Novocure, Metis EF-25)
- Supportive care for cancer-related fatigue (Alliance, A221101)
- Targeted therapy based on tumor-specific gene sequencing when applicable (National Cancer Institute–Molecular Analysis for Therapy Choice and DART [Dual Anti–CTLA-4 and Anti–PD-1 Blockade in Rare Tumors]).

In the last several years, we have provided several glioma studies to our patient population from both hospitals. The joint neuro-oncology program has resulted in cost savings, improved research collaboration, and increased access to clinical trials made available to patients in the local community who otherwise would need to travel to academic institutions.

Figure 2. Comparative Consent Rates for Neuro-Oncology Research Trials

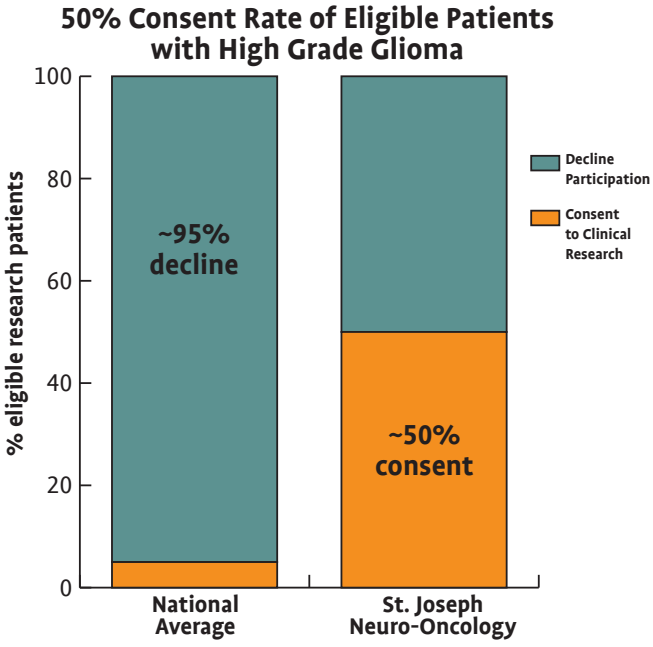


Table 3. St. Joseph Hospital's Treatment Trials for High-Grade Glioma, 2013-2015
Alliance A071102 Temozolomide +/- Veliparib for newly-diagnosed GBM
Alliance N1174 Bevacizumab +/- antiendoglin mAB TRC105 for recurrent GBM
NWBT 020221 DCVax®-L for newly-diagnosed GBM
NWBT 0202EA EAP for GBM with manufactured DCVax-L autologous dendritic cells
RTOG 0825 TMZ and RT +/- bevacizumab for newly-diagnosed GBM
RTOG 0837 TMZ and RT +/- cediranib maleate for newly-diagnosed GBM
RTOG 0913 Everolimus, TMZ, and RT for newly-diagnosed GBM
RTOG 1122 Bevacizumab +/- trebananib for recurrent GBM or gliosarcoma

Figure 3a. High Grade Glioma Patients in Clinical Trials

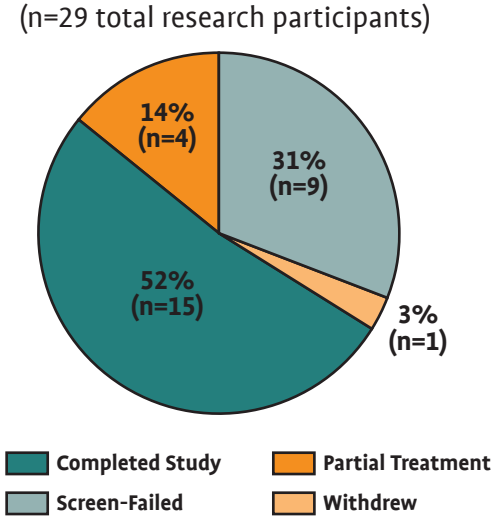
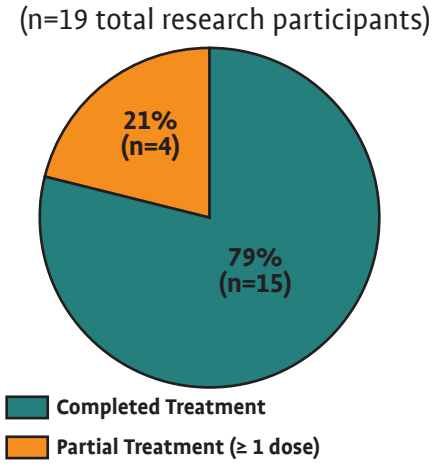


Figure 3b. 79% of Patients Completed a Clinical Trial



The pooling of resources has enhanced the neuro-oncology program by providing more cases to be discussed, greater professional learning, individualized care, and increased quality multidisciplinary discussion of cases in the local hospital setting.

Our Biospecimen Repository

To facilitate further research involvement, all neuro-oncology patients are asked to donate blood and/or tissue to the local tissue bank. The biospecimen program at St. Joseph Hospital was approved in 2011 for the accrual and storage of biological samples, which are obtained only after completion of standard-of-care procedures related to the patient's intervention, biopsy, surgery, or pathological analyses, as has been previously described.[8] Sample collections from patients with neoplasms of the CNS began in Apr. 2012 and, as of Sept. 30, 2017, we have a total of 58 cases, resulting from 1 or more donations by 54 unique neuro-oncology patients.

Demographically, the 58 cases represent 62 percent females (n = 36, mean SD = 59.1 ± 14.9 years, range = 23–83 years) and 38 percent males (n = 22, mean SD = 63.6 ± 14.8 years, range = 22–84 years). In total there are 82 biological specimens as shown in Table 4, right, composed of 56 percent tissue samples (n = 46 of 82 total) and 44 percent blood samples (n = 36 of 82 total). In 24 cases, we have a 41 percent concordance rate of blood and tissue from the same patient, 21 percent of cases have only blood, and 38 percent have only tissue available in the repository.

Sample collection over approximately six years shows a peak of nearly 30 samples during 2014 and variability in other years, according to data in Figure 4, right. In fact, some variability in repository acquisition is expected for neuro-oncology patients, where preservation of brain tissue is a key goal to enhance cognitive prognosis and quality of life. Therefore, variation in specimen availability likely indicates:

1. Improved surgical procedures for resection of diseased tissue and preservation of normal tissue.
2. Increased analytical procedures available for blood and tissue markers.
3. Optimized standard-of-care pathological testing paradigms.

Within this same time frame, patient enrollment in clinical trials also increased, and samples were often prioritized for use in clinical treatment trials per protocol specifications.

Table 5, page 42, shows the diagnostic breakdown of the 58 cases by primary disease or brain metastases.[9] From data in Table 5, the repository contains 67.2 percent of cases from primary CNS neoplasms, with the majority being glioblastoma multiforme (n = 15) and meningioma (n = 13). Importantly, 27.6 percent of cases are brain metastases, primarily from patients with breast cancer (n = 6) and a variety of other primary neoplasms. Notably, brain metastases are very common in breast cancer patients, and multidisciplinary team efforts played an important role in developing guidelines for earlier detection and treatment.[10] The World Health Organization (WHO) classification criteria for CNS samples in our biorepository are reviewed in Table 6, page 43, revealing that the majority of case samples in the biorepository are from patients classified as low WHO Grade I (20.7 percent or n = 12 cases) or high WHO Grade IV (29.3 percent or n = 17 cases).

Table 4. Biospecimen Sample Types

Biospecimen Sample Types	Total (n)	Percentage
Sample Type		
Blood	36	44%
Tissue	46	56%
Grand Total Samples	**82**	**100%**

Altogether, these data highlight the robust and ongoing opportunities available in our research program, with a broad range of demographic details available for each biospecimen sample. Interestingly, a 2010 study showed that younger and older adult patients with brain tumors have different needs to maintain a high quality of life,[11] such as maintaining independence and access to support programs and research. Our team evaluates a variety of patients who are interested in and willing to participate in research, providing one avenue for participation in research programs that allow patients to make their own informed decisions. We work together to ensure that opportunities are available and accessible to all patients in need.

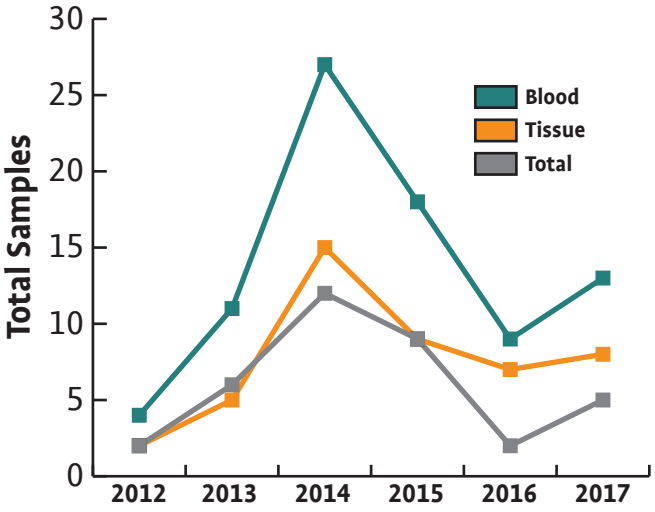
Looking Forward to Further Collaboration

The pooling of resources has enhanced the neuro-oncology program by providing more cases to be discussed, greater professional learning, individualized care, and increased quality multidisciplinary discussion of cases in the local hospital setting. Each hospital has exceptional surgical and radiological equipment available, and decisions are made during conference as to whether a surgical patient should have surgery at one hospital and, similarly, whether a patient should have a specific scan done at the other. Each hospital has specialized equipment that is available to patients based on what is best for them.

We seek out and initiate complex neuro-oncology clinical trials and have high patient enrollment and retention. Effective study management and reporting of quality data indicate our strong overall trial performance. By expanding our reach to evaluate more patients, we hope to continue to perform well and maintain high accrual rates. Our patients are retained and enroll locally with minimal financial and travel burden, maintaining personalized care from their existing medical team.

The neuro-oncology program collaborates not only in conferences but in other ways as well. Each hospital has its own nurse navigator who is responsible for patients at that location, with regular communication between the navigators about treatments and research studies. The nurse navigators work closely with each other and participate in community events, such as the Orange County Brain Tumor Walk hosted by the National Brain Tumor Society. In 2017 the joint St. Jude Medical Center and St. Joseph Hospital neuro-oncology program had a team of 80 walkers. Each nurse navigator took the lead at his or her own hospital to enlist walkers and support for the program.

Figure 4. Neuro-Oncology Biospecimen Sample Collections



Future neuro-oncology program goals will maintain the existing partnership while continuing to further develop. Specific future goals include:

- Expanding neuro-oncology conferences from once to twice a month
- Enhancing current technology to improve the audio-visual quality for the participants
- Inviting more hospitals within our health system to become involved and participate in joint programs.

Notably, through this pioneering journey at St. Joseph Hospital, other hospital programs have established relationships with St. Jude Medical Center physicians. There is potential to expand joint conferencing within other disease-site programs. Recently, St. Joseph Health joined the not-for-profit Catholic-affiliated Providence Health & Services healthcare system based in Renton, Wash., and created a new health system called Providence St. Joseph Health. This new organization will bring additional opportunities and increase our reach to other communities with patients and families in need of excellent care. We also anticipate an increase in patient retention. On the research side, the partnership allows evaluation of research metrics across multiple sites to identify areas of best practices and evaluate existing gaps. Upcoming opportunities with Providence St. Joseph Health are exciting, because we anticipate that our data and processes will now be a part of a larger overall health system that will benefit more people in the community. OI

Table 5. Diagnostic Characterization of Biospecimen Donors

Diagnostic Characterization	Total (n)	Percentage (of 58 total)
Primary CNS Malignancies		
Angiosarcoma	1	1.7%
Glioblastoma Multiforme	15	25.9%
Gliosarcoma	1	1.7%
Low Grade Glioma	2	3.4%
Meningeal Hemangiopericytoma	1	1.7%
Meningioma	13	22.4%
Pituitary Adenoma	3	5.2%
Spinal Schwannoma	2	3.4%
Undifferentiated Neoplasm	1	1.7%
Total Primary Cases	**39**	**67.2%**
Metastatic to CNS		
Breast	6	10.3%
Colorectal	1	1.7%
Choriocarcinoma	1	1.7%
Gall Bladder	1	1.7%
Gastric	1	1.7%
Lung	1	1.7%
Melanoma	1	1.7%
Renal Cell	1	1.7%
Other - metastatic	3	5.2%
Total Metastatic Cases	**16**	**27.6%**
Other		
Total Other Cases	**3**	**5.2%**

Joy Nakhla, RN, BSN, OCN, is a neuro-oncology nurse navigator; Viorela Pop, PhD, participated as clinical research associate; Lavinia Dobrea, RN, MS, OCN, is manager of the Oncology Research & Biospecimen program; Lawrence D. Wagman, MD, FACS, is a surgical oncologist and executive medical director; and Lars Anker, MD, is a neurosurgeon and program director of neuro-oncology at the Center for Cancer Prevention and Treatment at St. Joseph Hospital, Orange, Calif.

Table 6. Classification Criteria of All Cases

Diagnostic Characterization	Total (n)	Percentage (of 58 total)
CNS WHO Criteria		
WHO Grade I	12	20.7%
WHO Grade II	4	6.9%
WHO Grade III	0	0.0%
WHO Grade IV	17	29.3%
Total with WHO Criteria	**33**	**56.9%**
WHO Criteria Not Applicable		
Brain Metastases	16	27.6%
Pituitary Adenoma	3	5.2%
Spinal Schwannoma	2	3.4%
Other (benign or necrosis only)	4	6.9%
Total Not Applicable	**25**	**43.1%**
Grand Total	58	100.0

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Key Takeaways

For cancer programs looking to develop a similar neuro-oncology program or other joint program, the authors offer these key takeaways:

1. Do not be discouraged. It may take time and you may encounter roadblocks, but it is a manageable task. Start by asking questions. You may be surprised to find some of the infrastructure already in place in your hospital. The next generation of cancer care starts by using technology and thinking "outside the box." If you are excited about doing something with technology, chances are that you are not alone.
2. Be diplomatic to get other physicians on board with the idea. Remind the physicians that they are working toward a common goal. Exceptional patient care is not provided alone. Encourage working together. There is strength in numbers, and those numbers speak loudly in relation to clinical research trial contracts and patient revenue.
3. Focus on the positives of your program. Be verbal about what is happening in the program and how things could improve with collaboration.
4. Look to the future. It is not acceptable to be content with how things have always been. It is important to use technology to your advantage and to your patients' advantage. Think about expanding your cancer program to new levels by increasing the frequency of cancer conferences or adding disease-site programs. If possible, invite more hospitals to participate.