Virtua Fox Chase Cancer Program
2013 Annual Report
Message from the Medical Directors

Virtua is a multi-hospital healthcare system with facilities in Mt. Holly, Marlton, Voorhees, Berlin, Washington Township and Moorestown. The Virtua Fox Chase Cancer Program (VFCCP) serves Burlington, Camden and Gloucester counties and their surrounding communities in central and southern New Jersey.

VFCCP is accredited by both the American College of Surgeons Commission on Cancer and by the National Accreditation Program for Breast Centers. Accreditation by both of these organizations provides many notable benefits that enhance our quality of care by providing our patients with a full range of diagnostic, treatment and supportive services including community based resources. To maintain accreditation facilities must undergo a rigorous evaluation and review of its performance and compliance with standards established by each of these organizations.

Virtua offers a wide array of surgical oncology expertise in colorectal surgery, breast cancer surgery, urologic surgery, gynecologic surgery, thoracic, otolaryngotic surgery and spine surgery. Interventional radiology facilities are available at all hospital sites. Radiation oncology facilities and medical oncology and surgical oncology practices are also available throughout our service areas.

This year 24 physicians were appointed to the Virtua Fox Chase Adjunct Faculty Panel. This panel requires physicians to surpass rigorous standards developed by Virtua and the Fox Chase Cancer Center (FCCC) in Philadelphia. All of these physicians are board certified; participate in quality assurance audits and continuing education programs and collaborate closely with FCCC physicians.

In 2013, VFCCP continued to achieve and surpass its goals and objectives including:

- Gold Three Year with Commendation Accreditation from the American College of Surgeons Commission on Cancer. Gold level is the highest level a program can achieve complying with all standards receiving commendation for 8 of those standards.
- Achieved Three Year Accreditation from the American College of Radiology for our three radiation oncology facilities;
- Affiliated with Samaritan Healthcare & Hospice to increase access to palliative and hospice services for our patients;
- Opened a new Health and Wellness facility in Moorestown;
- Launched a Thoracic Program Service Line with implementation of a lung cancer screening program;
- Launched an Infusion Task Force to improve patient satisfaction and enhance quality and safety;
- Continued to expand our breast reconstruction program with nationally known reconstructive surgeons from Fox Chase Cancer Center;
- Expanded our psychosocial distress screening already used in radiation oncology sites to medical oncology practices;
- Expanded our survivorship program services to include nutritional counseling; lymphedema clinics; additional support groups and expansion of palliative care clinics.

The 2013 Annual Report describes details of our Cancer Program and Cancer Registry statistics. This year's report focuses on an in-depth review of rectal cancer presented by Dr. Galler, Dr. Wilson and Dr. Ji.

We are looking forward to 2014, as we continue to strengthen our oncology program working with our partners Fox Chase Cancer Center in Philadelphia and Samaritan Healthcare and Hospice. We wish to thank all the staff of the VFCC Program; Fox Chase Cancer Center and Samaritan Healthcare and Hospice for their commitment to excellence in cancer care for all the communities we serve.

Sincerely,

Stephen G. Wallace, MD, Medical Director
Virtua Memorial

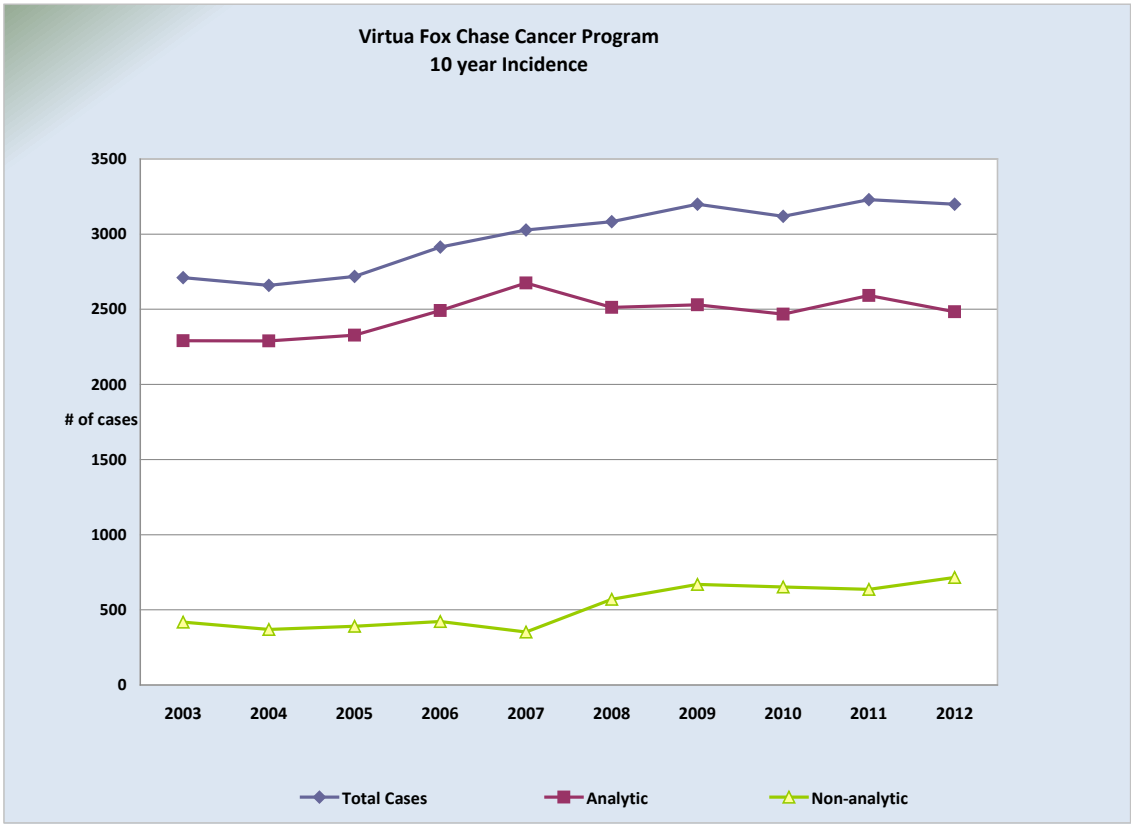
Ashok Bapat, MD, Medical Director
Virtua Voorhees

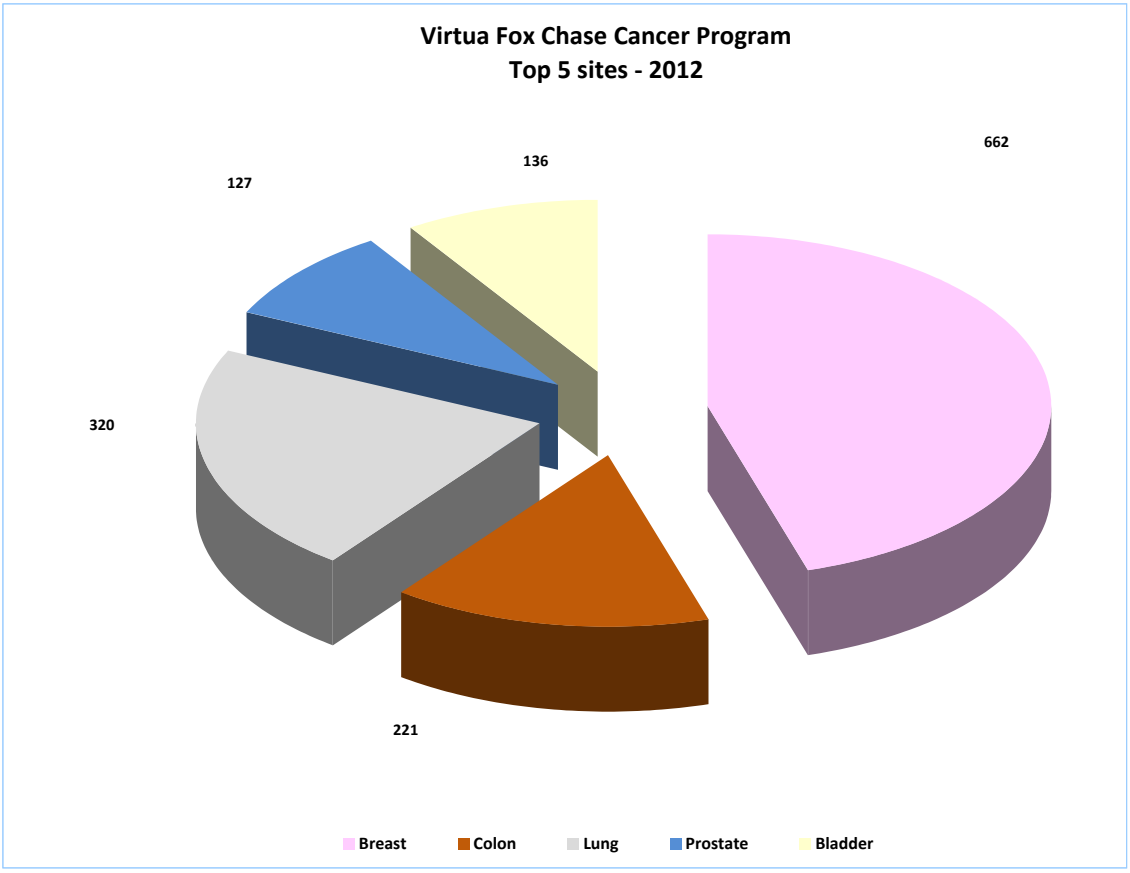
Virtua Fox Chase Cancer Program
2013 Cancer Registry Report

The Cancer Registry is responsible for the accurate, timely collection of cancer patient data which is then used for the evaluation of patient outcomes. Additionally, the Cancer Registry coordinates many of the activities of the Virtua Fox Chase Cancer Program (VFCCP) and our participation in the American College of Surgeon's (ACoS) Commission on Cancer (CoC) accredited program and the National Accreditation Program for Breast Centers (NAPBC). In April 2013, the Commission on Cancer awarded the VFCCP a Three Year with Commendation Accreditation Gold level (highest level) following our triennial survey. The CoC establishes standards to ensure high quality, multi-disciplinary and comprehensive cancer care delivery in hospitals through-out the United States granting accreditation to only those facilities that have voluntarily committed to provide the best in cancer diagnosis and treatment and are able to comply with rigorous standards.

The Cancer Registry is a primary source of data included in Virtua's Oncology Quality Dash Board which benchmarks Virtua's clinical outcomes against national standards. This year Virtua's Oncology Quality Dashboard included clinical quality measures endorsed by the National Quality Forum (NQF), American College of Surgeons (ACoS) and the National Cancer Comprehensive Network (NCCN); the National Accreditation Program for Breast Centers (NAPBC) and the Oncology Roundtable.

During 2012, the Cancer Registry collected data on 2,483 analytic patients (patients diagnosed and/or receiving their first course of treatment at VFCCP) and 716 non-analytic patients (patients with cancer initially diagnosed and treated at another facility). Breast, prostate, lung, colorectal, and bladder are the most frequently seen sites at Virtua comprising 62% of the analytic cases.





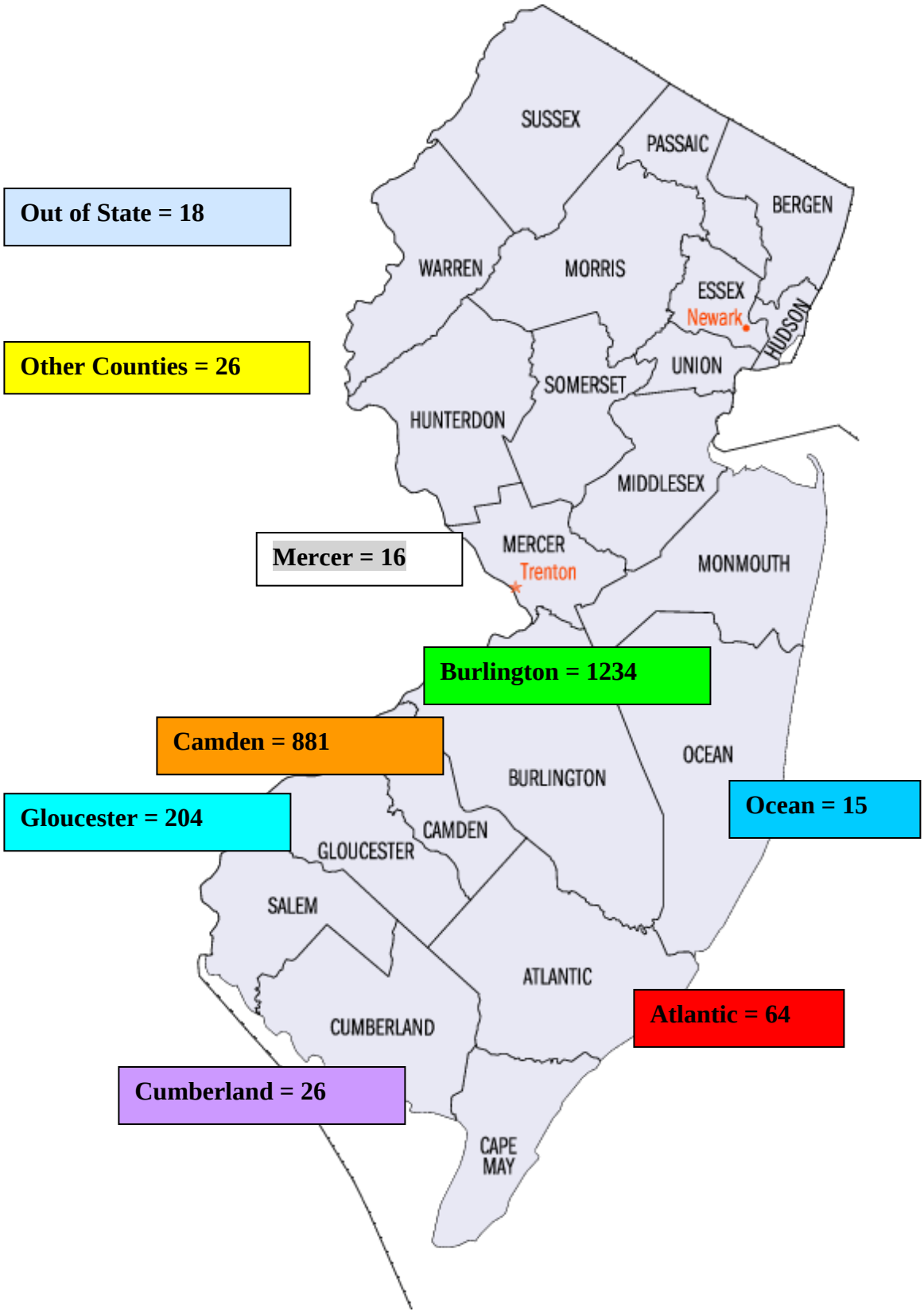
The Cancer Registry is staffed by one Lead Cancer Registrar and six Certified Cancer Registrars in the Voorhees Health and Wellness Center which covers the entire Virtua hospital system. All of the cancer registrars are certified by the National Cancer Registrars Association (NCRA) and are active members of NCRA as well as the Oncology Registrar Association (ORANJ) of New Jersey.

Medical oncologists, radiation oncologists, surgeons and pathologists perform rigorous quality assurance activities throughout the year reviewing cases accessioned in the Cancer Registry for accuracy, completeness and timeliness.

Weekly Cancer Conferences are held at the Virtua Memorial and Virtua Voorhees campuses. Cases are discussed in a multi-disciplinary format with the majority presented for consensus treatment decisions. Guest speakers from Fox Chase Cancer Center as well as other renowned oncologists participate in cancer conferences on both campuses. Site specific breast, colorectal, thoracic, thyroid, urology, and gynecologic oncology cancer conferences are held at Virtua as well.

The Cancer Registry responds to hundreds of data requests annually, supporting physicians, hospital administration and other components of the Virtua Fox Chase Cancer Program including clinical research, the nurse navigation program and the high risk programs.

Virtua Fox Chase Cancer Program
2012 Analytic Cases By County At Diagnosis



Virtua Fox Chase Cancer Program Performance Measures
National Quality Forum

The Virtua Fox Chase Cancer Program's (VFCCP) accreditation with the Commission on Cancer (CoC) American College of Surgeons requires our cancer program to submit data annually. This data is analyzed and then utilized to identify potential gaps in cancer care in an effort to improve quality of care. Annually, the CoC provides programs with Cancer Program Profile Reports on specific measures. Results of our performance measures for 2011 are as follows:

Adjuvant chemotherapy is considered or administered within 4 months (120 days) of diagnosis for patients under the age of 80 with AJCC Stage III (lymph node positive) colon cancer.

VFCCP Results: 84.4% CoC Benchmark: 90%

At least 12 regional lymph nodes are removed and pathologically examined for resected colon cancer.

VFCCP Results: 93.4% CoC Benchmark: 85%

Tamoxifen or third generation aromatase inhibitor is considered or administered within 1 year or 365 days of diagnosis with AJCC T1c or Stage IB-III hormone receptor positive breast cancer.

VFCCP Results: 96.1% CoC Benchmark: 90%

Radiation is administered within 1 year (365 days) of diagnosis for women under the age of 70 receiving breast conservation surgery for breast cancer.

VFCCP Results: 95.3% CoC Benchmark: 90%

Combination chemotherapy is considered or administered within 4 months (120 days) of diagnosis for women under 70 with AJCC T1cN0 or Stage IB-III hormone receptor negative breast cancer.

VFCCP Results: 89.6% CoC Benchmark: 90%

Virtua Fox Chase Cancer Program
2012 Analytic Case Distribution - by Site - Sex - AJCC Stage

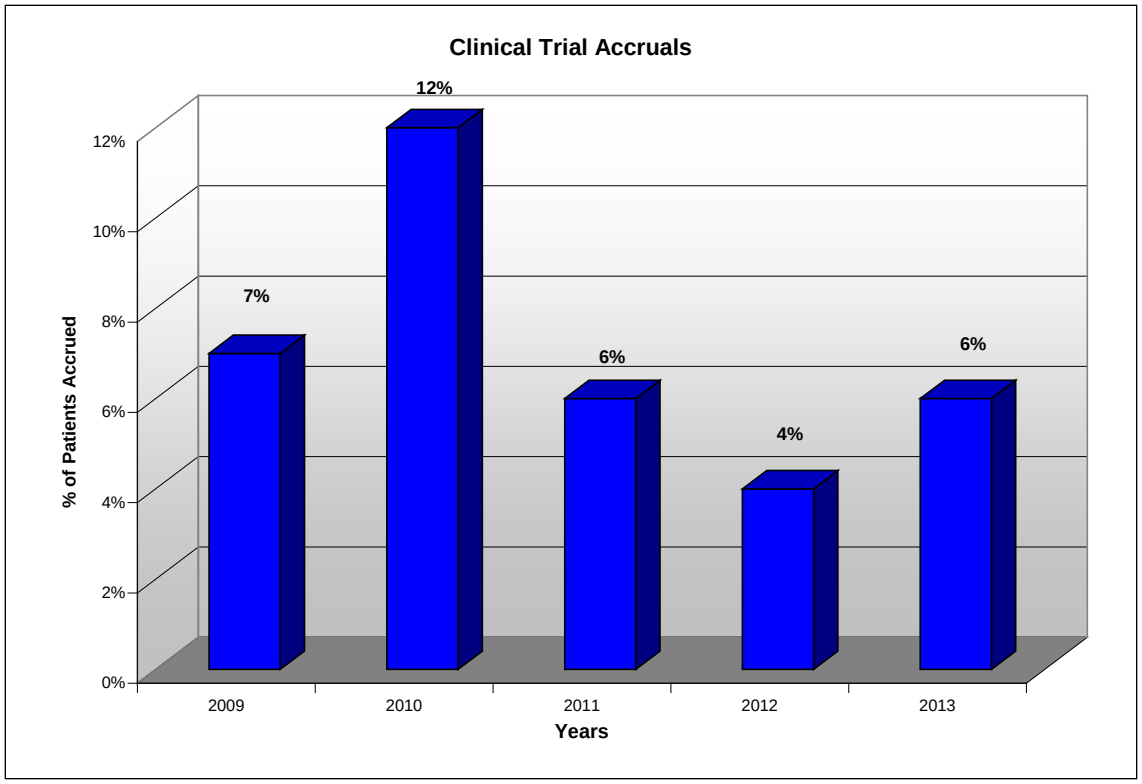
				AJCC Stage						
Primary Site	**Total Cases**	**Male**	**Female**	**0**	**1**	**2**	**3**	**4**	**N/A**	**UNK**
TOTAL:	**2483**	**940**	**1543**	**250**	**733**	**496**	**294**	**364**	**216**	**130**
Oral Cavity & Pharynx	36	24	12	1	4	6	6	16	0	3
Digestive										
Esophagus	26	18	8	0	2	4	2	8	0	10
Stomach	31	19	12	0	10	3	3	8	0	7
Small Intestine	19	8	11	0	2	3	7	3	0	4
Colon (excl Rectum)	220	101	119	11	47	59	39	46	0	18
Rectum & Rectosigmoid	86	49	37	3	12	29	19	14	0	9
Anus, Anal Canal	9	3	6	1	2	1	2	1	0	2
Liver/Intrahepatic Bileduct/Other Biliary	26	14	12	0	2	2	4	5	3	10
Gallbladder	3	2	1	0	1	1	1	0	0	0
Pancreas	51	18	33	0	5	8	3	25	0	10
Retro & Peritoneum/Omentum/Mesent	4	2	2	0	0	0	4	0	0	0
Other Digestive	2	1	1	0	0	0	0	0	2	0
Respiratory										
Nose, Nasal Cavity & Middle Ear	2	0	2	1	0	0	0	1	0	0
Larynx	18	16	2	0	9	3	1	5	0	0
Lung/Bronchus	318	171	147	0	62	35	84	134	0	3
Trachea, Mediastinum,Pleura & Other	1	0	1	0	0	0	1	0	0	0
Bones & Joints	2	1	1	0	0	1	0	0	1	0
Soft Tissue incl Heart	11	5	6	0	4	1	4	2	0	0
Skin										
Melanoma	25	10	15	5	12	6	0	0	0	2
Other Non-epithelial Skin	2	0	2	0	1	0	0	1	0	0
Breast	660	7	653	153	256	177	37	24	0	13
Female Genital										
Cervix	11	0	11	0	5	2	2	1	0	1
Corpus & Uterus, NOS	118	0	118	0	79	5	10	6	0	18
Ovary	37	0	37	0	14	3	7	9	0	4
Vagina	0	0	0	0	0	0	0	0	0	0
Vulva	8	0	8	0	6	0	1	1	0	0
Other Female Genital	1	0	1	0	0	1	0	0	0	0
Male Genital										
Prostate	127	127	0	0	22	82	11	9	0	3
Testis	12	12	0	0	11	0	1	0	0	0
Penis	1	1	0	0	0	1	0	0	0	0
Other Male Genital	0	0	0	0	0	0	0	0	0	0
Urinary										
Bladder	136	111	25	73	23	23	6	9	0	2
Kidney/Renal Pelvis	95	60	35	1	65	5	9	13	1	1
Ureter	4	3	1	1	0	2	1	0	0	0
Other Urinary Organs	2	1	1	0	0	0	0	0	2	0
Eye & Orbit	0	0	0	0	0	0	0	0	0	0
Brain & Central Nervous System	61	16	45	0	0	0	0	0	61	0
Endocrine										
Thyroid	76	26	50	0	43	14	12	2	0	5
Other Endocrine	7	1	6	0	0	0	0	0	7	0
Lymphoma										
Hodgkin	11	4	7	0	2	6	3	0	0	0
Non-Hodgkin	81	44	37	0	32	13	14	18	0	4
Myeloma	19	13	6	0	0	0	0	0	19	0
Leukemia	34	20	14	0	0	0	0	0	34	0
Mesothelioma	4	1	3	0	0	0	0	3	0	1
Kaposi Sarcoma	0	0	0	0	0	0	0	0	0	0
Other/Unknown/Uncertain Malig	86	31	55	0	0	0	0	0	86	0

Virtua Fox Chase Cancer Program
2013 Annual Report Clinical Research Report

The Virtua Fox Chase Cancer Program (VFCCP) has a robust clinical research program, participating in national cooperative group trials through Fox Chase Cancer Center. We are one of a select group of community-based hospitals in New Jersey and Pennsylvania whose cancer programs are affiliated with Fox Chase Cancer Center in Philadelphia. Virtua was chosen to be part of this network of community cancer programs by consistently demonstrating outstanding cancer-care standards and supporting an infrastructure to offer clinical trials. This affiliation allows Virtua patients to have access to the latest advances in cancer care, treatment and research.

The Virtua Fox Chase Clinical Research Program is staffed by a Registered Nurse, two Clinical Research Associates and a Clinical Research Assistant. The research staff work closely with our physician clinical investigators to provide our patients access to new clinical trials with the latest treatment options. A Scientific Review Committee comprised of our principal investigators meets monthly to discuss and recommend new trials to the Institutional Review Board (IRB) for approval.

Currently, there are 45 oncology clinical trials open at the VFCCP.



* 2013 represents data through 11/1/13

♦ As of November 1, 2013 6% of Virtua cancer patients were accrued to clinical trials. We continue to meet commendation level of the Commission's standard of enrolling oncology patients annually in clinical trials.

♦ From January 1, 2013 to November 1, 2013, 155 patients have enrolled in clinical trials available through the VFCCP.

♦ The VFCCP participates in multiple national cooperative groups including: Eastern Cooperative Oncology Group (ECOG), Radiation Therapy Oncology Group (RTOG), and American College of Surgeons Oncology Group (ACOSOG), Clinical Trials Support Unit (CTSU), and Gynecology Oncology Group (GOG).

♦ Information is available for patients and staff about Virtua's offered oncology clinical trials on the Virtua web site (www.virtua.org) and on New Jersey Cancer Trial Connect (www.njctc.org).

Prevention Trials

♦ The High Risk Assessment Program is designed to help women learn about their risk factors associated with breast and ovarian cancer. In collaboration with Fox Chase Cancer Center, eligible individuals receive the opportunity to participate in a variety of studies such as new screening methods, genetic testing for research purposes and cancer prevention trials.

♦ 31 participants have been accrued through the High Risk Assessment Program from January 1, 2013 through November 1, 2013.

To learn more about clinical trials or find out about open prevention and treatment studies available at the Virtua Fox Chase Cancer Program, call 1-888-Virtua-3 or visit our Virtua website www.virtua.org

Oncology Services
Advancing oncology care through education and coordination of care

Breast Care Program

The Breast Care Program is specifically designed to meet the needs of patients through the entire continuum of breast care. Breast cancer represents approximately 26% of all cancer cases seen at Virtua. Since 2009, the breast case load at Virtua has increased to an average of 675 cases a year. The program was established to support our growing Women's Health Program, for patients seeking breast care at our institution, and to provide greater access and enhanced services to patients in our community. We offer a full range of comprehensive clinical services from prevention and screening, through cancer diagnosis, multi-modality therapy, and supportive services. Under the direction of Dr. Diane R. Gillum and Dr Eric J. Miller, Virtua's Breast Care Program strives to provide innovative, integrated, high quality oncology care. Virtua strongly believes in a multidisciplinary team approach to breast cancer care that includes patients and their family, physicians, nurse navigators, genetic counselors, social workers, and support from health care professionals who specialize in all aspects of breast care. Virtua's Breast Care program was re-accredited from the National Accreditation Program for Breast Centers, passing on all 27 standards in September 2012. The Breast Program Leadership steering committee, under the guidance of Dr. Diane R.Gillum, monitors program quality, measures outcomes, sets standards of care system-wide and addresses all aspects of breast care. The multidisciplinary committee meets 6 times a year.

Care through the breast program is provided at 2 campuses, North and South to serve patients from across 5 counties. The program on the South campus at the Voorhees Health and Wellness Center includes a new state of the art radiation oncology facility along with all program support services for the oncology program. Our oncology breast plastic reconstructive program is at the North campus headed by Fox Chase Cancer Center plastic surgeons Drs. Sameer Patel M.D. and Neal Topham M.D.

In November 2011, Virtua enrolled in the Rapid Quality Reporting System (RQRS) through the Commission on Cancer. The intent of RQRS is to promote and facilitate evidence-based cancer care with access to real clinical time performance rates.

The goals of the breast navigation program are to support physicians in achieving optimal clinical outcomes, enhance communication between the various disciplines and referring physicians, and improve patient satisfaction. It allows for more efficient use of physician time spent with patients and ensures timely delivery of services. Access Navigation assists patients in obtaining prompt appointments with a breast surgeon for evaluation.

The breast nurse navigators are oncology nurses with additional training in breast health and breast cancer care. Nurse navigators are available to newly diagnosed patients to assist with education, support and access to resources. The role of the nurse navigators has been

expanded to include clinical trials support and recruitment. The navigation services are monitored by the Cancer committee and Breast Program Leadership committee.

Patient education and community outreach are important components of the Breast Care program. Many breast cancer educational programs are provided free to the community. Funding from the Susan G. Komen Foundation provides additional support to the navigation program.

Other Oncology Nurse Navigation Services

Virtua's Nurse Navigation program has been recognized as best practice from Fox Chase Cancer Center and the Association of Community Cancer Centers. Nurse navigators also offer support for thoracic, prostate, GI, GYN and head and neck cancer patients. Nurse navigators are available to newly diagnosed patients to assist with education, support and access to resources. To date, all the navigation services have patient satisfaction scores of 97-100%.

Oncology Social Services

The Virtua Fox Chase Cancer Program provides a full range of clinical oncology social work services endeavoring to meet the psychosocial needs of cancer patients and their families. We provide psychosocial counseling and emotional support to patients and their families through individual, family, and group counseling. The clinical oncology social workers also support patients' psychosocial needs by appropriate referrals to numerous community resources, including outpatient therapists who specialize in treating patients with chronic illnesses and in grief and loss, local and national support groups for families affected by cancer, and organizations dedicated to helping meet the varied practical and financial challenges faced by patients. Additionally, patients may receive the Oncology and Community Resource Guide to address any number of additional psychosocial needs of patients and their families. The oncology social workers continue to recommend and facilitate psychiatry referrals when indicated and to develop, implement, assess and facilitate oncology support groups for breast cancer, gynecologic oncology, and all newly diagnosed cancer patients. Cancer Survivorship needs are addressed through supportive individual counseling, a Cancer Survivors support group and appropriate referrals to a wide array of both Virtua and community resources.

Palliative Care and Survivorship Services

Virtua Oncology Services offers Palliative Care clinics, called LifeCare. Partnering with Samaritan Healthcare and Hospice, Dr. Stephen Goldfine and his team provide palliative care services to Virtua patients. These clinics are offered at 2 campuses, Memorial and Voorhees and address care of the body, mind and spirit.

Already existing survivorship programs include Look Good Feel Better sponsored by the American Cancer Society, massage therapy, hypnosis, physical therapy and rehabilitative services. Additional services for survivorship are psychosocial distress screening using the

Polaris Oncology Distress management system. We also offer Virtua in Motion Physical Therapy and Rehabilitation and Cancer Fitness classes. Virtua Centers for HealthFitness and researchers at the University of Pennsylvania have teamed up to bring *Strength after Breast Cancer* to breast cancer survivors. The program educates survivors about lymphedema and helps them to build strength. Registered Dietitians are available to provide Oncology Nutrition Counseling in one-on-one sessions. Spiritual Support and counseling are incorporated into our offerings for survivor patients.

Virtua Fox Chase Cancer Program's Cancer Genetics Report

In 2003, we developed our Cancer Genetics Program through our partnership with Fox Chase Cancer Center. The program began with a focus on hereditary breast and ovarian cancer syndromes and in 2009 expanded to include gastrointestinal and other adult cancer genetic syndromes. The volume of patients that has been in our program has grown exponentially.

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
New Patients	12	16	58	28	67	175	287	255	255	260	280*

* Patients 1/1/13-10/28/13

Breast and ovarian cancer

Genetic tests are available to detect genetic risks for hereditary breast cancer. Among them are the most common hereditary breast cancer syndromes involving the BRCA1 and BRCA2 genes. When genetic testing is completed and an alteration is found in one of the identified genes, an individual's risk for developing certain types of cancer is significantly increased. For women, there is an increased risk for developing breast and/or ovarian cancer. For men, there is an increased risk for breast and prostate cancer. In addition, men and women who have already been diagnosed with these cancers are at increased risk for developing a second cancer.

Colorectal cancer

Genetic tests are also available for detecting hereditary colon cancer syndromes. Common hereditary cancer syndromes include Lynch Syndrome and familial adenomatous polyps (FAP). Lynch Syndrome (or HNPCC) is an inherited condition that increases the chances for colon, uterine and other cancers. FAP is an inherited condition that may cause an individual to have hundreds of colon polyps and significantly increase the risk for colon cancer. Testing is also available for other gastrointestinal hereditary cancer syndromes.

In 2011, in conjunction with Virtua's Pathology Department, a quality initiative was implemented to conduct routine screening of colorectal cancer and uterine cancer tissues for patients who are age 60 and younger diagnosed with cancer by surgical pathology. In 2012, we expanded those criteria to screen all colorectal and uterine cancer cases regardless of age. In 2013, we began automatic reflexing to MLH1 hypermethylation testing on all uterine cancers with absent MLH1 by immunohistochemistry because a data review revealed a great majority of these cancers are sporadic. The aim of tumor screening is to identify patients who are at risk for having Lynch Syndrome and thereby reduce the morbidity and mortality due to Lynch-related cancers in our patients and their family members.

The Team Approach

The Cancer Genetics Program at Virtua is unique in that it consists of a multidisciplinary team of oncology and genetics experts including medical oncologists, an advanced practice nurse in genetics (only one of 4 in New Jersey), 2 board certified genetic counselors, and master's prepared licensed clinical social workers. The team discusses genetics cases and reviews current literature during monthly team meetings and the cancer genetics staff participates in weekly cancer case conferences at Virtua.

Experts at the Virtua Fox Chase Cancer Genetics Program help guide patients through the cancer risk counseling process to identify their risk for cancer. The counselors help patients who are uncertain about their family's medical history or have concerns about other cancers by obtaining medical records and pathology reports from healthcare centers where their family members have been treated. Other benefits of the program include:

- Receiving individualized and comprehensive counseling from cancer genetics experts including medical oncologists trained in cancer genetics, advanced practice nurses, board-certified genetic counselors and social workers;
- Discovering patients and families' increased risk for cancer and offering care plans;
- Learning about the benefits, risks and limitations of genetic testing;
- Undergoing genetic testing, if appropriate;
- Learning ways to decrease risk for developing cancer and early detection strategies for high risk individuals (screening or medical and surgical approaches)

Clinical trials

Patients who have a personal or family history of breast or ovarian cancer and are willing to participate in a research study, may be eligible for the Margaret Dyson Family Risk Assessment Program conducted in partnership with the Fox Chase Cancer Center in Philadelphia.

Participants will:

- Help provide insight into hereditary factors, or genes, that influence cancer risk
- Gain access to the latest news and information on cancer genetics

Community Outreach

Our cancer genetics staff is committed to community education of healthcare providers and the lay community. Our experts travel throughout our surrounding area fulfilling many speaking engagements and one on one interaction. Lectures are given free of charge as a community service. Requests for lectures are made through Virtua's speaker's bureau and through community contacts that the Virtua Fox Chase Cancer Program has made with organizations within Burlington, Camden and Gloucester counties.

For our clinicians, we have hosted a CME event with Dr. Obeid from Fox Chase Cancer Center with a focus on national, evidence-based referral guidelines for breast cancer genetics and the latest information on Next Generation Sequencing of breast cancer genes.

The Cancer Genetics Program has been interviewed and featured in many Virtua publications and local newspapers, magazines and television programs discussing the identification and management of high risk individuals. The Cancer Genetics Program is an established clinical site for the graduate students enrolled in the Genetic Counseling program at Arcadia University. Our program hosted one student in 2013.

Virtua Fox Chase Cancer Program
Education and Community Outreach Report

The Virtua Fox Chase Cancer Program (VFCCP) works closely with cancer advocacy organizations and community partners to improve and enhance cancer education, prevention and supportive services throughout the region. The cancer program continually reviews cancer incidence and prevalence within the region and develops resources and services to augment existing programs while identifying the future direction for cancer education and prevention efforts. Resources and services are designed across the continuum of care, from prevention to risk reduction and support. This report will detail all of the community and education activities of the VFCCP held throughout this year.

Oncology Lectures given in the community

Many of our oncology physicians, nurses, therapists, educators and executives are active members of the Virtua Speakers Bureau. These experts travel throughout our surrounding counties speaking on cancer related topics for lay and professional audiences. Lectures are given free of charge as a community service. Requests for lectures are made through Virtua's speaker's bureau and through community contacts that the Virtua Fox Chase Cancer Program has made.

Our oncology experts have been interviewed and featured in many Virtua publications and local newspapers, magazines and television programs discussing many aspects of oncology care from prevention to survivorship.

	Total Lectures Jan-Dec	Total Attendance
TOTAL LECTURES	**8**	**560**

Outreach Health and Wellness Events

Health fairs give the VFCCP the opportunity to reach out to people and the community about their health and well-being. By bringing health professionals and lay people together, a health fair educates people about health, behavior modification, prevention and available resources through the VFCCP. Our participation in health fairs can include exhibits, mini-workshops, demonstrations and screenings.

Display and Health Fairs	Encounters
22	2,652

**Encounters are the total number of people that the employee comes in contact with at a healthfair/event*

Grant Funded Programs

The New Jersey Cancer Education and Early Detection Program (NJCEED) is sponsored by the New Jersey Department of Health and Senior Services. NJCEED provides grants to facilitate comprehensive screening services for breast, cervical, prostate and colorectal cancer for uninsured or underserved populations. The NJCEED grant provides monies for outreach, education and cancer screening services with case management for breast, cervical, prostate and colorectal cancer. Services are provided by Virtua affiliated physicians to residents of Camden and Burlington Counties. This year's NJ CEED grant totaled $ 460,500 and was awarded to Virtua as a regional grant for both Camden and Burlington County.

Camden County CEED screenings	**Totals Screened**
Breast & Cervical Ca.	310
Prostate Cancer	18
Colon Cancer	118

Burlington County CEED screenings	**Totals Screened**
Breast & Cervical Ca.	420
Prostate Cancer	18
Colon Cancer	98

Susan G Komen for the Cure Central & South Jersey Affiliate funded the Breast Care Program with $ 46,000 to provide bilingual outreach to increase screening compliance among NJCEED patients and provide breast education in Gloucester County.

Support Groups and Counseling

Virtua Fox Chase Cancer Program offers support groups that provide patients and their loved ones an opportunity to learn ways of coping with their cancer diagnosis and treatment. These specifically designed groups can provide emotional support and decrease the sense of isolation commonly associated with treatment. They provide a forum where patients can get practical advice as well as share thoughts, feelings and concerns. The support groups are facilitated and managed by oncology professionals from the Virtua Fox Chase Cancer Program.

In addition to support groups, patients have access to oncology social workers that provide support both in the hospital and on an outpatient basis including individual and group support, and counseling for children whose parents have cancer. An oncology social worker is a professional who has specialized training in how a diagnosis of cancer affects a person and his or her family and friends. An oncology social worker understands that there

are many aspects of a person's life outside of cancer, and that cancer affects each person in a different way. The oncology social worker's expertise provide a comprehensive view to the person living with cancer that is respectful of each individual's ethnicity, spirituality, family situation, unique strengths and challenges. It is his or her job to represent a person's interests and needs to the medical team.

Support Groups	Virtua Location	# Of mtgs.	Avg. pts/
BRCA Support/Women Supporting Women	Mt. Holly	10	10
Man to Man: Prostate Cancer	Mt Holly	9	45
GYN Cancer Support Group	Voorhees	10	6
Newly Diagnosed Cancer Education Group	Voorhees	13	1
Cancer Survivors Support Group	Voorhees	3	17

Workshops

Look Good Feel Better is a workshop that teaches female cancer patients beauty techniques to help restore their appearance and self-image during chemotherapy and radiation treatments. A licensed cosmetologist teaches participants about makeup, skincare, nail care and options related to hair loss such as wigs, turbans and scarves. Each group receives a free kit of cosmetics to use during and after the workshop. The Virtua Fox Chase Cancer Program sponsors this workshop with the American Cancer Society as a community service and offers it on-site at Virtua Memorial and Virtua Voorhees.

Advocacy and Community Events

Virtua Fox Chase Cancer Program's employees actively participate in community awareness and cancer advocacy fund raising events independent of their employee responsibilities. This year, teams of employees, physician and patients walked, raced, rowed and raised funds to support cancer research and cancer care in our community.

VFCCP Teams participation in events held in our community include:

- Susan G. Komen Breast Cancer Foundation's *Race for the Cure* in PA and NJ
- Leukemia and Lymphoma Society's *Light the Night Walk*
- American Cancer Society's *Making Strides Against Breast Cancer* walk
- American Cancer Society's *"Relay for Life"* event
- *William G. Rohrer Center for Health Fitness 5K Race* to benefit Virtua Fox Chase Cancer Program

***Additional programs and activities of distinction for oncology patients*:**

- **Moving On** is a fitness and exercise program that offers a supervised exercise program for cancer survivors. This program is based in Virtua's William G. Rohrer Center for Health Fitness.

- ***Strength after Breast Cancer*** is an evidence-based rehabilitation adapted from Physical Activity & Lymphedema Trial conducted by University of Pennsylvania. Virtua in Motion Physical Therapy and Rehabilitation, Virtua's Center for Health-Fitness and researchers at the University of Pennsylvania have teamed up to bring exercise to breast cancer survivors.

- ***Outpatient nutrition services*** are offered to meet the needs of patients who are undergoing cancer treatment. Patients undergoing chemotherapy or radiation will be counseled by a registered dietician through meal plans that incorporate their individual food preferences.

- ***Complementary health services*** are available for our patients. They include massage therapy, guided imagery and mind/body healing.

- ***Collaborative Efforts*****:** Virtua collaborates with many organizations in our community while trying to meet the needs of all community members. We actively participate in cancer-related coalitions on many levels to help meet some of these needs. Examples include: American Cancer Society, the Susan G Komen Breast Cancer Foundation Central & South Jersey Affiliate, Burlington County Department of Health, Camden County Department of Health, South Jersey Cancer Coalition, South Jersey Breast Cancer Coalition, ACS Nutrition Task Team, Camden County CEED Coalition, NJ State CEED Coalition, New Jersey Cancer Control Task Force, and the Camden and Burlington County CAT Coalition.

Virtua Fox Chase Cancer Program will continue to improve upon its effectiveness to bring to the community the best cancer prevention, education, screening services and supportive programming available.

To receive complimentary Virtua Fox Chase Cancer Program publications for your office, please call 1-888-Virtua-3. Topics include smoking cessation, clinical trials, Breast Cancer Handbook, Prostate Cancer Handbook, Cancer Survivor's Guidebook, and health alerts on a variety of cancers and cancer-related topics.

Virtua Fox Chase Cancer Program
Radiation Oncology Services Report

The Virtua Fox Chase Cancer Program offers the following treatment options and advanced technologies to treat cancer patients:

- MOSAIQ oncology information system streamlines the entire radiation oncology workflow from the first diagnosis and staging, through treatment planning, treatment, long term follow up and cancer registry. The image enabled Electronic Medical Record allows the radiation oncology staff across Virtua to share and communicate information about their patients.

- Precision computerized treatment planning systems accurately target the tumor so it receives higher levels of radiation with minimal exposure to normal tissue.
- Conformal radiation therapy uses 3-D treatment planning with CT scanning to target the exact location of tumors.

- 4 D CT Simulator allows for assessment of tumor motion to precisely plan treatments.

- External beam radiation uses state of the art linear accelerators, including the Varian TrueBeam, equipped with the latest imaging technology; enabling staff and physicians to localize treatment volumes and deliver treatments with precision.

- Intensity Modulated Radiation Therapy (IMRT) uses computer generated images of the tumor to aim thin beams of radiation from many different angles, to the tumor and sparing the surrounding tissue.

- RapidArc gives the ability to deliver IMRT treatments in two minutes or less.

- Image Guided Radiation therapy (IGRT) precisely targets the tumor prior to treatment delivery.

- Calypso tumor tracking system precisely tracks tumors during treatment.

- Stereotactic Radiosurgery precisely treats small tumors in the brain, lung and other parts of the body.

- High dose rate (HDR) brachytherapy delivers a high dose of radiation from within the tumor bed (the area where the cancerous tumor has been removed) and may be completed in fewer treatments than with external radiation.

- MammoSite and SAVI radiation therapy system(s) for use in early stage breast cancer, deliver high dose partial breast radiation from within the tumor bed

- Low dose rate Brachytherapy which uses radioactive material placed directly into or near the cancer and delivers low doses of radiation over several months.

Lemuel Ariaratnam, MD directs the radiation oncology facilities located in Mount Holly and Voorhees. Dr. Ariaratnam is board certified in radiation oncology. He graduated from the Faculty of Medicine, University of Ceylon. Dr. Ariaratnam completed his post graduate training as a radiology resident at Beth Israel Medical Center, NY, NY and he completed his radiation oncology residency at Montefiore Hospital and Medical Center, Bronx, NY. Dr. Ariaratnam serves as Radiation Therapy Oncology Group (RTOG) Principal Investigator for our participation in RTOG clinical trials. He is also a member of our oncology IRB and Scientific Review Committee. In 2013 the Voorhees Facility delivered approximately 2,711 radiation treatments per quarter, and Memorial 2,232.

Stephanie E. Weiss, MD directs the Virtua Fox Chase Cancer Center in Washington Township and is a radiation oncologist at Fox Chase Cancer Center in Philadelphia. Dr. Weiss comes to Virtua from Brigham and Women's Hospital/Dana-Farber Cancer Institute and was a fellow at Harvard Medical School. She completed her residency in radiation oncology at Johns Hopkins Kimmel Cancer Center and earned her medical degree from St. George's University School of Medicine. Dr. Weiss provides radiation therapy for patients with all types of cancers, with a special expertise in the treatment of brain tumors. In 2013 Washington Township delivered approximately 621 radiation treatments per quarter.

Virtua is accredited by the American College of Radiology and is also credentialed by the Radiological Physics Center at MD Anderson to participate in Radiation Therapy Oncology Group treatment clinical studies.

Virtua Fox Chase Cancer Program Rectal Cancer Site Study 2013

Presented by:
Avi S Galler, MD; John J. Wilson, MD, Yong Ji, MD,PhD;
Susan VanLoon RN, CTR

Overview:

This report will provide a review of rectal cancer with a focus on treatment options. The epidemiology of rectal cancer; discussion of risk factors; description of the disease process and a description of rectal staging will be provided. In addition this report will include a presentation of rectal data from the VFCCP Registry. An overview of the services available for patients with rectal cancer at Virtua Fox Chase Cancer Program will also be discussed.

Epidemiology:

Worldwide, colorectal cancer is the third most common diagnosed cancer and third leading cause of cancer deaths. According to the National Cancer Institute, in 2013 approximately 40,340 people will be diagnosed with rectal cancer in the United States and there will be an estimated 50,830 deaths from colon and rectal cancer combined.[14] It is difficult to separate epidemiological considerations of rectal cancer and those of colon cancer because epidemiological studies often consider colon and rectal cancers together**.**

Colorectal Cancer Survival is highly dependent upon stage at diagnosis and ranges from 90% survival rate for cancers detected at the localized stage ; 70% for regional to 10% for people diagnosed with distant metastatic disease. [15]

Incidence and death rates for colorectal cancer increase with age. Overall, 90% of new cases and 94% of deaths occur in individuals 50 and older. Colorectal cancer incidence rates are about 35%-40% higher in men then in women. Gender differences in risk patterns may also help explain why the proportion of colorectal tumors occurring in the rectum is higher in men (31%) than in women (24%). Incidence rates are 20 % higher and mortality rates are 45% higher in African American men and women than those in whites.[12]

***General Information about Rectal Cancer*:**

The rectum is located within the pelvis, extending from the transitional mucosa of the anal dentate line to the sigmoid colon at the peritoneal reflection; by rigid sigmoidoscopy, the rectum measures between 10 cm and 15 cm from the anal verge. Adenocarcinoma accounts for the vast majority of rectal tumors. Rare rectal tumors include carcinoid tumors, lymphomas, and neuroendocrine tumors. [14]

Genetic Risk:

Approximately 75% of patients with colorectal cancer have sporadic disease with no apparent evidence of inherited disease. The remaining 25% of patients have a family history that suggests a hereditary contribution. [13]

Individuals with a first-degree relative who has had colorectal cancer have 2-3 times the risk of developing colorectal cancer compared to those individuals with no family history. If the relative was diagnosed at a young age or there is more than one affected relative the risk is even higher. [12]

Approximately 5-10% of colorectal cancers are a consequence of recognized hereditary conditions. The hereditary colorectal cancer syndromes include: nonpolyposis disorders, polyposis disorders and hamartomatous disorders.[13]

Hereditary nonpolyposis colorectal cancer (HNPCC) or Lynch syndrome: mismatch repair (MMR) genes represent the most common form of hereditary colorectal cancer and accounts for 3-5% of colorectal cancers. Individuals with Lynch syndrome have up to an 82% risk of developing colon cancer. Genes responsible for this form of inherited colorectal cancer have been identified. HNPCC is associated with mutations in genes involved in the DNA repair pathway, namely MLH1 and MSH2 genes. The National Comprehensive Cancer Network (NCCN) recommends that individuals identified with Lynch syndrome should have increased cancer surveillance with colonoscopy and endoscopy. Patients may also be offered prophylactic surgery to reduce the risk of certain cancers. [13]

Familial Adenomatous Polyposis (FAP) is caused by mutations in the tumor suppressor gene APC. FAP accounts for less than 1% of all colorectal cancers. Individuals that develop FAP develop hundreds of polyps at a young age and one or more of these adenomas may become malignant. By the age of 40 almost all people with this disorder will develop cancer if the colon is not removed.[15]

Genetic Testing & Counseling:

If appropriate, genetic testing can help identify individuals at risk and can help direct the management of a patient. Additionally, genetic testing can help target future screening activities and in some cases prevent cancer altogether. Genetic counseling is highly recommended pre-testing and post-testing.[11]

***Risk Assessment*:**

The National Comprehensive Network (NCCN) guidelines stratify patients into three groups depending on their risk of getting colorectal cancer:

- Average risk individuals are 50 years or older with no family history and no history of adenoma, colorectal cancer or inflammatory bowel disease.

- Increased risk individuals are those individuals with a personal history of adenomatous polyps/sessile serrated polyps, colorectal cancer or inflammatory bowel disease and those with a family history of colorectal cancer or advanced adenomatous polyps.
- High risk syndromes are individuals with a family history of Lynch Syndrome or with a personal or family history of polyposis syndromes. [11]

Screening Options:

Screening is the best method for early detection and prevention of colorectal cancer. Average risk individuals should begin routine screening at age 50. There are several modalities available: Annual fecal occult blood tests (FOBT); Flexible sigmoidoscopy (FS) every 5 years; Combined FOBT and FS annually and every 5 years, respectively; Barium enema every 5 years. The gold standard for colorectal cancer detection is colonoscopy every 10 years.

Individuals with adenomatous polyps are at increased risk for recurrent adenomatous polyps and colorectal cancer (CRC). To minimize risk of developing CRC a surveillance program is recommended for patients with adenomatous polyps following screening colonoscopy and polypectomy. The surveillance schedule will depend on the number, size, and histology of the adenomatous polyps. Each patient should have their risk reassessed depending on the characteristics of the polyps and family history. [11]

Individuals with a personal history of CRC are at increased risk for recurrent adenomatous polyps and cancer. Studies have found a high recurrence rate in 4-5 years following CRC resections. In patients with rectal cancer, local recurrence at the rectal anastomosis has been reported to occur in 5-36% of patients. Subsequent surveillance colonoscopies should be individualized. [11]

New modalities of surveillance are emerging, such as virtual or CT colonography, immunochemical FOBT, and stool-based DNA testing, but these have not yet supplanted colonoscopy as the standard of care. Individuals with personal and/or family histories of cancer require more frequent surveillance.[2]

Stage Information for Rectal Cancers:

Preoperative staging is an important aspect of rectal cancer treatment planning in order to better individualize management. Computed tomographic (CT) scanning of the chest, abdomen and pelvis is performed to rule out metastatic disease intra-abdominally or to the lungs and liver. Local staging can be assessed with either rectal magnetic resonance imaging (MRI) or endorectal ultrasonography. Both delineate tumor growth into the rectal bowel wall layers, as well as identify locally enlarged lymph nodes. PET/CT may also be employed in the staging and restaging of rectal neoplasms. Currently, endorectal ultrasound is the most popular method in the US, but with greater advances in MR technology we may soon see a shift in practice.

Rectal cancer staging adheres to the current TNM staging system of the 7th edition of the AJCC Cancer Staging Manual. T refers to the tumor, N refers to number of regional lymph nodes involved, and M refers to distant metastases. T is divided into the different layers of the bowel wall. T0 is no evidence of tumor; Tis is carcinoma in situ; T1 invades the submucosa; T2 invades the muscularis propria; T3 invades through the muscularis propria in the perirectal tissue; T4a penetrates the surface of visceral peritoneum and T4b directly invades or is adherent to other structures.

Stage I rectal cancer is defined as T1-2, N0, and M0. Stage II disease is subdivided into IIA (primary tumor is T3, N0, M0), IIB (T4a, N0, M0 lesions), and IIC (T4b, N0, M0). Stage III disease is subdivided into IIIA (T1-2, N1/N1c, M0 or T1, N2a, M0), IIIB (T3-4a, N1/N1c, M0 or T2-3, N2a, M0 or T1-2, N2b, M0), and IIIC (T4a, N2a, M0 or T3-4a, N2b, M0 or T4b, N1-2, M0). Stage IVA disease is defined as any T, any N, and the presence of distant metastasis confined to one organ or site (M1a). Stage IVB disease is defined as any T, any N, with metastases in more than one organ or site or in the peritoneum (M1b). The prefixes "p" and "yp" used in the TNM staging denote pathologic staging and pathologic staging following neoadjuvant therapy, respectively.[3] The prefix "u" indicates preoperative staging based on the endorectal ultrasound assessment.

Treatment decisions are made based on the stage of disease utilizing TNM classification. Definitions are as follows [16]:

Definition of Primary Tumor:

TX=Primary tumor cannot be assessed
T0= No evidence of primary tumor.
Tis= Carcinoma in situ
T1=Tumor invades submucosa
T2=Tumor invades muscularis propria
T3= Tumor invades through the muscularis propria into pericolorectal tissues.
T4a= Tumor penetrates to the surface of the visceral peritoneum
T4b= Tumor directly invades or is adherent to other organs or structures.

Definition of Regional Lymph Nodes:

NX=Regional lymph nodes cannot be assessed
N0= No regional lymph node metastasis.
N1= Metastases in 1–3 regional lymph nodes.
N1a= Metastasis in 1 regional lymph node.
N1b= Metastases in 2–3 regional lymph nodes.
N1c= Tumor deposit(s) in the subserosa, mesentery, or nonperitonealized pericolic or perirectal tissues without regional nodal metastases.
N2= Metastases in ≥4 regional lymph nodes.
N2a= Metastases in 4–6 regional lymph nodes.
N2b= Metastases in ≥7 regional lymph nodes.

Definition of Metastasis

M0=No distant metastasis M1= Distant metastasis. M1a= Metastasis confined to 1organ or site (e.g., liver, lung, ovary, nonregional node). M1b= Metastases in >1 organ/site or the peritoneum

Anatomic Stage

Stage0=	Tis	N0	M0
Stage I=	T1	N0	M0
	T2	N0	M0
StageIIA=	T3	N0	M0
Stage IIB=	T4a	N0	M0
Stage IIC=	T4b	N0	M0
Stage IIIA=	T1-T2	N1/N1c	M0
	T1	N2a	M0
Stage IIIB=	T3–T4a	N1/N1c	M0
	T2–T3	N2a	M0
	T1-T2	N2b	M0
Stage IIIC=	T4a	N2a	M0
	T3-T4a	N2b	M0
	T4b	N1-N2	M0
Stage IVA=	Any T	Any N	M1a
Stage IVB=	Any T	Any N	M1b

Signs & Symptoms:

Rectal cancer may be asymptomatic or may present with various forms of altered bowel habits such as constipation or diarrhea, decrease stool caliber, or bright red blood with bowel movements. Perianal pain usually indicates anal sphincter invasion, while tenesmus is a sign of a large tumor filling the rectal vault. An obstructing rectal tumor can cause abdominal distention, cramping, nausea and vomiting.[1] Weight loss and fatigue may be late symptoms of advanced rectal malignancy.

Diagnosis:

Diagnosis begins with a complete history specifically asking about bowel habits, personal and family history, and prior colonoscopies. Physical examination may be unimpressive or may reveal a mass, hepatomegaly, or enlarged Virchow's (left supraclavicular) or inguinal lymph nodes. [1] Digital rectal examination is essential. If a mass is palpable, the tumor size, location, and distance to the anorectal ring should be assessed.

Once a mass is established, it is confirmed with endoscopy and biopsy. Proctoscopy determines the distance from the anal verge, percentage of the circumference, and other

morphologic features. A complete colonoscopic evaluation should be performed because of the increased rate of synchronous colon polyps and cancers, 20-33% and 4-8%, respectively[1]. In addition, a CEA level should be drawn for later surveillance.

Surgical Treatment for Rectal Cancer:

Treatment for rectal cancer is individualized and based on the clinical disease stage. The goal of surgery is to completely remove the portion of the rectum that contains the primary tumor en bloc with complete mesenteric lymph node removal. Tumor removal ranges from a simple polypectomy to an extensive abdominoperineal resection when tumor invades the anal sphincters. The addition of preoperative radiation and chemotherapy has allowed for downstaging and sphincter-saving resections. Patients with low-risk, early stage disease usually are treated primarily with surgery, while locally advanced, high-risk disease patients require neoadjuvant therapy.[4,5]

Local Excision:

Local excision (LE) of early stage T1 low-risk rectal cancer is appropriate with favorable clinical and histological features. It is also a reasonable treatment for high-risk patients with advanced disease who are unfit for radical surgery. With minimal morbidity and mortality, the tumor can be removed via transanal excision, transanal endoscopic microsurgery (TEMS), or transanal minimally invasive surgery (TAMIS). Full thickness excision of the lesion down to perirectal fat with 1 cm margins is required. Accurate clinical staging is necessary as the major disadvantage is the inability to remove and stage the mesorectal lymph nodes. Criteria for LE include well to moderately differentiated T1 tumors, absent lymphovascular or perineural invasion, and tumors less than 3 cm in diameter that occupy less than 1/3rd of the rectal circumference.[2,4]

Local recurrence rates range from 7-21% for T1 lesions and 26-47% for T2 lesions. With the exception of poor operative candidates, patients with T2 lesions or greater should undergo radical surgery with mesenteric excision. The addition of neoadjuvant or adjuvant therapies combined with LE may be considered in the setting of clinical trials.[5]

Radical Resection:

The goals of surgery are to have tumor resection with good circumferential margins, an appropriate lymph node clearance and, if possible, a safe and well functioning reconstruction of bowel continuity. Total mesorectal excision (TME) involves precise dissection of the rectum and its associated mesentery, lymphatic, and vascular and perineural tumor deposits. TME optimizes oncologic outcomes and minimizes morbidity by reducing injury to the autonomic nerves and presacral veins. The rectal tumor is removed after the colon and rectum are mobilized with 5cm proximal margins. Distal resection margins of 2cm are recommended, but 1cm margins are acceptable in distal rectal tumors in select patients following neoadjuvant therapy.[5,6]

Sphincter-saving procedures, such as low anterior resections and colo-anal anastomoses, are sought in order to re-establish bowel continuity. Anastomotic leaks are multifactorial and range from 3-32%[5]. Therefore, leak testing is performed by insufflating the rectum with air while submerging the anastomosis. If a leak is present, it can be corrected with suture repair, repeating the anastomosis, or repair with a proximal diversion. Many individuals with a low anastomosis, especially those who have received pre-operative chemoradiation, will have a temporary diverting loop ileostomy to protect the distal anastomosis.

If tumor is present at the level of or invading the anal sphincter, then sphincter-saving surgery is not feasible with good oncologic outcomes. An abdominoperineal resection (APR) is therefore performed. The anus and anal sphincter complex is excised with the rectal tumor and a permanent colostomy is fashioned. An APR may also be appropriate in individuals with weak sphincters which would otherwise ultimately have fecal incontinence with bowel continuity.[4]

With advances in technology, minimally invasive radical resection is being performed utilizing laparoscopic and robotic techniques. Several studies have shown equivalent oncologic outcomes between laparoscopic and open TME when performed by experienced laparoscopic surgeons.[7] Laparoscopic and robotic surgery affords patients surgery with less pain, quicker GI recovery, earlier ambulation, and shorter hospital stays.

***Locally Advanced and Recurrent Disease*:**

In patients with locally advanced and T4 tumors, resection of the involved adjacent organ should be performed with an en bloc technique.[5] Total pelvic exenteration (TPE) removes all the organs in the pelvic cavity including the gastrointestinal system, the urinary system, and the gynecologic system. Removal of the rectum and anus results in an end colostomy. Urinary diversion is required after removal of the bladder and urethra with creation of a urine reservoir, known as an ileal conduit. [8]

If primary or recurrent rectal cancer invades the presacral fascia or sacral bone, the only chance of a cure is by removing the sacrum with the rectum. Abdominosacral resection (ASR) is a technically demanding and challenging procedure. It is fraught with complications and a high positive resection margin up to 50%. This specialized procedure is performed at select specialized centers with the necessary surgical expertise and multidisciplinary support which includes neurosurgery, as well as colorectal surgery, medical and radiation oncology.[9]

Radiation Therapy for Rectal Cancer:

Radiation therapy is given fairly routinely in a preoperative fashion with concurrent chemotherapy for patients with stage II or III rectal cancer. Radiation is usually aimed at the primary rectal tumor and the regional lymph nodes in the pelvis at risk for harboring cancer cells.

Studies have shown better results giving radiation before surgery versus after surgery, mainly with regards to lower complications, but there may also be a slight benefit with regards to local recurrence. It is thought that radiation before surgery (as opposed to after surgery) produces less strictures (narrowing) at the site where the bowel will eventually be connected since only one end of the connection would usually get radiated before surgery, whereas radiation after surgery usually entails both ends of the connection (anastomosis) receiving radiation. Also there is less small bowel in the radiation field before surgery because the rectum and tissue around it are still in place keeping more of the small bowel up and above the radiation fields. Local recurrence may be better with preoperative radiation because it helps to sterilize the area where surgery will be performed, and there is less risk of hypoxic (poorly oxygenated) cancer cells before surgery since the blood supply has not been affected as much, as hypoxic cells are known to be more radiation resistant.

Radiation is occasionally given to patients with stage IV rectal cancer in a palliative fashion as well, and sometimes in stage II or III patients it is given in a definitive fashion, that is, without any plan for surgery, if the patient is deemed medically inoperable (not fit for surgery).

Radiation planning entails a CT simulation, where patients are usually in a prone position (on their stomach) on a cushion called a belly board, which has a hole cut out in the middle, and is the same position in which they will receive treatment. This allows the bladder and some of the small bowel to fall forward into that hole and away from the radiation fields which are more posterior around the rectum. A small amount of rectal contrast is usually given through a small soft tube, the CT scan is performed, and usually about 3 small tattoos that look like blue freckles are marked on the skin to notate where the center of the fields will be.

Generally, a week of computer planning is done to custom design the radiation fields and dosing to the patient's anatomy. This is accomplished with Conformal/3-Dimensional planning, where three fields are employed, a posterior beam and two lateral beams with custom blocking and wedging. Once that is completed, patients come back for a "dry run" or "setup" where films are taken of the patient's fields to ensure everything is lining up as planned, and if they are approved, treatment is usually started that day along with concurrent chemotherapy. When radiation is given postoperatively, extra care is taken to avoid the bowels. Techniques such as Intensity Modulated Radiation Therapy and treating with a full bladder can help aid with bowel displacement in addition to the standard techniques of prone positioning with a belly board.

The radiation is typically given over 28 treatments, 5 days a week, over 5 ½ weeks (1.8 Gray daily x 28 days). The first 25 treatments focus on the tumor and the nodes at risk; the last 3 treatments focus just on the tumor. X-rays are taken most days before treatment to insure proper targeting, and after any corrections are made, the treatment is given afterwards. The treatment itself usually only takes about 5 minutes, but with checking in and lining up, patients are usually out the door in about 20-30 minutes each day.

The principal short term side effects are diarrhea, fatigue, and skin irritation. Patients are instructed to cut back on fiber and take Imodium if they develop diarrhea. For fatigue, naps are suggested. The skin irritation is usually managed with moisturizers and creams. They may also develop some rectal irritation which occasionally requires a steroid suppository or foam. Bladder or urethral irritation may occur which is usually managed by drinking more water to keep the urine dilute and not as acidic. These short term side effects usually peak about a week after completing treatment, and are mostly resolved within a month after completing treatment.

Potential long term side effects include chance of damage to bladder, bowels, and hips, as well as sterility, and small chance of a cancer developing from radiation. For men there is a small chance of erectile dysfunction, and for women, there is a chance of having vaginal narrowing and dryness. The bladder is fairly resistant to radiation but patients may lose some elasticity and therefore storage capacity of the bladder and need to urinate a little more frequently. There is a small chance of scar tissue developing in the bowels, which could cause a blockage requiring surgery, but this is very rare. There may be more frequent bowel movements long term. The hip bones receive a low dose of radiation and can get a little weaker in the long term, and so patients are advised to make sure their calcium and vitamin D intake is sufficient. Radiation can rarely cause a cancer, but it is very rare within the first ten years, and risk is about 1% per decade on average afterwards.

Chemotherapy for Rectal cancers:

Chemotherapy plays two important roles in the treatment of rectal cancer. It helps decrease the chance of recurrence and improves the cure rate for patients with stage II and stage III rectal cancer. It can be given pre-operatively (neoadjuvant chemotherapy) and/or post-operatively (adjuvant chemotherapy). It also can help control the progression of the cancer when the cancer relapses or metastasizes to other organs.

Neoadjuvant chemotherapy*:*

Clinical trials have shown that the chemo agent 5-Fluorouracil (5-FU) given by intravenous continuous infusion via a pump, together with radiotherapy before surgical resection, increases the chance of local cancer control. Patients who are treated with neoadjuvant chemotherapy have decreased rate of local recurrence. The patients who benefit from neoadjuvant chemotherapy are usually those with stage II (T3-T4, lymph node negative disease with tumor penetration through the muscle wall) or stage III (local lymph node involved) rectal cancer. Alternatively, the patients can take an oral agent, capecitabine (Xeloda), although some patients often need to reduce the dose of the chemo agent due to its toxicity.

Some patients are found to have “complete pathological response”. At the time of surgery, there is no evidence of residual tumor. Those patients are the ones who have the best chance of long term cure.

***Adjuvant chemotherapy*:**

Patients who received neoadjuvant chemotherapy usually will continue chemotherapy after the surgery. Fit and younger patients often receive adjuvant FOLFOX, a combination of 5-FU continuous infusion, Leucovorin and oxaliplatin. Other patients are treated with 5-FU and Leucovorin only. Another regimen involves oral capecitabine in combination with oxaliplatin. Adjuvant chemotherapy helps eradicate residual cancer cells and therefore improve the chances for a patient's survival.

Palliative chemotherapy:

When rectal cancer recurs or metastasizes, most patients are not curable. Chemotherapy has been shown in clinical trials to help control disease progression, improve quality of life and improve survival. In addition to the same programs used in the adjuvant setting, another regimen, FOLFIRI, a combination of 5-FU, Leucovorin and irinotecan, is also effective in improving survival. Oral capecitabine, either alone or combination with oxaliplatin or irinotecan, is also approved to treat metastatic rectal cancer.

Targeted therapy:

Angiogenic agents such as bevacizumab (Avastin) and aflibercept (Zaltrap) have been shown in clinical trials to improve patient's survival further, when used together with conventional chemotherapy such as FOLFOX, FOLFIRI or capecitabine. They also increase response rate. They sometimes help convert patients with limited metastases to become candidates for potentially curative surgery. Bevacizumab and aflibercept do not have the usual toxicities of conventional chemo agents but do have unique side effects including elevated blood pressure, bleeding, delayed wound healing and rarely bowel perforation.

Another category of targeted therapy includes monoclonal antibodies against epidermal growth factor receptors (EGFR). Cetuximab (Erbitux) and panitumumab (Vectibix) are examples of agents in this class of drugs. These agents can improve response rate and survival but do not benefit rectal cancer patients that harbor a common specific mutation (K-RAS mutation).

More recently, a newer oral angiogenic inhibitor, regorafenib (Stivarga,) was approved to treat patients with metastatic rectal cancer after failure on other chemotherapy agents. Those patients have quite advanced disease. The benefit and side effects should be carefully reviewed and discussed before this medication is prescribed.

***Future Therapies*:**

Rectal cancer treatment is continuing to evolve. 3-D ultrasonography and improved MRI technology are allowing for more accurate pre-operative staging. Minimally invasive techniques with laparoscopic and robotic technologies are resulting in comparable outcomes to open procedures with decreased perioperative blood loss and shorter recovery

times. New chemotherapeutic agents are showing substantial improvements in tumor response and progression-free survival. Individualized treatment based on biomarkers will be able to predict prognosis and allow for unique patient-tailored treatments. Cancer patients with complete responses to chemoradiation could potentially avoid surgical resection with close follow-up. Still, surgery is the gold standard and the best chance for a cure for patients with rectal cancer.[10]

***Virtua Fox Chase Services*:**

An important part of each patient's treatment plan includes Virtua's interdisciplinary colorectal cancer conference. These conferences are attended by surgeons, radiation oncologists, medical oncologists, radiologists, pathologists, oncology nurses, genetics counselors, social workers and other health care providers with a special interest in gastrointestinal malignancies. These conferences focus on collaborative strategies for the assessment, staging, diagnosis, treatment, and follow-up of each patient. Pertinent information including patient history, physical examination findings, and pathology, imaging and operative findings are reviewed and discussed. Staging, treatment options, clinical trial eligibility, journal article review and latest cancer therapies are also considered as the team formulates consensus-driven management decisions.

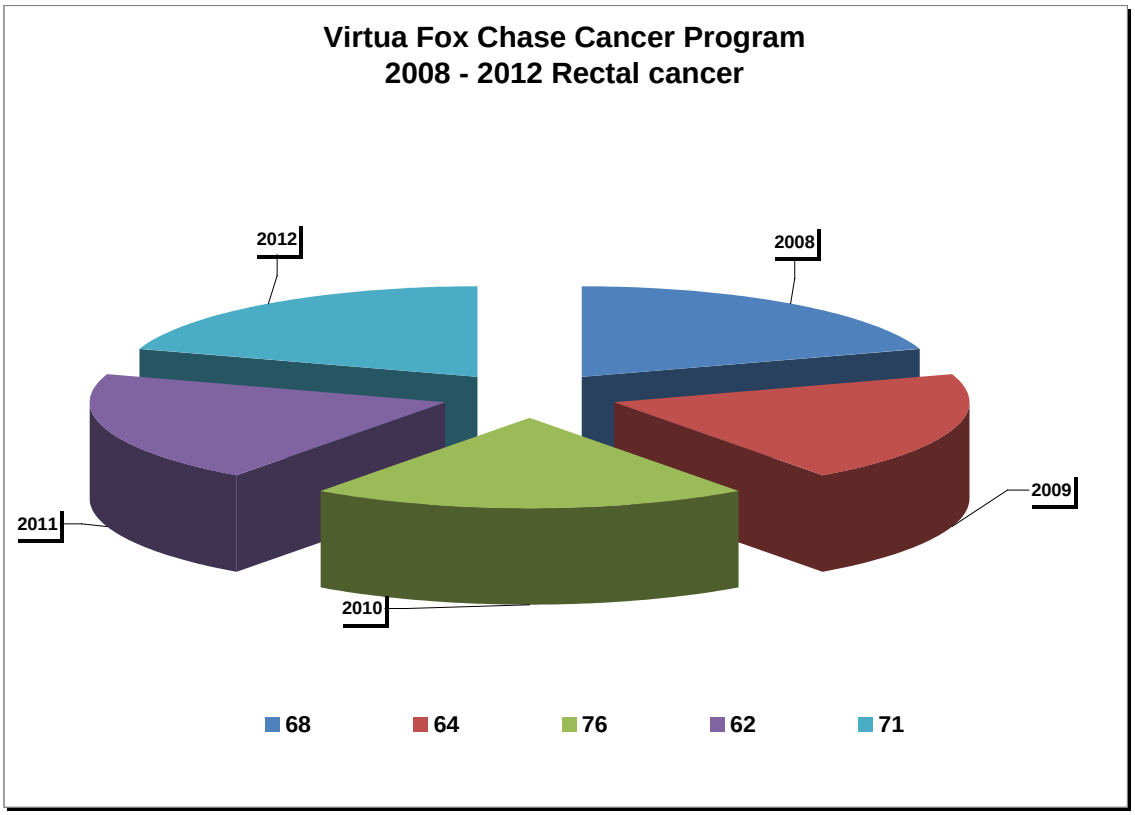
A Nurse Navigator is available to newly diagnosed patients with rectal cancer to assist with education, support and access to resources. The goal of the Nurse Navigation Service is to support physicians in improving clinical outcomes and to enhance patient satisfaction. Nurse navigation offers personalized service and helps guide each individual through the patient's cancer journey.

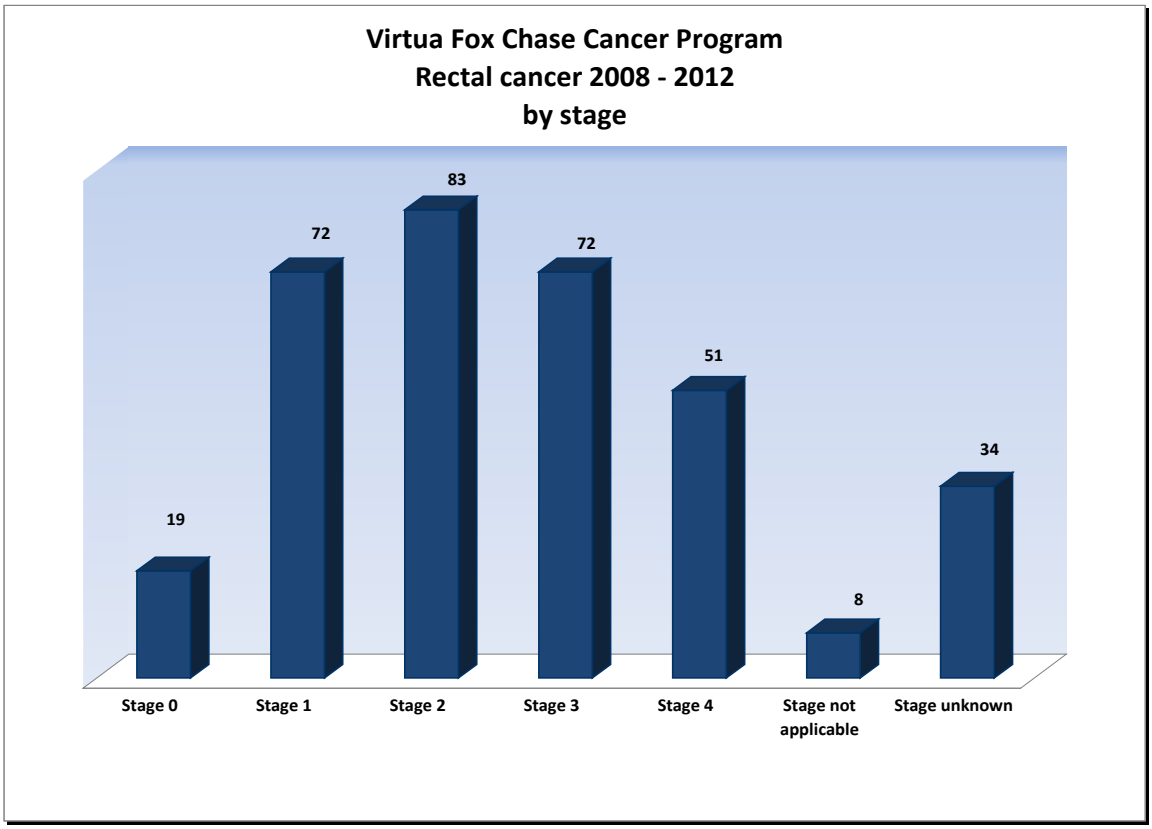
A Cancer genetics professional is also available to our colorectal patients. During a genetics consultation in the Cancer Genetics Program at Virtua, the medical history and family history are reviewed by a cancer genetics professional to determine if a family shows risk factors associated with a cancer syndrome. Based on the cancer risk assessment and tumor screening test results, genetic testing may be offered. The cancer genetics professional counsels the patient and discusses what testing involves, the screening, surgical and medical management recommendations, in addition to discussing the risks, limitations and benefits of genetic testing and finally interpretation of genetic test results and how they impact the family.

The Virtua Fox Chase Cancer Program offers support groups for patients and their families. Support groups provide a forum where patients can get practical advice as well as share thoughts, feelings and concerns.

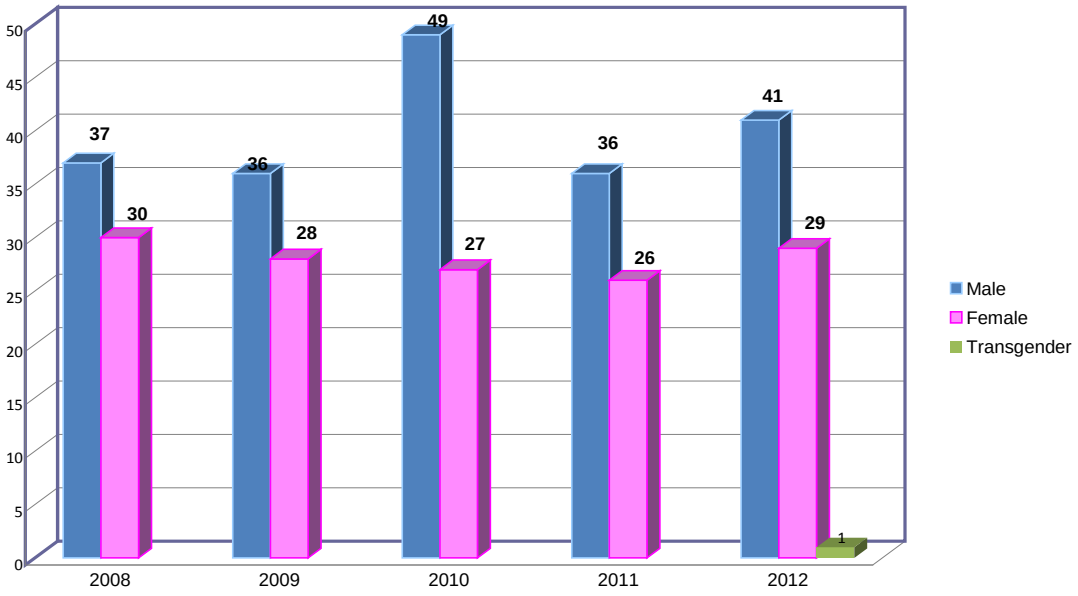
The Virtua Fox Chase Cancer Program also participates in National Cancer Institute Cooperative Group clinical trials. Presently there is one clinical trial available for patients with rectal cancer meeting specific protocol requirements. Additional information pertaining to open clinical trials is available on the Virtua web site www.virtua.org.

Presentation of Data:

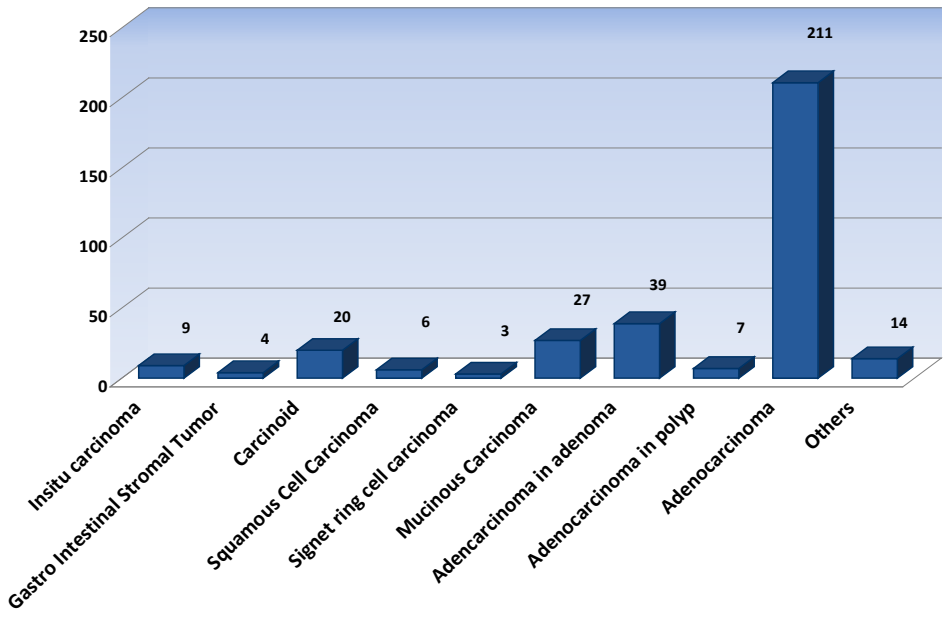




Virtua Fox Chase Cancer Program
Rectal Cases 2008 - 2012
by Sex



Virtua Fox Chase Cancer Program
2008 - 2012 Rectal ca
by Histology



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