We will provide superior quality, accessible, comprehensive cancer treatment, prevention and patient support services for western North Carolina and the surrounding region.

ONCOLOGY SERVICE LINE MISSION STATEMENT
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LETTER FROM THE
Cancer Committee Chair

There have been many changes in medicine over the last several years. The area of oncology, however, has changed more rapidly than most realize. Over the past year at Mission Hospital there have been multiple programs, some new and others that have been around for many years. We have seen increased emphasis on survivorship and survivorship programs. We have expansion of community programs such as Camp Blue Bird, an adult camp for cancer patients here for 20 years, for patients either going through treatment or having survived their cancers. In an attempt to try to bring patients back into a more normal lifestyle, there have been transition programs in survivorship that have grown and involve all of our clinics through Mission Health.

With the acquisition of some of the smaller hospitals in the region, collection of data from these hospitals is now being funneled through the office of Cancer Data Services, located in the Cancer Center at Mission Hospital. This has been an attempt to try to capture all patients in the region who are served through the Mission network.

There are increasing technological changes in oncology. The most notable change for the Mission program this year was the implementation of 3D mammography (tomosynthesis). We know early detection results in higher survival, and probably in the long run reduces cost of management. The first 3D mammography machine was placed at the HOPE Women’s Cancer Center followed by the Mission Breast Center, and then placement in all the regional hospitals. This has allowed best technology for mammography to be available to all women in the counties served by these hospitals.

Although the majority of patients seen in most oncology programs are adults, there is a very active and large pediatric oncology program through Mission Health. In our community and surrounding area, Mission has had the privilege of having 3 pediatric oncologists who give care to the children in this region, offering them cooperative group trials and interaction with the pediatric programs at nearby universities, primarily Chapel Hill and Duke. There is a strong relationship with Carolinas Medical Centers, primarily for neurosurgical support, as unfortunately brain tumors are common tumors seen in the pediatric population.
We know that one major goal of oncology is to personalize treatments so that patients get the best care for the characteristics of the tumor for which they are being treated. A personalized medicine program through the Fullerton Genetics Center and under the direction of Dr. Lynn Dressler has expanded the testing to allow state of the art genomics to be available to patients here in western North Carolina. As this area of oncology expands, we expect to see more patients treated in individualized fashion with the hope of better outcomes and decreased toxicity.

As part of the goal of identifying and treating patients in an individual fashion, the oncology portion of pharmacy expanded with the hiring of a clinical oncology pharmacist. The goal is to have specialized pharmacist working in the cancer center and training pharmacy students and pharmacy residents to improve the understanding of oncology pharmaceuticals. Also this allows extended training for the staff in the Cancer Center. Pharmacy is a very large part of oncology care and entails the use of outpatient pharmacy and standardization of treatments, both inpatient and outpatient.

Finally, as our therapies become more multidisciplinary, rehabilitation services have gone beyond the usual thought of physical therapy to include therapies that improve speech, lymphedema, pelvic floor weaknesses, and traditional physical therapy to improve the quality of life of cancer patients.

We expect to see further growth in integrated care. The goal of the members of the cancer program family continues to be bettering the lives of patients with whom we come in contact every day, with medical interventions as well as personal and social interactions. The ultimate satisfaction for the staff at the Cancer Center is to be sure we provide the best treatment and support to patients in the region and, as often as possible, outside of the region.

Michael J. Messino, MD
Cancer Committee Chairman
Medical Oncologist
2015 MISSION ONCOLOGY SERVICE LINE

Committee Members

PHYSICIANS

Michael J. Messino, MD, Medical Oncology, Chairman
Randall Johnson, MD, Surgery, Cancer Liaison Physician
Paul Ahearne, MD, Surgical Oncology
Michael Teaford, MD, Pathology
David Schuetze, DO, Pathology
Eric Kuehn, MD, Radiation Oncology
Kellie S. Condra, MD, Radiation Oncology
Matthew Hull, MD, Radiation Oncology
Christopher H. Chay, MD, Medical Oncology
Gregory Pollack, MD, Medical Oncology
Rachel Raab, MD, Medical Oncology
Wieslawa Pekal, MD, Medical Oncology
Trevor Austin, MD, Medical Oncology
Shonda Asaad, MD, Medical Oncology
Raymond Thertulien, PhD, MD, Medical Oncology
Praveen Vashist, MD, Medical Oncology
Peter H. Rosal, MD, Radiology
Sheri Fleeman, MD, Radiology
Krystal Bottom, MD, Pediatric Medical Oncology
Doug Scothorn, MD, Pediatric Medical Oncology
Michael Parmer, MD, Palliative Care
Donald Gajewski, MD, Orthopaedic Oncology

NON-PHYSICIANS

Jonathan Bailey, VP, Administration
Marika Loveless, MHA, RN, Administration
Diane Walter, PharmD, Pharmacy
Jolynn Sessions, PharmD, Pharmacy
Stephen Aiken, PharmD, Pharmacy
Melanie Clark, RN, Pediatric Oncology
Dawn Neuhauser, MSN, RN, Outpatient Infusion
Darren Coleman, MSN, RN, Inpatient Oncology
Kerry Crandall, MS, CGC, Genetics
Camilla Shanahan, MS, CGC, Genetics
Lynn Dressler, DrPH, Personalized Medicine
Janet Magruder, RN, Breast Nurse Navigator
Denise Steuber, RN, Breast Nurse Navigator
Charlotte Lail, RN, Lung Nurse Navigator
Carol Logan-Thompson, MSN, RN, Lung Nurse Navigator
Penny Stollery, MSN, ANP-C, Survivorship Clinic
Cathi Durham, MBA, MHA, Business Development
Shirley Ballantyne, RN, Integrative Health
Linda Silwedel, RN, Integrative Health
Amanda Pearson, Administrative Assistant
Donna Borowski, Nicotine Cessation System Wellness
Stephanie Porter, RN, Outpatient Infusion & Research
Remonia Ashmore, RN, Outpatient Infusion
Mary Etta Hartwick, RN, Research
Leslie Verner, RN, Research
Mike Heilig, DPT, Rehab Services
Elizabeth Tilley, MA, ACS Representative
Sally Kodaras, LCSW, ACS Patient Navigator
Christen Fulk, Foundation
Sedope Kunutsor, MPH, CTR, Cancer Registry
Alan Hudson, Administrative Assistant
Stephanie Kiser, Community Health

Alice Myer, LCSW, Hope Women’s Cancer Center
Carey Baumgarten, LCSW, SECU Cancer Center
Jody Fearon, RN, Outpatient Infusion Navigator
Laura Pustinger, BSRT, Radiation Therapy
Reida Schremp, RN, Case Management
Sam Sadri, Performance Improvement
Jeffrey Whitridge, RD, Clinical Nutrition
Lyndsay Mountz, Marketing
Cathy Trimby, Performance Improvement
Jon Brown, VP, Information Technology
Anna Eller, RN, Nurse Educator
Cora McPherson, Business Planning
Dianna Traylor, MSN, Oncology Informatics
Tony Mai, PharmD, Oncology Informatics
John Coletti, Physics – Radiation Therapy
Debbie Kent, RN, Breast Nurse Navigator
2015 MISSION ONCOLOGY SERVICE LINE
Program Highlights

Relay for Life – On May 30th, the Buncombe County American Cancer Society 2015 Relay for Life took place at Carrier Park. More than 25 teams were there to support the event. Honorable speakers including Dr. Michael Messino and Dr. Eric Kuehn shared some encouraging words. Survivors and their families also shared inspirational stories of their experiences through their cancer journey. Multiple activities were hosted during the event including the Dunk Tank, which was clearly a hit and drew a lot of participants. There were activities for children, educational information on nutrition, healing touch, coin toss, and pet therapy among others. Our survivors enjoyed the several gifts, baskets and giveaways. We are happy and proud to say we raised over $7,000 in support of cancer management, research and awareness. The evening concluded with a walk around the track towards the luminaries, which were lit in honor and memory of someone special. The team work exhibited was remarkable and clearly showed our connection and support as a community – whether as a survivor, family member, friend or care provider.

The Annual National Cancer Survivor’s Day – This day signifies “Celebration of Life” held nationwide and around the world on the first Sunday of June. Here at the SECU Cancer Center, we had the opportunity to recognize this day on Tuesday, June 9th. Many of our healthcare providers made it possible to host multiple educational sessions or tables to provide information, answer questions, provide support and celebrate the lives of our patients and families. During this colorful and positive event, we were able to connect with over 400 survivors who left the building feeling supported and inspired.

Personalized Medicine – We are excited to welcome Lynn Dressler, Dr.P.H, Director of Mission Health Personalized Medicine program to the cancer program team. Dr. Dressler has worked in the cancer field for over 34 years and has over 30 years of experience with transitional research in cancer, health policy research and participated in the research study that directly led to the FDA approval of the HER FISH ASSAY, one of the first personalized medicine tests in solid tumors. Dr. Dressler states, “Unfortunately, we do not have all the science needed to test and treat all the different cancers but we are making incredible progress. Just in the last 5 years, patients with certain forms of advanced or metastatic lung cancer and melanoma are now being given targeted therapy with dramatic improvements.” Dr. Dressler, partnering with our physician providers, brings the opportunity to Mission to move cutting edge, clinically useful testing into clinical care and make a difference in the lives of cancer patients. Dr. Dressler comments, “To be able to provide these services to the local community, where the majority of cancer patients are treated, this is the best job I could have dreamed of.”
Research Study – Dr. Christopher Chay, Medical Oncologist, was recognized for being the first provider in the United States to enroll a patient on an international trial for Multiple Myeloma by Millennium. Dr. Chay worked with Research Nurse, Karen Smith on this study which looked at the effectiveness of the drug ixazomide citrate which is supposed to slow disease progression and improve overall survival in patients with newly diagnosed multiple myeloma. These are patients who have had a major positive response to initial therapy and have not undergone stem cell transplantation.

Camp Bluebird – Camp Bluebird is a three-day retreat for adults with cancer. This event is held in May and October of each year in the beauty of the mountains of Western North Carolina at the Bonclarken Assembly in Flat Rock. This camp offers a unique experience for adult cancer patients by providing a creative and educational atmosphere of support. The purpose of the camp it to create time for listening and learning, time for sharing and caring, analysis of lifestyle adjustments when living with cancer, how to incorporate family support in the management of patients with cancer, assessment of non-medical needs and ways to meet those needs, educational assistance for medical concerns, management of treatment side effects, nutritional education and information, and creative outlets through arts and crafts. Camp Bluebird is sponsored by Mission Hospital and the AT&T Telephone Pioneers. The AT&T Telephone Pioneers are active and retired employees who join together to meet a variety of community needs. The name of the camp originated from the Pioneers’ project of preserving bluebirds in the Southeast. The bluebird is symbol of hope. Campers had the opportunity to build a bluebird house as a reminder of the lessons and joys of camp.

Cancer Transitions…Moving Beyond Treatment – Cancer Transitions™ is a free 2.5 hour, four week workshop designed to help cancer survivors make the transition from active treatment to post-treatment care. Expert panelists including physicians, nurses, nutritionists and fitness experts discuss exercise tailored to each participant’s abilities, training in relaxation and stress management, and tips for nutritious eating. The presentations offer opportunities to directly address the emotional and social hurdles they face during this time of change. Research has shown that men and women who participate experience:

- Less worry about the negative impacts of cancer
- Better physical and social functioning
- More commitment to physical activity
- Abstinence from fat-related dietary habits.

Courses offered include:

- Take Control of Your Survivorship and Exercise for Wellness
- Emotional Health and Well-being
- Nutrition Beyond Cancer and Medical Management: What You Need to Know and Moving Beyond Treatment.
Mission Health Cancer Registry is designed to collect, manage, analyze and report complete information on cancer patients newly diagnosed and/or treated at Mission and its member hospitals. Every single eligible case recorded or abstracted must meet the quality criteria established by the Facility Oncology Registry Data Standards (FORDS). Statistical information gathered from this data is used by area physicians, the American Cancer Society, the North Carolina Central Cancer Registry, the National Cancer Data Base and local hospitals to review trends and outcomes for cancer patients. Monitoring survival statistics and disease recurrence helps improve the standard of care for patients who have cancer, certain diseases of the blood and lymphatic systems and non-malignant brain tumors, as well as providing data to prompt new research studies and clinical trials. Hospital administration and medical staff benefit from using cancer registry data for resource planning, physician recruitment and cancer program marketing, among other uses.

In 2015, we decided to implement a regional cancer registry. This was achieved by collaborating the cancer registries at Mission Hospital, McDowell Hospital, Angel Medical Center, Blue Ridge Regional Hospital and Transylvania Regional Hospital into one Electronic Registry System (ERS). Processes such as casefinding, data capturing (abstracting), quality assurance and follow-up were streamlined to ensure consistency and completeness of the data collected. This merge allows better monitoring of patient flow within the Mission Health System, accurately trending patient volume, and monitoring types and locations of services provided. This collaboration also ensures data reporting compliance according to the North Carolina Central Cancer Registry and National Cancer Data Base guidelines.

The cancer registry maintains a complete database of cancer cases diagnosed and/or treated at Mission Health since January 2000. Since that time, approximately 46,800 patients have presented to Mission Health for diagnosis or treatment of some type of malignancy, with an additional 3,910 cases reported in 2015. All living patients in the registry are required to be followed throughout their lifetime. Long-term follow-up is essential to evaluate outcomes of cancer care. Accurate follow-up data enables the program to compare outcomes with state, regional or national statistics. The data analysts (Registrars) regularly review inpatient visits, outpatient discharge and other external sources to obtain current information on our patients. Letters are also sent to the managing physicians and patients to obtain updated information.

Each year, complete and accurate data for all requested analytic cases are submitted to the National Cancer Data Base (NCDB). Data submitted to the NCDB are used to provide feedback to assess the quality of patient care. This feedback enables cancer programs to compare treatment and outcomes with state, regional and national patterns of care.

The NCDB is a nationwide oncology outcomes database used as a clinical surveillance mechanism to monitor changes and variation in patterns of cancer care and patient outcomes. The NCDB data provides useful benchmarks for patient care and continuous quality improvement for cancer programs.

Sedope Kunutsor, MPH, CTR
Manager, Cancer Data Services
2000-2015
Annual Cancer Case Volume

<table>
<thead>
<tr>
<th>Year</th>
<th># of cases</th>
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<tr>
<td>2001</td>
<td>1,971</td>
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<td>2002</td>
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<td>3,559</td>
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<tr>
<td>2014</td>
<td>3,726</td>
</tr>
<tr>
<td>2015</td>
<td>3,910</td>
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The statistics presented below for Mission Health are based on the actual number of new cancer cases seen at our facilities in 2015 with the exception of carcinoma in-situ of the cervix, squamous cell and basal cell skin cancers and intraepithelial neoplasia cases. Also excluded from the statistical analysis are cases that were diagnosed and received all treatments at other facilities prior to referral to any of Mission’s facilities at the time of progression of disease.

Analytic Case:
A case that was diagnosed at Mission or cases in which all or part of the first course of therapy was given at Mission after the reference date.

Non-Analytic Case:
A case involving a patient who was diagnosed and treated elsewhere or was diagnosed and treated prior to the reference date. These patients are excluded from the survival statistics.
MISSION CANCER CARE

2015 Cancer Incidences

<table>
<thead>
<tr>
<th>PRIMARY SITE</th>
<th>ANALYTIC CASES</th>
<th>STAGE AT DIAGNOSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Cases</td>
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<tr>
<td>ALL SITES</td>
<td>3,172</td>
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<tr>
<td>ORAL CAVITY</td>
<td>68</td>
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</tr>
<tr>
<td>LIP</td>
<td>5</td>
<td>0%</td>
</tr>
<tr>
<td>TONGUE</td>
<td>28</td>
<td>1%</td>
</tr>
<tr>
<td>OROPHARYNX</td>
<td>6</td>
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</tr>
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<td>HYPOPHARYNX</td>
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<td>0%</td>
</tr>
<tr>
<td>OTHER</td>
<td>28</td>
<td>1%</td>
</tr>
<tr>
<td>DIGESTIVE SYSTEM</td>
<td>524</td>
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<tr>
<td>ESOPHAGUS</td>
<td>32</td>
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<tr>
<td>STOMACH</td>
<td>43</td>
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<tr>
<td>COLON</td>
<td>160</td>
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<tr>
<td>RECTUM</td>
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<tr>
<td>ANUS/ANAL CANAL</td>
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<tr>
<td>LIVER</td>
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<td>2%</td>
</tr>
<tr>
<td>PANCREAS</td>
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<tr>
<td>OTHER</td>
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<td>1%</td>
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<td>RESPIRATORY SYSTEM</td>
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<tr>
<td>NASAL/SINUS</td>
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<tr>
<td>LARYNX</td>
<td>26</td>
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<tr>
<td>LUNG/BRONCHUS</td>
<td>534</td>
<td>17%</td>
</tr>
<tr>
<td>OTHER</td>
<td>9</td>
<td>0%</td>
</tr>
<tr>
<td>BLOOD &amp; BONE MARROW</td>
<td>166</td>
<td>5%</td>
</tr>
<tr>
<td>LEUKEMIA</td>
<td>92</td>
<td>3%</td>
</tr>
<tr>
<td>MULTIPLE MYELOMA</td>
<td>46</td>
<td>1%</td>
</tr>
<tr>
<td>OTHER</td>
<td>28</td>
<td>1%</td>
</tr>
<tr>
<td>BONE</td>
<td>5</td>
<td>0%</td>
</tr>
<tr>
<td>CONNECT/SOFT TISSUE</td>
<td>23</td>
<td>1%</td>
</tr>
<tr>
<td>SKIN</td>
<td>143</td>
<td>5%</td>
</tr>
<tr>
<td>MELANOMA</td>
<td>134</td>
<td>4%</td>
</tr>
<tr>
<td>OTHER</td>
<td>9</td>
<td>0%</td>
</tr>
</tbody>
</table>
## 2015 Cancer Incidences

<table>
<thead>
<tr>
<th>PRIMARY SITE</th>
<th>ANALYTIC CASES</th>
<th>STAGE AT DIAGNOSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Cases</td>
<td>O</td>
</tr>
<tr>
<td>BREAST</td>
<td>557</td>
<td>19%</td>
</tr>
<tr>
<td>FEMALE GENITAL</td>
<td>257</td>
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<tr>
<td>CERVIX UTERI</td>
<td>20</td>
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<tr>
<td>CORPUS UTERI</td>
<td>135</td>
<td>4%</td>
</tr>
<tr>
<td>OVARY</td>
<td>65</td>
<td>2%</td>
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<tr>
<td>VULVA</td>
<td>24</td>
<td>1%</td>
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<tr>
<td>OTHER</td>
<td>13</td>
<td>0%</td>
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<tr>
<td>MALE GENITAL</td>
<td>173</td>
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</tr>
<tr>
<td>PROSTATE</td>
<td>160</td>
<td>5%</td>
</tr>
<tr>
<td>TESTIS</td>
<td>11</td>
<td>0%</td>
</tr>
<tr>
<td>OTHER</td>
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</tr>
<tr>
<td>URINARY SYSTEM</td>
<td>237</td>
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<tr>
<td>BLADDER</td>
<td>130</td>
<td>4%</td>
</tr>
<tr>
<td>KIDNEY/RENAL</td>
<td>94</td>
<td>3%</td>
</tr>
<tr>
<td>OTHER</td>
<td>13</td>
<td>0%</td>
</tr>
<tr>
<td>BRAIN &amp; CNS</td>
<td>166</td>
<td>5%</td>
</tr>
<tr>
<td>BRAIN (BENIGN)</td>
<td>18</td>
<td>1%</td>
</tr>
<tr>
<td>BRAIN (MALIGNANT)</td>
<td>57</td>
<td>2%</td>
</tr>
<tr>
<td>OTHER</td>
<td>91</td>
<td>3%</td>
</tr>
<tr>
<td>ENDOCRINE</td>
<td>82</td>
<td>3%</td>
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<tr>
<td>THYROID</td>
<td>59</td>
<td>2%</td>
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<tr>
<td>OTHER</td>
<td>23</td>
<td>1%</td>
</tr>
<tr>
<td>LYMPHATIC SYSTEM</td>
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<td>4%</td>
</tr>
<tr>
<td>HODGKIN'S DISEASE</td>
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</tr>
<tr>
<td>NON-HODGKIN'S</td>
<td>117</td>
<td>4%</td>
</tr>
<tr>
<td>UNKNOWN PRIMARY</td>
<td>51</td>
<td>2%</td>
</tr>
<tr>
<td>OTHER/ILL-DEFINED</td>
<td>16</td>
<td>1%</td>
</tr>
</tbody>
</table>
MISSION CANCER CARE

2015 Cancer Cases by County

Other Locations:

- Catawba County - 2
- Cleveland County - 1
- Caldwell County - 14
- Watauga County - 1
- Wilkes County - 6
- Other County - 41
- Out of State - 48
Total Prospective Cases Presented

- **Bronchus & Lung**: 40%
- **Genitourinary**: 23%
- **Breast**: 20%
- **Gastrointestinal**: 9%
- **Other**: 8%
A finite number of didactic educational sessions are periodically held. These typically consist of lectures by nationally recognized speakers.

**Helping patients cope with cognitive changes after chemotherapy**  
Karla L. Thompson, PhD Assistant Professor and Director of Psychological Services, University of North Carolina, Chapel Hill

**Acute Myeloid Leukemia (AML)**  
Joshua Zeidner, MD University of North Carolina Lineberger Comprehensive Cancer Center

**Incorporating Palliative Care, Hospice & EOL care in Oncology Practice**  
Mary W. Dunn, NP-C OCN University of North Carolina Lineberger Comprehensive Cancer Center

**Supporting patients with advanced cancer who are parents of dependent children**  
Eliza M. Park, MD Assistant Professor of Psychiatry, University of North Carolina Lineberger Comprehensive Cancer Center

**Addressing the challenge of endocrine resistance in advanced breast cancer**  
Maria Theodoulou, MD Memorial Sloan Kettering Cancer Center, NY

**21 – Gene RT – PCR assay and DCIS Score Clinical update**  
John David Pluennke, Genomic Science Liaison in Medical Affairs, Genomic Health

**Recent advances in Radiation Oncology**  
Michael Eblan, MD (Chief Resident) & Andrew Z. Wang, MD (Associate Professor), University of North Carolina, Chapel Hill

**Review of Head and Neck Cancer**  
Brien Pace, RN, MSN, ACNP-BC University of North Carolina Hospitals, Chapel Hill

**Late effects of Childhood Cancer**  
Julie Blatt, MD Professor, Dept. of Pediatric Hematology Oncology, University of North Carolina, Chapel Hill

**Gynecologic Malignancies Update 2015**  
Wendy Brewster, MD, PhD, University of North Carolina, Chapel Hill

**Oncologic Imaging: A Multidisciplinary Approach**  
Univ. of Texas MD Anderson Faculty and MAHEC physicians. Moderated by Paul M. Silverman, MD

**Annual Personalized Medicine Conference for Primary Care & Specialists**  
Lynn G. Dressler, Dr. P. H. Director, Personalized Medicine and Pharmacogenomics, Mission Health

**Pediatric Oncology – Past, Present and Future Directions**  
Stuart Gold, MD Professor, Pediatric Hematology Oncology, University of North Carolina, Chapel Hill

**Continuum of Care - Psychosocial Distress Screening**  
Jean Sellers, RN, MSN Clinical Director, University of North Carolina Lineberger Comprehensive Cancer Center

**Enhancing the patient voice in clinical care through patient-reported data**  
Bryce Reeve, PhD, Professor, University of North Carolina Lineberger Comprehensive Cancer Center
The Mission Clinical Research Program at the SECU Cancer Center has grown to Breast tomosynthesis (also known as 3D mammography) is a way of acquiring multiple image slices of the breast, similar to a CT scan. Adding tomosynthesis to a regular mammogram has been shown to increase cancer detection by 40%. Most of the additional cancers detected are small early invasive cancers. Tomosynthesis has also been shown to decrease patient callbacks for additional imaging. This reduces one of the supposed ‘harms’ of mammography screening by approximately 20%.

The Mission Breast program is a multidisciplinary group of oncologists, breast surgeons, radiation therapists, geneticists, pathologists and radiologists with special training in the detection and treatment of breast cancer. We strongly encourage women to start screening mammography every year beginning at age 40. There is no controversy that this schedule saves the most lives. It has been calculated that if patients are screened every other year beginning at age 50, the number of women dying of breast cancer in the United States will increase from 40,500 to 47,000 each year.
MISSION CANCER CARE

Pediatric Hematology-Oncology Program

Project Summary

One of the most significant determinants of outcome for pediatric oncology patients admitted to the hospital with a febrile illness is the time from admission to the start of antibiotic administration. Numerous published reports have identified 60 minutes as the ideal target time from admission to antibiotics. This project was designed to determine how well our program was doing in reaching that target, identify areas for which intervention may decrease that time, and to implement changes in the process which may help us reach that target.

Baseline Data

All pediatric oncology patients admitted directly to Mission Hospital in 2014 were identified by systemic chart review. The following data were collected for each admission:

1. Time of admission
2. Start time of antibiotic administration
3. Time of antibiotic order entry
4. Time of lab draw [as a surrogate of time of obtaining IV access]
5. Antibiotic choice
6. Absolute Neutrophil Count [ANC] at presentation

Overall, 48% (14/29) of pediatric oncology patients admitted with fever in 2014 received antibiotics within 60 minutes of admission. Only 33% of patients ultimately found to have ANC < 500 received antibiotics within 60 minutes of admission. In comparing patients who received antibiotics in < 60 minutes, with those who received antibiotics in > 60 minutes, it is clear that the major factor associated with rapid antibiotic administration is placement of order for antibiotics within 15 minutes of admission.

Interventions

1. All pediatric oncology patients who are directly admitted with febrile illnesses will receive IV Ceftriaxone (unless patient has a documented allergy). This order should be placed as soon as the patient is pre-registered. The order for antibiotics should not be held until the results of the CBC are available.

2. Standardized Ceftriaxone dosing for patients > 10kg.
   a. Patients 0-10kg = Dose 75mg/kg
   b. Patients 10 – 20kg = Dose 1000mg
   c. Patients > 20kg = Dose 2000mg
   d. Patients with Cephalosporin Allergies
      i. Patients > 6 months old: Levofloxacin 10mg/kg/dose
      ii. Patients < 6 months old: Meropenem 20mg/kg/dose

3. Pharmacy stocked 1000mg and 2000mg doses of Ceftriaxone in the Pyxis on the Pediatric floor
Timeline for Project Implementation

1/21/2015  Project Concept Developed
2/2/2015  Initial Feasibility Meeting with Pediatric Hospitalists
3/6/2015  Submission of Project Concept to MMA
3/17/2015  Project Presentation to Oncology Service Line
4/15/2015  Completion of Baseline Data Analysis (2014)
4/22/2015  Finalization of Project Details
5/2/2015  Implementation Meeting with Pediatric Hospitalists
5/27/2015  Project Review with Pediatric Pharmacists
5/27/2015  Request for Febrile Neutropenia PowerPlan Submitted
7/14/2015  Updated PowerPlan Finalized
8/19/2015  PowerPlan Reviewed by Clinical Plan Committee
8/24/2015  PowerPlan Approved by Clinical Plan Committee
9/22/2015  Febrile Neutropenia PowerPlan Uploaded into Cerner
10/1/2015  All processes finalized and in place

Post-Intervention Data Collection

All pediatric oncology patients admitted directly to Mission Hospital from July 1, 2015 through December 31, 2015 were identified by systemic chart review (as was done during collection of the baseline data). The following data were collected for each admission:

1. Time of admission
2. Start time of antibiotic administration
3. Time of antibiotic order entry
4. Time of lab draw [as a surrogate of time of obtaining IV access]
5. Antibiotic choice
6. Absolute Neutrophil Count [ANC] at presentation

Over the time period for which the data were collected, 22 pediatric patients were directly admitted to the hospital with febrile illnesses. Of these patients, 18 received antibiotics within the recommended 60 minute time-frame (82%).

As is apparent from the above timeline, final implementation of the project was not completed until October 1, 2015. If only those patients who were admitted with febrile illnesses between October 1, 2015 and December 31, 2015 are considered, 16 of 17 patients (94%) received antibiotics within the 60 minute time-frame.
These results are summarized in the chart below:

Patients Receiving Initial Antibiotics within 60 Minutes of Presentation

- **Physician Champions:**
  - **Krystal Bottom, MD**
    Pediatric Hematology & Oncology
  - **Douglas Scothorn, MD**
    Pediatric Hematology & Oncology
  - **Ginna Priola, MD**
    Pediatric Hematology & Oncology
Introduction

What is Personalized Medicine? Personalized Medicine evaluates the genetic and genomic mutations found in an individual cancer patient’s tumor to predict which cancer treatments are most likely to work for that patient. With advances in the field of cancer genomic medicine, it is now standard of care in many advanced cancers to perform personalized medicine testing of a patient’s tumor to provide patients, health care providers and health insurers with information that could minimize toxic side effects from cancer drug treatment and maximize cancer drug effectiveness. Testing for a patient’s response to drugs, before they get the drug, makes good clinical sense, meets best practices and FDA recommendations and provides clinicians and patient’s key information to enhance patient drug management. Personalized Medicine holds the promise of optimizing cancer patient experiences and quality of life, and decreasing cost of care. Overall, personalized medicine testing strives to replace the trial and error approach to management of cancer with a scientifically, individually guided approach.

How does Personalized Medicine work? In cancer patients, tests are performed on the patient’s individual tumor to analyze mutations that are associated with tumor growth. We then try to match the tumor mutation(s) to drugs that target those mutations. By using “targeted therapy” we can utilize the most effective drug to target (and hopefully destroy) the tumor cells that carry the mutation, and leave the normal cells intact. This should lead to less toxicity and more effective management of the cancer for each patient.

What are the accomplishments for 2015?

Innovation and Program Development: Developed the first integrated tumor marker program at Mission Cancer Center: The purpose of this program is to provide a uniform, inter-disciplinary approach to tumor marker testing to predict response to cancer therapy. The program includes education and training; meeting or exceeding national guidelines for tumor marker testing; conducting quality improvement studies to ensure we are following guidelines; streamlining the process/communication of test ordering, sample submission and results interpretation; and enhance opportunities for our patients to participate in genomic research.

Access to Genomic Profiling in Advanced Stage Cancers: Targeted therapy has dramatically changed the landscape of how cancer patients are being treated. With personalized medicine testing, patients with advanced lung cancer and melanoma are now living longer because of new treatment options. However, over time, many patient’s cancers become resistant to the targeted therapy and the cancer recurs. Basically the cancer cells outsmart the targeted therapy and find another way to grow and survive, often acquiring different mutations to do so. Personalized medicine testing can now look at a broad spectrum of tumor mutations that are common to many different cancers and promote tumor growth. The mutations tested are those associated with targeted therapy—either FDA approved drugs already on the market or new drugs in development. For example, a particular mutation, (BRAF), common in many melanomas, may also be found in lung cancer. A lung cancer patient with this mutation could be treated with the drug used for melanoma patients. Genomic profiling looks at mutations that promote tumor growth, regardless of where the cancer occurs (lung or thyroid). In 2015, the Personalized Medicine Program (PMP) expanded the access to genomic profiling for our cancer patients and began offering clinical consultation to interpret and apply results for each individual patient getting certain genomic tests.
Highlights of Program Services

Enhancing quality, safety and consistency of cancer patient care:

- Meeting/exceeding national guidelines for tumor marker testing to predict response to therapy: Following national guidelines (NCCN, ASCO, and ACMG) the PMP worked with oncology, pathology and genetics to develop and implement three proposals for tumor marker testing: 2 in colorectal cancer (Universal testing for Lynch Syndrome in newly diagnosed colorectal cancer patients; BRAF, NRAS and KRAS testing in Stage IV colorectal cancer patients) and 1 in endometrial cancer (Universal testing for Lynch Syndrome in newly diagnosed endometrial cancer patients). Somatic testing for Lynch Syndrome for colorectal and endometrial patients is of critical importance to help understand if the patient’s tumor may be a result of an inherited syndrome that places that patient (and their family) at high risk for the development of multiple cancers. Testing for certain mutations in the tumor tissue can help understand the likelihood of an inherited syndrome as well as provide physicians and patients with important information about clinical management of the disease. Testing Stage IV colorectal cancer patients for certain markers can help the physician and patient better understand response to certain drugs as well as prognosis.

- Quality Improvement studies: Quality improvement (QI) studies evaluate how well we are following guidelines once they have been implemented in our center. Building on the work conducted in 2014 to develop and implement proposals for testing Stage IV Lung Cancer patients (non-small cell lung cancer with a certain histology) for 3 critical mutations to predict response to targeted therapy (EGFR gene mutation, ALK and ROS gene translocations), the PMP sought to evaluate how well we were following the proposals approximately 1 year after implementation. Evaluating all relevant Stage IV Lung cancer patients (NSCLC, ADC), we found that eligible patients were routinely being tested. For those patients who did not get tested, there was good clinical justification (for example, patients refused treatment or testing; patients did not live long enough for testing; patients received testing from another hospital).

- Education of providers and patients regarding Personalized Medicine Cancer Testing: The PMP sponsored three speakers to discuss different aspects of personalized medicine testing, including Dr. Mark Dunnenberger, a former resident with St Jude’s Hospital, who spoke to our pediatric oncology program regarding clinical applications of personalized medicine testing in pediatric cancers, especially acute leukemia; Dr. Juliann Chmeieleck, who spoke to our Thoracic Cancer program regarding applications and new testing in thoracic cancer (lung and bronchus); and Dr. Lincoln Naddud, who spoke at Mission’s cancer grand rounds about InterMountain Health’s Cancer Genomics and Precision Molecular Oncology Program.
Publications, Presentations, Honors and Grants

- Grant funding: North Carolina Biotechnology Center Presidential Award. $45,000 (Lynn Dressler). The Western North Carolina Personalized Medicine Demonstration Project. This demonstration project utilizes personalized medicine testing in primary care to help predict which drugs might be most effective and/or have the least side effects to treat a patient’s condition. Personalized medicine testing provides opportunities to enhance patient care, decrease costs of care, and increase economic growth for our state. Start date: February 01, 2016.

- National invitation by NIH IGNITE Consortium: To be an Affiliate Member, making Mission’s Personalized Medicine Program the first non-academic site to join the consortium. IGNITE’s purpose is to implement genomics and personalized medicine to improve the public’s health.

- Peer-reviewed scientific article: This study evaluated over 8000 cancer patients who were participating in a clinical drug trial and found that both patient ethnicity and place where they received care were factors influencing patient participation in pharmacogenomics studies. This study has led several sites to re-evaluate their approach and infrastructure to allow all interested patients to participate in genomic research.


Two National Presentations


Plans for 2016

- Expand services to cover all cancer tumors: A member of the PMP team will be covering each of the tumor boards including newly developed tumor boards.
- Expand consultation services for genomic profiling in 2016 to help providers and patients interpret and apply results from complex comprehensive genomic profiling
- Coordinate and integrate services with genetics to bring in house testing for Leukemia patients
- Conduct quality improvement projects in Lynch Syndrome and Oncotype Dx Testing

Lynn Dressler, Dr. P.H.
Director, Personalized Medicine
Prior to 2014, the presence and concept of “Outpatient Oncology Clinical Pharmacy” was new to the Mission Cancer Program. In May 2014, a board certified oncology clinical pharmacist was hired to develop a clinical pharmacist program and training program for student and resident pharmacy learners at SECU Mission Cancer Center with University of North Carolina Eshelman School of Pharmacy. Oncology clinical pharmacists can provide many services to patients and other healthcare providers to include: drug therapy education, medication therapy management, optimizing standard medication plans such as order-sets or clinical pathways, symptom control associated with cancer therapies, executing quality improvement projects, clinical research, and much more. This program continues to develop and reach more patients each month.

In 2015 the Cancer Program took on a quality improvement initiative, led by the oncology clinical pharmacist group, which would ultimately shorten infusion times and visit times for patients receiving rituximab doses at Mission-affiliated infusion centers. Rituximab is a medication that is the back-bone of treatment for many forms of lymphoma and certain forms of leukemia. It is a highly effective drug, but because of the way it works and the diseases it is used to treat, there is a chance of an allergic/hypersensitivity reaction with early doses. Because of this, the patient’s first infusion is generally given very slowly over 5 to up to 24 hours. Subsequent infusions could be shortened, but still take 3 to 6 hours to infuse. In 2012 following several successful trials demonstrating safety, the Food and Drug Administration updated the labeling of rituximab to allow 90 minute infusions of rituximab, for second and subsequent infusions of rituximab. The study at SECU Mission Cancer Center established the 90 minute infusion as our new standard of care. This study was approved by the Mission Research Institute and Investigational Review Board. We retrospectively reviewed 265 infusions and prospectively reviewed 51 infusions to assess safety and duration of infusion/ chair time. Additionally, satisfaction surveys were given to both patients and the nursing staff.

Table shows patient survey data comparing their satisfaction of “traditional” infusion times versus “rapid” rituximab.
Table shows patient survey data comparing their satisfaction of “traditional” infusion times versus “rapid” rituximab.

Nursing staff, similarly, were satisfied with the new rapid-rituximab program. This effort decreased infusion times by more than 1.5 hours per patient per dose. Safety and incidence of allergic/hypersensitivity reactions were similar in both groups. Additionally, the decreased chair time for the rituximab infusions enables Mission Cancer Center to provide care to more patients who need our infusion center services. The rapid rituximab protocol has been instituted at Mission’s regional infusion center partners. The impact has been great, as it is estimated that we provide approximately 700 outpatient doses of rituximab per year.

Jolynn K. Sessions, PharmD, BCOP
Oncology Clinical Pharmacist
Associate Professor of Clinical Education
Mission Cancer Center and UNC Eshelman School of Pharmacy
Oncology Nursing and Pharmacy

Mission Cancer Center’s Main Campus at 21 Hospital Drive has an Outpatient Infusion Center which consists of 36 chairs and 6 beds with a view of the city. We have an onsite pharmacy with two chemotherapy hoods for mixing chemotherapy. This allows us to provide prompt service to our patients. Patients enjoy the ability to access our short treatment area for injections and short infusions. Mission Cancer Program also has a Women’s Cancer Center at 100 Ridgefield Court in Asheville. This outpatient infusion center has 12 chairs and 1 bed.

Our Nursing and Pharmacy teams have oncology specialty training. Inpatient and Outpatient Oncology nurses complete the ONS Chemotherapy Biotherapy Course and competency training prior to the ability to administer chemotherapy to patients. Numerous oncology nurses are Oncology Certified through the Oncology Nursing Society. Radiation Oncology Nurses have specialty training in the field of Radiation Oncology Nursing. 100% of our Pediatric Oncology Nurses maintain the Pediatric Advanced Life Support Certification and are specialty trained in Pediatric Oncology. Many of our Oncology Pharmacists are Oncology Board Certified.

Our team works together to ensure the patient has an excellent experience as evidenced by our focus on patient safety, patient education, compassionate care and quality of care. This is evident by our patient satisfaction scores which are consistently over 90th percentile. The team begins their day by hosting Safety Huddles to review treatment plans for the day. As a service to patients, a patient copay assistance program and replacement drug programs were initiated. Standardization of drug regimen templates have been initiated based on NCCN Guidelines and are considered Best Practice.

Marika Loveless, RN, MHA, OCN
Executive Director, Mission Health Cancer Program
Outpatient rehabilitation services had many growth opportunities in 2015. Speech therapy services started at the cancer center in 2014, followed by physical therapy in the second quarter of the 2015 fiscal year. Earlier that year, therapy services restructured and centralized referral management was implemented. This made the process easier for physicians to refer their patients. In addition, patients had one number to call to set up or change their appointments.

Rehab therapy services are actively involved in care pathway planning. In 2015 the cancer center had their first Head and Neck Multidisciplinary work group to outline pathways for patients diagnosed with head and neck cancer. Concurrently, speech therapy participates in weekly head and neck rounds with other team members. Therapists serve on the Survivorship Steering Committee. There were multiple presentations on when to refer to therapy (see table below) as well as how to use the Distress Inventory to help determine need for services. Other collaboration occurred with physicians seeing patients with breast cancer. Rehab services provided screening tools to help identify those patients who would benefit from skilled therapy services.

Rehabilitation services played an active part in the community outreach programs such as the YMCA LiveSTRONG program. In addition, therapists participated in Camp Bluebird where they screenings for lymphedema and other therapy-related issues for cancer survivors. There was ongoing collaboration for compression garment financial assistance resources for patients as well.

Mike Heilig, PT OCS
Executive Director of Outpatient Services
CarePartners

Laura Dylus, MSPT, NCS
Outpatient Clinical Manager
CarePartners
Patient and Family Counseling Services

When a person receives a cancer diagnosis, the impact on that individual and loved ones extends way beyond the physical symptoms and medical treatment; it is often a life-changing event for everyone who is intimately involved. Mission Cancer Care is acutely aware of the multi-faceted disruption caused by this disease and is committed to proving whole-person, patient centered care; we provide extensive support services that address the emotional, relational, spiritual, practical and financial challenges experienced by patients and their family members/caregivers.

Both Hope Women’s Cancer Center and the SECU Cancer Center provide individualized assistance with accessing financial and community resources to ease the burden for patients and families. We are fortunate to have an American Cancer Society Patient Resource Navigator who is able to connect patients with ACS and community resources. It is common for patients, their families and caregivers to experience times of emotional and or spiritual turmoil; these struggles can have a profound impact on all aspects of life and can even impact the success of cancer treatment. Patient and Family Counseling and Spiritual Care are now available as part of our support services program in both of our Asheville centers. Clinical Social Workers, Alice Myer, LCSW (Hope) and Carey Baumgarten, LCSW (SECU) provide supportive counseling services; they offer individual and family sessions as well as support groups. In counseling sessions, they help people clarify their needs and concerns, validate their strengths and help patients find better ways to cope with diagnoses, treatment side effects, general life disruption and survivorship.

In early 2015, Mission Cancer Care implemented a distress screening protocol that asks patients to identify a range of concerns from physical symptoms, fertility and nutrition issues to challenges finding and/or affording things like childcare, transportation and medication. The screening also asks people if they are struggling with emotions like fear, depression or sadness or if they have spiritual concerns or worry about other family members’ health. This screening tool allows us to identify patients who are struggling but might not ask for assistance. We are able to use this tool to connect them with Mission professionals and or community partners who can address specific needs, and this contributes significantly to stress reduction, improved coping and better outcomes for all concerned.

Alice Myer, LCSW
Hope Women’s Cancer Center

Carey Baumgarten, LCSW
Mission SECU Cancer Center