# Table of Contents

- Letter from Carlos Becerra, MD ................................................................. 5  
- Cvetko Patient Resource Center ............................................................... 6  
- Onward: The Survivorship Journey™ ....................................................... 8  
- Patient Navigators are at the Heart of Our Program ............................... 8  
- BMT Update ............................................................................................ 9  
- Philanthropy ............................................................................................ 10  
- Arts in Medicine ..................................................................................... 12  
- Hematology Medical Oncology Fellowship ............................................ 15  
- Clinical Research Trials .......................................................................... 16  
- Quality .................................................................................................... 18  
  - Cancer Research and Treatment Centers ............................................. 18  
  - Patient Care Evaluation Study ............................................................. 20  
  - Patient Profile: Patrick Koennecke ..................................................... 28  
- Baylor Sammons Cancer Center 2017 Publications ............................... 30  
- Contact Information ................................................................................ 37  
- Cancer Registry ...................................................................................... 38
The Merriam-Webster Dictionary defines the word innovation as ‘the introduction of something new, a new idea, method, device.’ I can’t think of a better word to describe the amazing care and extensive research that took place within the walls of Baylor Charles A. Sammons Cancer Center at Baylor University Medical Center in fiscal year 2017.

This year’s Oncology Annual Report focuses on Innovation in Cancer Care. Last year’s report foreshadowed the promise of immunotherapy and how it would significantly change the way we approach cancer treatment. Now, I’m excited to report that many aspects of immunotherapy are moving from the research lab to clinical trials to approval for specific treatments among populations of cancer patients. In fact, the FDA has approved innovative cell-based therapy treatment for two different cancers – acute lymphoblastic leukemia in children and young adults and a specific sub-type of non-Hodgkin’s lymphoma.

Much of the spirit of innovation is rooted in research that refines the introduction of new agents and combines them with novel agents to improve response rates and sustain those rates over time in patients with a variety of cancers. Where such an approach is showing promise, we are seeing patients respond for longer periods of time, representing a huge leap forward in containing specific types of the disease.

An example of bench research currently occurring at Baylor University Medical Center is three clinical trials using radioactive isotopes with monoclonal antibodies. Led by principal investigators, Yair Levy, MD, and Ed Agura, MD, medical oncologists on the medical staff at Baylor University Medical Center, one trial has enrolled patients with AML while the second has focused on patients with multiple myeloma. The third trial involves patients 55 years of age and older and is looking at using this approach to completely eliminate bone marrow cancer before stem cell transplantation is attempted.

Our work with TGen and the advanced research that is taking place in the area of genomic therapy is highlighted in this report as is our comprehensive approach to cancer survivorship called Onward: The Survivorship Journey.

Across the spectrum of cancer care at Baylor Sammons Cancer Center at Baylor University Medical Center, breathtaking advancements are taking place thanks to a thriving spirit of innovation.

Carlos Becerra, MD
Interim Chief of Oncology, Baylor Scott & White Health – North Texas
Interim Medical Director, Baylor Charles A. Sammons Cancer Center
Our outpatient social worker saw 92 patients/families in our office for concerns involving coping with their diagnosis, psychosocial evaluations, financial issues, housing, transportation, home health and hospice needs, distress screen interventions, and educational questions.

We provided more than 694 behavioral health oncology visits.

Our trained Cancer Survivor Network volunteers made 364 patient visits in the hospital to newly diagnosed patients for support.

More than 2,529 patients participated in music therapy sessions led by our music practitioners.

Our FitSteps® exercise program had 4,573 patient visits.

Our Deborah Rodriquez Patient Resource Library has more than 1,050 books on topics such as coping, disease specifics and healthy cooking, in addition to Bibles, and even novels for patients to check out. Additionally, there are numerous brochures from the American Cancer Society, Leukemia & Lymphoma Society, National Cancer Institute (NCI) and more. We have three computers and a printer for patients and families to use for research, with suggested websites.

Our Integrative Medicine clinic is held on Tuesdays and Thursdays and had 259 patients in clinic for consults, nutrition and acupuncture.

The Cvetko Center offered 549 programs in FY 2017, with 6,614 participants attending. This included 12 cancer-specific support groups: amyloid, breast, caregiver, lung, myeloma, neuro-endocrine, ovarian, prostate, oral head and neck, gynecological cancers telephone group, young adults, and Waldenstrom’s.

We sponsored a total of 56 chemo side effects classes.

Our very popular Healthy Cooking Demonstration classes attracted 228 participants.

We offer a diverse variety of educational classes and programs including our Barrett Lectureship; Prostate, Ovarian, and Breast cancer survivor luncheons; Young Adult Cancer Survivor conference; Complementary Therapies workshop; Cancer Survivor’s Week celebration in June; Nutrition classes; Relaxation and Journaling classes and Look-Good-Feel-Better® classes, to name a few.
In the United States today, there are more than 16 million cancer survivors. Thanks to dedicated scientists and researchers, the number is growing daily. At Baylor Scott & White, we seek to meet the needs of this unique patient population—to make the life saved a life worth living to its fullest. In 2017, we launched Onward: The Survivorship Journey, an oncology survivorship program, to bring together a multidisciplinary team of clinical oncology professionals to help patients and their families navigate the cancer journey after treatment ends.

After cancer treatment, patients continue to experience personal fears, family concerns, financial worries and medical treatments. Our program uses innovative and integrative methods that promote overall patient well-being because healing is a body, mind and spirit collaboration.

Survivorship Program Offerings

- The Arts in Medicine Program features music therapy, art therapy and an open art studio
- The Behavioral Health Oncology Service helps cancer patients manage common cancer-related physical, emotional and behavioral health challenges
- Integrative Medicine combines traditional care with evidence-based techniques such as acupuncture, nutritional counseling, relaxation and biofeedback technique
- Genetic counseling and genetic testing for individuals at high risk of developing cancer
- Wellness and support programs
- Fitness and rehabilitation components to meet each patient’s needs
- Chaplaincy services as well as sacred spaces for reflection
- Research studies and clinical trials conducted at Baylor Dallas by some of the nation’s leading scientists and researchers
- Erin’s Appearance, a special boutique that offers products and services aimed at minimizing the effects of cancer therapy
- Patient navigators are healthcare professionals who coordinate the patient’s care from diagnosis through treatment and survivorship, providing a personalized approach and ongoing support to patients and families throughout their cancer journey. The patient navigator serves as the entry point into Baylor Sammons Cancer Center and offers: early intervention and prevention; patient advocacy and support; coordination of appointments and care; support to remove barriers to care; education and empowerment to make informed medical decisions; assistance with resource identification and procurement; increased adherence to appointments and treatments; better management of cancer-related side effects; increased satisfaction with overall care and experience; and improved communication with the care team.

Patient navigation services are no cost to patients and families. The Patient Navigation department is located on the second floor of Baylor Sammons Cancer Center in Suite 220. Contact Patient Navigation by calling 214.820.3535 or email SammonsNavigators@BSWHealth.org.

The Baylor University Medical Center BMT program maintained strong referral and transplant volumes in 2017. The program actively supported outreach clinics in Abilene, Longview, Fort Worth and Waco. In addition, telehealth capability was added in 2017, extending the program’s reach for patient consultation and evaluation services to oncology practices throughout the region. Program quality, an ongoing focus, showed even stronger results as 100-day first-allo post-transplant survival continued to show improvements over previous years. On the research front, several new trials were initiated to provide patients with access to new therapies. Among the most exciting of these trials were CAR-T therapies, which reengineer a patient’s immune cells to be able to recognize and attack cancer cells. One of the most enjoyable events of the year was the annual BMT Reunion “Dancing Through the Decades,” which hosted more than 200 former patients and families who celebrated life and recovery.

Support

Onward: The Survivorship Journey™

The Baylor Health Oncology Service helps cancer patients manage common cancer-related physical, emotional and behavioral health challenges

Integrative Medicine combines traditional care with evidence-based techniques such as acupuncture, nutritional counseling, relaxation and biofeedback technique

Genetic counselling and genetic testing for individuals at high risk of developing cancer

Wellness and support programs

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Entertainer and breast cancer survivor Rita Wilson brings humor and humanity to 17th annual Celebrating Women luncheon

On October 20, 2016, Baylor Health Care System Foundation hosted the 17th annual Celebrating Women luncheon. The event raised more than $1.8 million to support Baylor Scott & White’s fight against breast cancer in North Texas.

Breast cancer survivor, multi-talented actress, writer, producer and singer, Rita Wilson was the featured speaker. During a Q&A session moderated by Rowland K. Robinson, president of Baylor Health Care System Foundation, Wilson discussed her family, career highlights, and her breast cancer diagnosis and journey.

Breast cancer is around 5 percent, the lowest of all cancers.

Inflammation is also problematic for some types of breast cancer. A different team of researchers at Baylor Sammons Cancer Center has been studying how an anti-inflammatory drug named anakinra can help breast cancer patients. Based on positive outcomes from that study, researchers leading the AGAP trial are adding anakinra to the three-drug chemotherapy combination to reduce inflammation and shrink pancreatic tumors. As the inflammation decreases, patients are reporting that they feel better.

Shrink pancreatic tumors to an operable state, chemotherapy treatments have to hit their target. Often, this is difficult since access to pancreatic tumors is often blocked by dense connective tissue exacerbated by inflammation from the cancer.

Current chemotherapy regimens and radiation therapy for inoperable pancreatic cancer provide limited help. In fact, the five-year survival rate for this aggressive disease is around 5 percent, the lowest of all cancers.

There's been so much enthusiasm around the trial that, after launching in January 2016, researchers reached their enrollment goal of 16 patients by year's end.

“This trial has ingratinated the pancreas team at Baylor Sammons Cancer Center,” said Scott Celinski, MD, another principal investigator for this study. “We have been able to encourage physicians to recommend patients for these clinical trials and that the needle won't move without participation. The enthusiasm is shown by hitting the target accrual of qualified patients in half the expected time.”

The researchers are also collecting samples from patients in the trial to study biomarkers that can possibly be used to detect pancreatic cancer at an earlier stage.

All of this work is funded entirely through philanthropy, specifically a grant from SAA. The goal is to make a material difference in cancer survival rates. Dr. Becerra and his colleagues have done some magnificent work in pancreatic cancer thanks to SAA funding.”

Pancreatic cancer patients see promising results in AGAP Trial at Baylor Sammons Cancer Center

On June 11, 2011, a new fundraising organization swim onto the scene in Dallas. Swim Across America (SAA), a 30-year-old 501c3 non-profit organization, launched its first swim event at Lake Ray Hubbard in Rockwall, Texas. SAA identified the Innovative Clinical Trials Center (ICTC) at Baylor Health Care System as the recipient of funds from the event.

Baylor Sammons Cancer Center. To date, all patients enrolled in the AGAP trial have had their tumors shrink from an inoperable state to an operable one.

Baylor Scott & White, the principal investigator for the study, one of the initial interesting findings is that all of these patients had negative margins on pathology post-surgery, meaning no cancer cells were detected at the outer edge of the tissue that was removed. The research team will continue to measure disease-free survival in these patients.

Now, more than two years after her donation, preliminary data are showing that the clinical trial she funded at Baylor University Medical Center may help her fulfill that goal.

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More than two years ago, Baylor Sammons Cancer Center and T. Boone Pickens Cancer Hospital at Baylor University Medical Center introduced an innovative program to cancer patients – Arts in Medicine. Offered through the Cvetko Patient Resource Center at Baylor University Medical Center and underwritten by donations from foundations and individual donors, interest in the program has grown beyond the expectations of the program’s founders.

“In fiscal 2017, the Arts in Medicine Program served more than 9,050 patients,” explains Benny Barrett, coordinator of the program. “Requests for our services continue to expand, with more than 2,000 to 2,500 per month. This growth has enabled us to innovate and introduce new elements to serve a variety of patient needs. While at least one-third of our services are provided to oncology patients, we also serve a large patient population in colorectal, anti-partum, dialysis and post-op/recovery.”

The Arts in Medicine Program began in July 2015 with a $1.5 million grant from the Paula Walker Fund through the Baylor Health Care System Foundation and the Dallas Foundation. The program offers a variety of therapeutic arts activities and events including:

- Art therapy
- Art carts
- Read-Aloud program
- Art curator and Art Advisory Council
- Artist-in-Residence
- Music therapy
- Performance Series
- Even evening with the Artist series
- Open Art Studio
- Music practitioners
- Exhibitions and shows
- Art curator and Art Advisory Council
- Evening with the Artist series

Arts in Medicine
Finding Comfort and Healing Through Creative Expression

Responding to requests from enthusiastic participants, the Open Art Studio began a monthly Grateful Patient Art Exhibit in fiscal year 2017. This activity provides a platform where patients can showcase their artistic abilities for others to see.

Barrett anticipates that the program will see an uptick in referrals when the new electronic health record is implemented at Baylor University Medical Center. “Currently, we receive therapy referrals primarily from word-of-mouth, either by phone or in-person. The new electronic health record will include a referral option for Arts in Medicine,” he explains.

Program staff is working on a much-anticipated new program, the Legacy Program. Scheduled for launch next year, an oral history initiative will be provided free-of-charge to patients with an end-of-life diagnosis. Patients will be videoed telling their story and a DVD will be prepared for them to share with family members.

As Arts in Medicine continues to flourish at Baylor University Medical Center, several other Baylor Scott & White – North Texas facilities are considering implementing components of the program.

Arts in Medicine FY 2017 Statistics

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<th>Category</th>
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<td>Total patients served</td>
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<tr>
<td>Patients served by certified music practitioners</td>
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<td>Oncology patients who participated in AIM programs</td>
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<td>Participants in art therapy sessions</td>
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<tr>
<td>Participants in music therapy sessions</td>
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<tr>
<td>Number of performance series events</td>
<td>236</td>
</tr>
<tr>
<td>Participants in read-aloud programs</td>
<td>78</td>
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</tbody>
</table>

Durba Mukhopadhyay
Associate Professor of Physiology

Growing up in Calcutta, India, Durba Mukhopadhyay and her three sisters spent hours watching their mother and grandmother paint.

“Our family was very much involved in the arts, and we used to do lots of crafting during holidays in my childhood,” Durba recalls. “Painting was also a part of our daily ritual. My mother and grandmother painted whenever they could using water color, pastel or oil, even after days of hard work. Painting always helped us deal with our internal emotions and difficult days.”
“I found peace when I was in the art studio. It was all about creativity, compassion, peace and love for each other. The warm, caring environment was made possible because of the staff. I can sum up my entire experience at Baylor University Medical Center with two lines from the Tagore’s poem whose writing pervaded the very soul of my existence as I grew up...”

“Every fellow is expected to actively participate in a research project that includes some type of quality improvement. Upon completion of the program, fellows will have been exposed to and will have become familiar with every aspect of hematology and oncology, including radiation oncology, gynecologic oncology and hematology.”

Dr. Burch says early in their fellowship, participants are encouraged to delve into research occurring in their area of special interest. “Every fellow is expected to actively participate in a research project that includes some type of quality improvement. Upon completion of the program, fellows will have been exposed to and will have become familiar with every aspect of hematology and oncology, including radiation oncology, gynecologic oncology and hematology.”

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Clinical Research Trials

Clinical trial evaluates effectiveness, safety of combining CAR-T cells and rituximab to treat non-resectable pancreatic cancer

Chimeric antigen receptor (CAR) T therapy is a type of cancer treatment that harnesses the power of the human immune system to recognize and kill cancer cells. It is among the most promising approaches to fighting cancer. Used successfully, and approved by the FDA to treat some blood cancers, researchers at Baylor University Medical Center and Baylor Scott & White Research Institute have launched a clinical trial to evaluate CAR-T effectiveness and safety in fighting pancreatic cancer.

The trial involves removing T cells, a type of white blood cell, from the patient and genetically engineering them in the laboratory to recognize a specific protein on the surface of a cancer cell. At that point, they become the potent, cancer killers known as CAR-T cells. Those T cells are then expanded, or multiplied, to millions of cells and infused back into the patient in smaller doses than those administered to patients with blood cancers. Seven to 14 days after receiving the altered cells, rituximab, an activator (dimerizer drug), is administered to the patient. The activator turns on the cells and tells them to start attacking the cancer cells. Researchers closely monitor patients for cytokine release syndrome, a condition that occurs when large numbers of toxins are released by the immune system, that recognize and attach to cancer cells delivering treatment to the affected cells. This is known as targeted therapy. BSWRI is involved in several trials using a radioactive isotope with a monoclonal antibody. Three clinical trials were opened, two using lower dose radioactive particles known as alpha emitters, for the treatment of acute myelogenous leukemia (AML) and multiple myeloma, and one using higher dose beta-emitting particles in older AML patients to eliminate cancer cells in the bone marrow.

Researchers build on foundational work in immunotherapy

Immune therapies are designed to unleash the potential of the human immune system to seek and destroy cancer cells. These therapies, which have been advanced by researchers at BSWRI, harness the body’s immune system to recognize and attack to cancer cells delivering treatment to the affected cells. The common goal is to identify high-risk precancerous lesions and early-stage pancreatic cancer in patients who could be candidates for early surgical intervention. This project is one of three precision medicine initiatives proposed under the 2015 BSWRI-TGen partnership that also includes: advanced genomic sequencing, which maps out the billions of chemical base pairs that comprise the human genome; and development of new clinical trials, which enable patients to receive the newest therapeutics tailored to the genetics of the individual tumor. Other participants in this project include: Huntsman Cancer Institute, University of Southern California and Hoag Memorial Hospital; Ochsner Health System; Medical College of Wisconsin; University of Arizona; Arizona Cancer Center; Hoag Memorial Hospital; and Baylor Scott & White Health (BSWHealth). United by a desire to accelerate cancer research, the collaboration maximizes the strengths of the two organizations through the creation of a Center of Excellence in translational oncology research with an emphasis on early detection and intervention. The result is a powerful blend of clinical, technological and diagnostic knowledge.

The BSWRI-TGen collaboration is funded by Baylor Health Care System Foundation programs is measured by joint publication and extramural grant awards and will be rewarded with opportunities for additional development funds.

Each of these mAbs acts as a “smart bomb” for cancer cells. Antibodies are manufactured by the body in response to foreign substances, including cancer cells. Researchers search for and attach to antigens, or specific proteins on the surface of the intruder and then destroy it. The key for researchers is to find an antigen that exists on the surface of a type of cancer cell and then to make copies of the antibody that targets it, called a monoclonal antibody (mAb). Each of those mAbs acts as a “smart bomb” for cancer cells.

A highlight of the collaboration in FY2017 was the award of a $5.13 million federal grant to develop an early detection system for pancreatic cancer, the third-leading cause of cancer-related deaths in the United States. A group of the nation’s premier cancer researchers, including Ajay Goel, PhD, director of gastrointestinal research and director of the Center for Epigenetics, Cancer Prevention and Cancer Genomics at Baylor Scott & White Research Institute and Daniel Von Hoff, MD, physician in chief of TGen, Dr. Goel is principal investigator for this multi-institutional National Institutes of Health (NIH) grant along with Dr. Von Hoff. Known as the U1 grant, funding was awarded by the National Cancer Institute’s (NCI) Pancreatic Cancer Detection Consortium, an initiative dedicated to bringing researchers together to better understand the disease and to develop and test new molecular and imaging biomarkers. The common goal is to identify high-risk precancerous lesions and early-stage pancreatic cancer in patients who could be candidates for early surgical intervention.
Baylor Sammons Cancer Center at Baylor University Medical Center is among five top-tier cancer programs in the country to participate in a pilot accreditation process for rectal cancer. The National Accreditation Program for Rectal Cancer is sponsored by the American College of Surgeons (ACS). The accreditation process analyzes several aspects of a multidisciplinary approach to diagnosing and treating rectal cancer. This model, used in other parts of the world, has demonstrated improved survival rates beyond colon cancer.

“We have submitted our data for final accreditation review,” says James Fleshman, Jr., MD, chairman of the department of surgery and a colon and rectal surgeon on the medical staff at Baylor University Medical Center. “The standards Fleshman, Jr., MD, chairman of the department of surgery and a colon and rectal surgeon on the medical staff at Baylor University Medical Center. “The standards

National Accreditation Program for Rectal Cancer (NAPRC)

The standards used by the ACS to evaluate components of a rectal cancer program focus on program management, clinical services and quality improvement. We anticipate the accreditation process will raise the bar for all of the disciplines involved in diagnosing and treating rectal cancer – surgery, radiology, pathology and others. Enhanced quality care should reduce the number of colostomies, improve sphincter sparing and increase the quality of surgical outcomes for patients.”

The Pancreatic Cancer Research and Treatment Center. “We want to keep people from dying of pancreas cancer. If we know a patient is likely to develop the disease, we want to catch it early. Currently, many pancreas cancer patients present with late-stage disease, when it is too late to provide effective treatment. Ultimately, we are aiming to combine the screening program with research to develop a blood test that will enable us to either prevent the disease from developing or catch it early so effective treatment can be provided.”

Pancreatic Cancer Familial Risk Assessment Program

Pancreatic Cancer Familial Risk Assessment Program Cancer specialists have long known that screening and early detection are an individual’s best resources to prevent and treat the disease. Screening mammography, low-dose CT scan and colonoscopy have positively impacted the early diagnosis and treatment planning for breast cancer, lung cancer and colon/rectal cancer. However, some cancers remain elusive, evading attempts to develop equally effective screening approaches. One of those is pancreatic cancer.

The Pancreatic Cancer Research and Treatment Center, part of Baylor Sammons Cancer Center, is at the forefront of developing an effective screening through the Pancreatic Cancer Familial Risk Assessment Program. The program targets individuals diagnosed with pancreas cancer at a young age, those with a family history of pancreatic cancer, and those with other health issues that put them at a higher risk of developing pancreatic cancer. To date, about 30 patients have participated in the program.

“Our goal is simple,” says Scott Celinski, MD, co-director of the Baylor Pancreatic Cancer Research and Treatment Center. “We want to keep people from dying of pancreas cancer. If we know a patient is likely to develop the disease, we want to catch it early. Currently, many pancreas cancer patients present with late-stage disease, when it is too late to provide effective treatment. Ultimately, we are aiming to combine the screening program with research to develop a blood test that will enable us to either prevent the disease from developing or catch it early so effective treatment can be provided.”

The Pancreatic Cancer Familial Risk Assessment Program can help answer such questions as:

- What is my level of risk for developing pancreatic cancer?
- What about the risk to my family members?
- How is testing for inherited forms of cancer helpful?
- The evaluation process begins with a consultation with a genetic counselor to discuss the individual’s personal and family history. During the genetic counseling session, information is provided on the risk to develop cancer, surveillance and early detection options, genetic testing, as well as some prevention strategies and treatment options. Further testing can include diagnostic tests and therapeutic procedures and will be discussed during the initial consultation. If abnormalities are found during the initial evaluation, additional exams and procedures, including diagnostic tests and therapeutic procedures, may be ordered. This follow-up testing and care will be discussed with the individual after a review of the results of the initial evaluation tests has been completed.

Pancreatic Cancer Familial Risk Assessment Program

Cancer specialists have long known that screening and early detection are an individual’s best resources to prevent and treat the disease. Screening mammography, low-dose CT scan and colonoscopy have positively impacted the early diagnosis and treatment planning for breast cancer, lung cancer and colon/rectal cancer. However, some cancers remain elusive, evading attempts to develop equally effective screening approaches. One of those is pancreatic cancer.

The Pancreatic Cancer Research and Treatment Center, part of Baylor Sammons Cancer Center, is at the forefront of developing an effective screening through the Pancreatic Cancer Familial Risk Assessment Program. The program targets individuals diagnosed with pancreas cancer at a young age, those with a family history of pancreatic cancer, and those with other health issues that put them at a higher risk of developing pancreatic cancer. To date, about 30 patients have participated in the program.

“Our goal is simple,” says Scott Celinski, MD, co-director of the Baylor Pancreatic Cancer Research and Treatment Center. “We want to keep people from dying of pancreas cancer. If we know a patient is likely to develop the disease, we want to catch it early. Currently, many pancreas cancer patients present with late-stage disease, when it is too late to provide effective treatment. Ultimately, we are aiming to combine the screening program with research to develop a blood test that will enable us to either prevent the disease from developing or catch it early so effective treatment can be provided.”

The Pancreatic Cancer Familial Risk Assessment Program can help answer such questions as:

- What is my level of risk for developing pancreatic cancer?
- What about the risk to my family members?
- How is testing for inherited forms of cancer helpful?
- The evaluation process begins with a consultation with a genetic counselor to discuss the individual’s personal and family history. During the genetic counseling session, information is provided on the risk to develop cancer, surveillance and early detection options, genetic testing, as well as some prevention strategies and treatment options. Further testing can include diagnostic tests and therapeutic procedures and will be discussed during the initial consultation. If abnormalities are found during the initial evaluation, additional exams and procedures, including diagnostic tests and therapeutic procedures, may be ordered. This follow-up testing and care will be discussed with the individual after a review of the results of the initial evaluation tests has been completed.

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Early detection and a collaborative approach to treatment have led to a reduction in the incidence of cervical cancer and improvement in survival for patients diagnosed with cervical cancer in the United States. Baylor University Medical Center and Baylor Sammons Cancer Center strive to improve patient access to this collaborative approach and promote research opportunities while maintaining rationally accepted treatment guidelines.

Upon confirmation of a malignancy, additional workup is needed, including routine blood work and radiographic studies to determine the extent of disease with respect to spread to regional tissues, lymph nodes or distant sites. Radiographic studies commonly include computed tomography (CT), magnetic resonance imaging (MRI) and/or positron emission tomography (PET). Interestingly, while the staging system for other types of cancers primarily utilizes a variety of technologically advanced imaging studies, cervical cancer staging is limited essentially to the physical exam findings, plain film X-ray and basic procedures, such as endoscopic examination of the bladder and rectum. This approach is driven by the fact that most cervical cancers in women living in developing nations who do not have access to sophisticated technology, such as CT, MRI or PET imaging. Ultimately, treatment recommendations in the United States are generally based on the results of all available information for the individual patient.

Therapeutic considerations for cervical cancer include surgery, radiation therapy, and chemotherapy. The treatment depends upon disease stage (Table 1). Briefly, for early stage disease (tumors ≤4 cm in size limited to the cervix), treatment options include surgery versus definitive radiation therapy. Typically, for stage IA (stromal invasion ≤0.4 mm), surgery is offered to prevent infertility. The choice of surgery depends upon whether the patient wants to maintain fertility. Radiation therapy is an option for patients with stage IA (stromal invasion >0.4 mm but ≤2 mm) or stage IB1 disease (clinically visible lesion ≤2 cm). The most common type of surgery is a hysterectomy.
Cervical cancer is staged based on the extent of the spread of the disease. Stage I cervical cancer extends only within the cervix. Stage II cancer extends to the upper vagina or extends to the pelvic sidewall. Stage III cancer extends to areas beyond the true pelvis, such as the rectum, bladder, or muscles. Stage IV cancer can involve distant parts of the body.

### Stage I
- **Stage IA1**: The cancer is limited to the cervix and measured less than 5 mm in diameter.
- **Stage IA2**: The cancer is limited to the cervix and measured more than 5 mm in diameter.

### Stage II
- **Stage IIA**: The cancer is limited to the cervix and involves no more than 2 cm of the lower uterine segment.
- **Stage IIB**: The cancer is limited to the cervix and involves more than 2 cm of the lower uterine segment.

### Stage III
- **Stage IIIA**: The cancer is limited to the cervix and extends to the adjacent pelvic structures.
- **Stage IIIB**: The cancer is limited to the cervix and extends to the pelvic sidewall.
- **Stage IIIC**: The cancer is limited to the cervix and extends to the true pelvis.

### Stage IV
- **Stage IV A**: The cancer is limited to the cervix and extends to any part of the body.
- **Stage IV B**: The cancer is limited to the cervix and involves distant metastases.

### Treatment Options
- **Surgical options** for Stage I and II cancers include radical hysterectomy, conservative surgery (hysterectomy with preservation of ovary), and pelvic lymph node dissection. For Stage III and IV cancers, chemotherapy and radiation therapy are typically used in combination.

### Side Effects
- Radiation therapy can cause side effects such as fatigue, vaginal dryness, and changes in bladder and bowel function.
- Chemotherapy can cause side effects such as hair loss, nausea, and fatigue.

### Prognosis
- The survival rate for cervical cancer depends on the stage of the disease at diagnosis. Patients with early-stage disease have a good prognosis, while those with advanced disease have a poorer prognosis.

### Additional Resources
- **National Comprehensive Cancer Network (NCCN)**: Provides guidelines for the treatment of cervical cancer.
- **American Society for Radiation Oncology (ASTRO)**: Offers guidelines for radiation therapy.
- **American Society for Clinical Oncology (ASCO)**: Provides updates on the latest research and treatment options.

This information is based on the latest guidelines and standards of care for cervical cancer management. Always consult with a healthcare professional for personalized advice.
To maintain this treatment duration, HDR is interspersed during the course of EBRT; however, it should be noted that neither EBRT nor chemotherapy is given on the same day as an HDR treatment. Typically, if the tumor is small and the vaginal anatomy is optimal, HDR begins approximately two to three weeks after starting EBRT. HDR begins once a week, with the EBRT given on the other four days of the week. If large tumor volume requires delaying the start of HDR, it may be necessary to perform two implants per week after the EBRT has been completed to keep the total treatment duration to <8 weeks.

Traditionally, the dose of HDR is prescribed to an arbitrary applicator-based point called Point A. Though historically represents where the uterine artery is in closest proximity to the cervix, the definition of Point A varies from institution to institution. This point historically represents where the uterine artery is in closest proximity to the cervix, but its definition may vary significantly from institution to institution.

While it is well established that MRI is superior to other current imaging modalities in delineating gross tumor involving the cervix and adjacent normal tissues, MRI is not uniformly accessible, and thus CT imaging has been used as a clinically acceptable alternative to MRI. The gynecological working group formed by the Groupe Européen de Carcinologie des Organes Pelvienne (GEC-ESTRO) formulated and described new terminology regarding three-dimensional imaging, where available, to optimize treatment delivery to the tumor volume.

Radiation Treatment for Cervical Cancer at Baylor Sammons Cancer Center

Baylor Sammons Cancer Center is a large tertiary referral center. We identified cervical cancer patients treated at Baylor University Medical Center between January 2013 and December 2016 through our tumor registry. We gathered information on patients’ clinical characteristics and treatment and evaluated the doses of radiation delivered to our patients compared with national standards. During this three-year time period, 53 cervical cancer patients were identified in the Baylor University Medical Center tumor registry. Of the 53 patients, 45 were treated for curative intent without surgery. The remaining eight patients received adjuvant treatment following a radical hysterectomy (Figure 1). Twenty-two of the 53 patients were treated with both EBRT and HDR with concurrent chemotheraphy for their intact cervix. Another 22 patients received HDR alone at our institution, as they had received EBRT and concurrent chemotheraphy at an outside facility. One of the 53 patients received only EBRT for treatment of her intact cervix. Three of the eight post-hysterectomy patients received both EBRT and HDR, while the remaining five received HDR alone.

As shown in Table 2, the mean radiation dose directed to the whole pelvis for the 53 patients who received EBRT as part of their treatment at our institution was 4,440 cGy, with a range of 4,300 cGy to 4,500 cGy. In addition to whole-pelvic radiation, 16 patients had clinical findings necessitating a parametrial external beam boost, pelvic lymph node boost and/or cervix boost. The mean radiation dose for the EBRT boost was 360 cGy in 3 fractions to 2000 cGy in 10 fractions.

Brachytherapy was delivered by various equipment including tandem and ovoid device, tandem and cylinder device, or simply a vaginal cylinder. In patients with an intact cervix who underwent brachytherapy, a tandem was always used with either ovoid attachments or a vaginal cylinder. In post-hysterectomy patients who underwent brachytherapy, a vaginal cylinder alone was utilized.

Figure 1. Radiation treatment of 53 patients with cervical cancer at Baylor Sammons Cancer Center

<table>
<thead>
<tr>
<th>EBRT and HDR</th>
<th>HDR alone, EBRT and chemos</th>
<th>EBRT only</th>
<th>HDR only</th>
</tr>
</thead>
<tbody>
<tr>
<td>34 Treated with curative intent, no surgery</td>
<td>22 HDR alone, EBRT and chemos outside</td>
<td>1 EBRT only</td>
<td>8 Received with adjuvant treatment</td>
</tr>
<tr>
<td>53 Total patients</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>
Table 2. Radiation treatment dosage for cervical cancer at Baylor University Medical Center

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Patients</th>
<th>Mean (cm²)</th>
<th>Dose range (cGy)</th>
<th>Tractons</th>
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<tbody>
<tr>
<td>EBRT</td>
<td>35</td>
<td>4644</td>
<td>460605 to 510308</td>
<td></td>
</tr>
<tr>
<td>Brachytherapy (tandem and ovoid)</td>
<td>3</td>
<td>23.4</td>
<td>23.4 to 23.4</td>
<td></td>
</tr>
<tr>
<td>Rectal 2 cc dose: HDR plus EBRT</td>
<td>5</td>
<td>485</td>
<td>264 to 807</td>
<td></td>
</tr>
<tr>
<td>Bladder 2 cc dose: HDR plus EBRT</td>
<td>5</td>
<td>485</td>
<td>264 to 807</td>
<td></td>
</tr>
<tr>
<td>Bladder 2 cc dose: EBRT alone</td>
<td>3</td>
<td>387</td>
<td>387 to 471</td>
<td></td>
</tr>
<tr>
<td>Rectal 2 cc dose: HDR alone</td>
<td>5</td>
<td>404</td>
<td>347 to 484</td>
<td></td>
</tr>
</tbody>
</table>

EBRT indicates external beam radiation therapy; HDR, high-dose-rate radiation.

Conclusion

Cervical cancer often requires a multidisciplinary approach for definitive treatment, which includes a gynecologic oncological surgeon and a radiation oncologist. This approach is generally attainable in the United States and other developed nations; however, it is difficult in developing nations. Early detection and a collaborative approach to treatment have led to a reduction in the incidence of cervical cancer and improvement in survival for patients diagnosed with cervical cancer in the United States. Baylor University Medical Center

References

Dec. 15, 2015, is a day Patrick Koennecke will never forget. He simply refers to it as “the date.” The 60-year-old Waxahachie resident and warehouse manager was recovering from major back surgery. He began to notice a pain in his upper stomach on the left side. He described it as a broken rib feeling. His back surgeon determined the pain was not a result of his back surgery and he referred Koennecke to a cancer surgeon at Baylor University Medical Center.

“I went to Baylor Dallas for some testing and on Dec. 15, 2015, my wife and I met with the doctor,” recalls Koennecke. “I never want to hear that you have cancer, but that’s what he told me. His diagnosis was stage 3 or 4 pancreatic cancer. They could see a cloudy mass on my pancreas. He told me there was no cure, no treatment available, and because an artery was involved, surgery was too risky or the tumor was inoperable. Even though the news was devastating, I was surprised at how easy it was for us to discuss the diagnosis with the physician.”

While much of Dec. 15, 2015 is a blur to Koennecke, the one thing he remembers surprised at how easy it was for us to discuss the diagnosis with the physician.”

Koennecke and his family celebrated the holidays and he prepared for his first treatment in mid-January 2016. “I didn’t know what to expect, but I embarked on this journey with prayer and support from my family, my co-workers and my community,” he says. “My treatment regimen involved 12 infusion sessions that I completed in late summer. At first, I continued to work, but I later decided to take time off to focus solely on my health and well-being. By early spring, I began to complete their treatment regimen, he banged a gong in the infusion treatment unit.

The primary endpoint of the study was to determine whether the combination of these four drugs would improve disease-free survival (DFS) and to determine the number of patients who met or surpassed 11.5 months of DFS. The secondary objectives of the study were to evaluate the safety and tolerability of the combination of nab-paclitaxel, cisplatin and gemcitabine in patients with resectable or potentially resectable pancreatic adenocarcinoma (PDAC). The Koennecke was the first patient of 16 to enroll in the study.

Koennecke’s daily log book details the tough days as he experienced several treatment side effects, including fatigue, weakness, loss of appetite, fluid retention, upset stomach and neuropathy. Through it all, he kept battling, knowing this was part of the treatment process. As June 2016 approached, Koennecke began counting down the treatments. After finishing the 12th treatment, he thought he would have to time to recuperate and build up strength for surgery. But, his surgeon had another idea, and he was taken to surgery within a couple of weeks.

His surgeon and oncologist were encouraged because a CT scan performed after his last infusion showed the tumor had shrunk, making surgery possible. The surgery involved removing a large portion of his pancreas, spleen and rerouting some arteries. Koennecke remembers having complete confidence in the surgeon and knowing that he was in the right place at the right time. The surgery was deemed a success, and the long journey had finally come to an end.

“I stayed in the hospital for a week,” says Koennecke. “Two weeks after returning home, I received the news I had been hoping for, the pathology report showed no signs of cancer anywhere and no follow-up treatment was needed.”

Dr. Carlos Becerra and Patrick Koennecke

Clinical Trials Center. The trial involved combining a new drug with traditional chemotherapy drugs to treat patients with resectable, potentially resectable or locally advanced pancreatic adenocarcinoma (PDAC). Koennecke was the first patient of 16 to enroll in the study.

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“I stayed in the hospital for a week,” says Koennecke. “Two weeks after returning home, I received the news I had been hoping for, the pathology report showed no signs of cancer anywhere and no follow-up treatment was needed.”

How did Koennecke celebrate his wonderful news? Like all infusion patients who complete their treatment regimen, he banged a gong in the infusion treatment unit. He says he made sure his infusion nurse was there to hear him bang the gong and to help him celebrate his victory over cancer. While he is still dealing with side effects of treatment and surgery, his physicians constantly remind him that it beats the alternative. He says the physicians created a new him.

“I am more than a year and a half into recovery/remission with no signs of cancer anywhere and no follow-up treatment was needed.”

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2017 Publications from Baylor Sammons Cancer Center


**Cancer Registry**

**Non-Small Cell Lung**

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<th>2016</th>
<th>2015</th>
<th>2014</th>
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<tbody>
<tr>
<td>LNC</td>
<td>At least 10 regional lymph nodes are removed and pathologically examined for resected NSCLC (Quality Improvement - Released Fall 2014)</td>
<td>80.0%</td>
<td>72.9%</td>
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<td>CRT: Radiation therapy is considered or administered following any primary treatment of Stage IIIC or IV NSCLC (Surveillance Measure - Released Spring 2015)</td>
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<tr>
<td>CBRT: Use of brachytherapy</td>
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**Breast Cancer**

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<td>LNC</td>
<td>At least 15 regional lymph nodes</td>
<td>80.0%</td>
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<td>65.9%</td>
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<tr>
<td>PBRT: Post Breast Conserving Surgery Radiation</td>
<td>100.0%</td>
<td>89.9%</td>
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**Bladder Cancer**

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<td>LNC</td>
<td>At least 1 regional lymph node is removed and pathologically examined for resected unilateral nephroblastoma (Surveillance Measure)</td>
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<td>99.0%</td>
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**Colorectal Cancer**

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<tr>
<td>LNC</td>
<td>At least 10 lymph nodes are removed in patients under 80 undergoing partial or total colectomy</td>
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<td>CBRT: Radiation therapy</td>
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<tr>
<td>CBRT: Use of brachytherapy</td>
<td>80.0%</td>
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**Ovarian Cancer**

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<tr>
<td>LNC</td>
<td>At least 12 regional lymph nodes</td>
<td>85.0%</td>
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<td>87.8%</td>
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<td>CBRT: Radiation therapy</td>
<td>80.0%</td>
<td>77.2%</td>
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**Surveillance Measures**

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<thead>
<tr>
<th>Category</th>
<th>Target</th>
<th>2016</th>
<th>2015</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECS</td>
<td>At least 1 regional lymph node is removed and pathologically examined for resected colon cancer (Accountability Measure)</td>
<td>85.0%</td>
<td>88.6%</td>
<td>87.8%</td>
</tr>
<tr>
<td>CRC</td>
<td>At least 12 lymph nodes are removed in patients under 80 undergoing partial or total colectomy</td>
<td>85.0%</td>
<td>88.6%</td>
<td>87.8%</td>
</tr>
<tr>
<td>CCR: Chemotherapy administered to cervical cancer patients who received radiation for Stage IB or II cervical cancer with positive pelvic nodes, adverse surgical margins, and/or positive parametrium (Group 2) (Surveillance Measure - Released Spring 2015)</td>
<td>96.0%</td>
<td>93.3%</td>
<td>93.5%</td>
<td>93.5%</td>
</tr>
</tbody>
</table>

**Accountability Measures**

<table>
<thead>
<tr>
<th>Category</th>
<th>Target</th>
<th>2016</th>
<th>2015</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECBC</td>
<td>Endoscopic, laparoscopic, or robotic perforation all endometrial cancer (Quality Improvement - Released Fall 2015)</td>
<td>71.0%</td>
<td>66.8%</td>
<td>75.1%</td>
</tr>
<tr>
<td>MEOMC</td>
<td>Ovarian carcinoma, epithelial, ovarian cancer (Quality Improvement - Released Fall 2015)</td>
<td>67.1%</td>
<td>71.3%</td>
<td>82.3%</td>
</tr>
</tbody>
</table>

**Additional Information**

- **NCDB Target**
- **Cohort**
- **My CoC**
- **>{{Program}}**
- **CoC State**
- **Performance Rate**
- **CoC Census**
- **Region (West)**
- **CoC Region (West)**
- **CoC Region (South Central)**
- **CoC Region (North Central)**
- **CoC Region (Northeast)**
- **CoC Region (Midwest)**
- **CoC Region (Southwest)**
- **CoC Region (Southeast)**

*Data Source: Baylor Scott & White – North Texas Cancer Registry Data. Data results pending release by the Commission on Cancer National Cancer Data Base.*