2019 Annual Meeting

NORTHERN NEW ENGLAND

NNECOS
ASSURING ACCESS TO HIGH QUALITY CANCER CARE

CLINICAL ONCOLOGY SOCIETY

PROGRAM and ABSTRACTS

OCTOBER 18-19, 2019
SAMOSET RESORT
220 WARRENTON ST.
ROCKPORT, ME 04856
Go Green with NNECOS!

Attendee Information Page

- Presentation handouts
- Presenter bios
- Online evaluation
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- Educational credit
- Property map
- Abstracts

www.nnecos.org/samoset
Welcome to Rockport and the 2019 NNECOS Annual Meeting!

Thank you for joining us at this year’s annual meeting at the Samoset Resort. Our planning committee is pleased to present a carefully thought out program of concise, interactive, interdisciplinary sessions with meaningful takeaways to bring back to your practice. We invite you to take advantage of the additional networking time built into the schedule to network with colleagues from across the region. Now, more than ever, professionals must participate in the political, economic, and scientific debates that challenge the cancer care community nationwide.

As you enjoy the delicious refreshments in the State of Maine Hall, please take the time to visit with our exhibitors and thank them for supporting this meeting. You can also win great prizes playing our Passport to Prizes game! A special note of thanks to the 31 companies supporting the society as corporate members this year (see list on page 55)!

At the conclusion of the meeting, we ask that you complete and submit your online evaluation, allowing you to obtain educational credit, and providing feedback to help shape future educational events.

2019 Annual Meeting Planning Committee

Lori Aubrey, Diana Barnard, Maara Barry, Mary Chamberlin, Emma Dann, Brenda Farnham, Victoria Forbes, Susan Gilchrist, Nirav Kapadia, Saranya Kodali, Torrina Lavoie, Elizabeth McGrath, Nicole Messier, Lauren Michalakes, Carl Nelson, Stephen Rust, Aysha Sheikh, Julian Sprague, Paul Unger, Tracey Weisberg

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Will you help SHAPE THE FUTURE OF NNECOS?

As NNECOS embarks on its first strategic planning process, your input will help shape the goals and strategies that will ensure our ongoing success. Please share your thoughts by completing a brief confidential survey by November 4th.

www.nnecos.org/survey
NNECOS 2019 Palliative Care Symposium  
FRIDAY, OCTOBER 18, 2019  
ROCKLAND

8:00 AM - 8:50 AM Keynote: Exploring the Intersection Among Aging, Cancer, and Other Serious Illnesses (Multimorbidity)  
Ronald J. Maggiore, M.D.  
University of Rochester

9:00 AM - 9:50 AM Beyond Frailty - Ensuring Geriatric Assessment Leads to Intervention  
Sarah H. Kagan PhD, RN  
University of Pennsylvania

9:50 AM - 10:20AM REFRESHMENT BREAK / EXHIBITS / NETWORKING  
STATE OF MAINE HALL

10:20 AM - 11:05 AM Models of Delivery of Palliative Care  
Andrew Hertler, MD, FACP - Moderator  
New Century Health  
Panelists:  
Matthew M. Wilson, MD, DHMC  
Lauren G. Michalakes, MD  
Pen Bay Medical Center  
Stephen T. Rust, MD, FACP, FAAHPM  
Capital Region Palliative Care and Hospice

11:15 AM - 12:00 PM  
Project ECHO: A Disruptive Innovation to Expand Palliative Care in Maine  
Lauren G. Michalakes, MD - Pen Bay Medical Center; Joan B. Ingram, MPH - MaineHealth

FRIDAY, OCTOBER 18, 2019  
CAMDEN

8:00 AM - 8:50 AM Keynote: Value-Based Cancer Care: Creating Partnerships between the Oncology Navigator and Oncology/Hematology Physician Practices  
Tricia Strusowski, RN, MS  
Oncology Solutions LLC

9:00 AM - 10:55 AM Patient Story & Round Table Rotations Break - 10:10 - 10:35 AM - STATE OF MAINE HALL  
Tracey F. Weisberg, MD - New England Cancer Specialists; Torie Lavoie - New England Cancer Specialists; Nicole Messier BSN, RN, OCN, ONN-CG - UVM Medical Center

11:00 AM - 12:00 PM  
Report Out & Discussion - Next Steps  
Project ECHO and Patient Navigation Facilitator: Aysha Sheikh, RN, MPH  
Maine Cancer Foundation

12:00 PM NETWORKING LUNCH  
Buffet, Dessert, Exhibits in STATE OF MAINE HALL - Networking Seating in CAMDEN
12:50 PM WELCOME
1:00 - 1:45 PM High Quality Cancer Care for Every Patient: Politics, Policy and Quality: What's Ahead
BAY POINT BALLROOM
Stephen S. Grubbs, MD, FASCO - ASCO

1:55 - 2:45 PM CONCURRENT SESSIONS
“CAR Talk” – Chimeric Antigen Receptor (CAR) T-Cell Therapy Driving Progress in the Fight Against Cancer
CAMDEN
John M. Hill, Jr., MD - DHMC

Reconsidering Cancer Survivorship in Our Aged Society: Improving Patient Experience and Clinical Care
ROCKLAND
Sarah H. Kagan PhD, RN - University of Pennsylvania

2:45 - 3:05PM
EXHIBITS/NETWORKING
STATE OF MAINE HALL

3:05 - 4:35 PM ONCOLOGY REHAB
BAY POINT BALLROOM
• Why Cardiac Rehabilitation is Important for Cancer Patients
  Susan C. Gilchrist, M.D., M.S. - MD Anderson Cancer Center

• Value of Exercise based Oncology Rehabilitation for cancer Survivors
  Kim L. Dittus, MD, PHD, UVM Medical Center
  G. Stephen Morris, PT, Ph.D., FACSM - Academy of Oncologic Physical Therapy-APTA

4:35 - 5:00 PM REFRESHMENTS/EXHIBITS / NETWORKING
STATE OF MAINE HALL

5:00 PM - 6:00 PM Better Care for Cancer Patients at Lower Cost: How Oncology Practices Can Improve Value While Remaining Financially Viable
BAY POINT BALLROOM
Harold D. Miller, MS - Center for Healthcare Quality and Payment Reform

6:00 PM - 7:00 PM EXHIBITS / NETWORKING / RECEPTION / PRIZE DRAWING
STATE OF MAINE HALL

6:15 PM - 7:00 PM ABSTRACT POSTER SESSION: Supportive care, prognostic markers, genetic evaluations and indications - ROCKPORT

7:00 PM OPTIONAL EVENING ACTIVITIES
• Platinum Dinner (invite only) - CAMDEN
• Networking Dinner (ticketed) BAY POINT BALLROOM
• S'Mores Reception FIRE PIT
7:15 AM Fellow/Trainee Breakfast
PENOBSCOT BAY
7:15 AM - 8:30 AM BREAKFAST/
EXHIBITS/NETWORKING
STATE OF MAINE HALL - additional seating available in ROCKLAND
7:30 AM Annual Business Meeting of Voting Membership - CAMDEN
(grab your breakfast at the buffet)

8:30 AM - 9:30 AM Steven M. Grunberg, MD Memorial Keynote: Current status of molecular testing in defining optimal treatment strategies in non-small cell lung cancer
BAY POINT BALLROOM
Paul J Hesketh, MD, FASCO - Lahey

9:30 AM ABSTRACT POSTER SESSION: Case reports and treatment ROCKPORT

10:15 - 10:45 AM EXHIBITS / REFRESHMENTS / NETWORKING
STATE OF MAINE HALL

10:45 AM - 11:30 AM CONCURRENT
Re-Imagining Life With Cancer - ROCKLAND
Barbara L. Jones, Ph.D. University of Texas Austin
Innovative Techniques in Neurosurgical Oncology - CAMDEN
Linton T. Evans, MD - DHMC

11:35AM - 12:15 PM CONCURRENT
Venous Thromboembolism and Cancer: What the Practicing Oncologist Needs to Know in 2019- CAMDEN
Deborah L. Ornstein, MD, MS. - DHMC

Survivorship Issues: Implications of Head & Neck Cancer Treatment Panel - ROCKLAND
Moderator: Nicole Messier BSN, RN, OCN, ONN-CG - UVM Medical Center
Panelists: Philip Schaner, MD - DHMC
Elise Cushman RD, LD - DHMC
Michelle Coogan RN - DHMC
Christina M. Mimikos, DO - Maine Medical Partners
Zoe Kennedy, MA, CCC-SLP - Voice & Swallowing Center of Maine

12:20 PM - 1:10 PM Abstract Podium Presentations - BAY POINT BALLROOM
Moderator - Marie Wood, MD - UVM
• Heather Wright, MD - DHMC
• Whitney Hammond - NH-DHHS
• Allison Smith, MD, MPH - DHMC

1:10 - 1:30 PM LUNCH BUFFET & AWARDS - BAY POINT BALLROOM

1:30PM - 2:15PM LUNCH LECTURE: Evidence-based Multi-disciplinary Management of Pancreatic Cancer
Timothy J. Fitzgerald, MD Maine Medical Center

2:15 PM RECEPTION & PRIZE DRAWING - KNOX COUNTY HALLWAY

2:30 PM FELLOWS RETREAT - PENOBSCOT BAY

2:35 PM WORKSHOPS
• Regional Research - Rural Access to Clinical Trials - CAMDEN
• Patient Engagement Initiatives - ROCKLAND
Call for Proposals
The Northern New England Clinical Oncology Society is seeking research funding proposals for investigative projects of value to the entire Northern New England community of cancer care providers. The society seeks to award one or more research grants to worthy proposals, up to a total of $20,000 per application cycle. Eligible candidates will be a current NNECOS member in good standing. Fellows and members of the interdisciplinary care team are strongly encouraged to apply. Projects should be in alignment with the society’s mission to assure access to high quality oncology care in our region. Preference will be given to projects promoting collaboration amongst NNECOS institutions (academic and community).

**PROPOSAL ELEMENTS**

**Introduction:** 1–2 paragraphs describing the problem and data supporting development of the research question.

**Objectives:** A limited number of objectives with one primary objective, clearly defined and describing what specific measures will be used to determine if objective is satisfied.

**Methods:** Describe actions to be taken and the rationale for the application of specific procedures or techniques.

**Statistics:** Except for small pilot/feasibility studies, statistics should be provided to support sample sizes.

**Budget:** Clearly outlined budget including materials and funds for collaborating facility employees required in the operations of a project (i.e. research coordinator, statistician, etc. in alignment with national averages for their role). Indirect costs and salary support for academic attending physicians and private practice providers should not be included. If the proposal is part of a larger project, the total amount of funding and its sources should be disclosed.

**References:** Pertinent journal and abstract references to support proposal should be provided.

**Total Length:** The introduction, objectives, methods and statistics sections should cover no more than two pages in length.

**NOTIFICATION**
Awardees will be notified in approximately 60 days, be required to submit progress reports to NNECOS, and may be asked to present a final report of the research to the NNECOS annual meeting.

Additional Information
For more details, including a list of previously funded projects and application template, visit nnecos.org/research.
NNECOS will award a limited number of educational grants (typical range between $2,000 and $4,000) in sponsorship of local educational activities. NNECOS will accept requests for applications (RFAs) from NNECOS members to support an educational endeavor (clinician-focus or patient-focused) at their practice or institution. Applications will be reviewed on a rolling basis.

**PAST APPROVED GRANTS INCLUDE**

- **GI Malignancies Nursing Education** - Dinner Program - St. Johnsbury, VT
- **OCN Review Course** - DHMC Lebanon
- **Medical Marijuana and Cannabidiol Education Program** - Vermont Cancer Support (Survivor) Network
- **Patient Education Symposium** - 3/4 day patient symposium for myeloma patients and their families - DHMC
- **Stowe Weekend of Hope** - Hope and Wellness Through Movement Day
- **Factors Predicting Biomodality versus Trimodality Therapy in Esophageal Cancer**
- **Genomic and Clinical Correlates between Breast Cancer and Bovine Leukemia Virus**
- **Trends in Risk Factors and Screening Practices for newly-diagnosed patients with melanoma**

**VISITING PROFESSORS**

- **Visiting Professor - Genetic Evaluation of Breast Cancer Patients** (tumor board, lecture, case presentation meetings, journal club) - Northern Light Cancer Institute
- **Visiting Professor - Management of Advanced Adenocarcinoma of Prostate** (tumor board, lecture, case presentation meetings, journal club) - EMMC Cancer Care
- **Visiting Professor - Bone Marrow Transplant for Heme Malignancies** (tumor board, lecture, case presentation meetings, journal club) - EMMC Cancer Care
- **Visiting Professor - Hematopoietic Stem Cell Transplant** - Lecture at UVM Grand Rounds - Burlington, VT
- **Visiting Professor - Sarcoma** - Lecture at UVM Grand Rounds - Burlington, VT

Learn more and apply at [www.nnecos.org/Educational-Grants](http://www.nnecos.org/Educational-Grants)
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A case of facial nerve palsy as a harbinger of Multiple Myeloma

O. Barrett-Campbell, J. Hill
Dartmouth Hitchcock Medical Center

Background: Multiple myeloma (MM) is the proliferation of malignant plasma cells in the bone marrow producing monoclonal immunoglobulin. Typical presentation includes anemia, lytic bone lesions, renal failure and hypercalcemia. Neurologic complications may occur, infrequently, generally in the form of radiculopathy due to external compression. We report a case of MM presenting with Bell's Palsy.

Methods: A 70-year-old man presented with subacute onset of left-sided facial weakness and drooling. Exam revealed left facial paralysis, with laboratory data showing hypercalcemia (14.3 mg/dL), elevated creatinine (9.9 mg/dl) and normocytic anemia (9.2g/dl). Head CT was normal, and he was diagnosed with Bell’s palsy. Free kappa light chains were elevated to 477 mg/dl, and free light chain ratio was 711. Skeletal survey showed diffuse lytic lesions, and bone marrow biopsy revealed 80% plasmacytosis with negative congo red stain. FISH was positive for monosomy 13.

Results: He had minimal improvement in renal failure and eventually required dialysis. Bortezomib and Dexamethasone were initiated, with a good partial response after 3 cycles and resolution of facial paralysis and renal failure. He is currently being evaluated for autologous stem cell transplant.

Conclusions: Central nervous system (CNS) involvement is rare in MM. The proposed mechanisms include meningeal metastasis, direct infiltration of cranial nerves, skull base lesions with mass effect, extramedullary CNS plasmacytoma, treatment complications or hyperviscosity syndrome. This appears to be the first reported case of idiopathic Bell’s Palsy as the initial presentation of MM.

Notes: This clinical vignette highlights a rare presentation of multiple myeloma, a condition with significant associated morbidity and mortality.

A Transplant a day keeps the Leukemia Away: A Case of AML in remission, one year after 2nd Stem Cell Transplant with 3rd relapse

A. Donovan, K. Meehan, S. Brighton, J. Hill
Dartmouth Hitchcock Medical Center

Background: Treatment of relapsed refractory acute myeloid leukemia is challenging given high risk of relapse and treatment-related morbidity and mortality. We present a
A complicated patient with relapsed AML after two allogenic stem cell transplants, now in complete remission on chemotherapy.

**Case Presentation:** In the Spring 2016, a 53 year old woman presented with fatigue and pancytopenia. Bone marrow biopsy revealed 80% grade 2 myelofibrosis. She received Revlimid/Dexamethasone for 3 months with resolution of transfusion dependency while awaiting transplant.

On the day of her admission for her first allogeneic stem cell transplant, a bone marrow demonstrated MDS related AML. She received 7+3 induction and achieved complete remission. In the Spring of 2017 she received an allogeneic SCT but relapsed 8 months later, with induction options limited to HiDAC due to transaminitis from GVHD. Course was complicated by a fungal pneumonia, and she was then treated with Sorafenib maintenance.

Her AML relapsed again in Spring of 2018, and with MEC induction she had no evidence of disease. She underwent a second MUD-allogeneic SCT in the summer of 2018; however, 4 months later her AML again relapsed. She was started on Decitabine and Venetoclax and remains in complete remission 3.5 years since initial presentation, and 12 months since last relapse.

**Discussion:** Treatment of relapsed-refractory AML is complicated and requires significant attention weighing the risks of treatment vs. expected outcome. Our patient demonstrates treatment success despite an intensive treatment course with many complications, and exemplifies the importance of a personalized approach to AML treatment.

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**Orthopedic and Oncologic Rehabilitation for a Pancreatic Cancer Survivor Following Total Knee Arthroplasty Revision: A Case Report**

K. Dumond, A. Litterini  
*University of New England*

**Background:** Literature supporting, and recommendations for, physical therapy (PT) management and physical activity for cancer-related fatigue (CRF) and total knee arthroplasty (TKA) is abundant, but the conditions in conjunction with cancer prehabilitation is relatively non-existent. The purpose of this case report was to describe PT management for TKA revision and Whipple procedure prehabilitation for a pancreatic cancer survivor concurrently undergoing chemotherapy treatment with CRF.

**Methods:** A 77-year-old male presented to outpatient PT status-post right TKA septic revision concurrently on intravenous chemotherapy for stage II adenocarcinoma of the pancreas. Outcome measures were range of motion (ROM [passive and active]), manual muscle testing (MMT), fastest Timed Up & Go (TUG), 10-point Numeric Rating Scale for Fatigue, Lower Extremity Functional Scale (LEFS), and static balance testing. Interventions included strength and ROM exercises, balance and endurance training, and home exercise (HEP) instruction.
Results: Improvements were observed in fatigue (5/10 to 2/10) and TUG (15 to 11 seconds), indicating decreased fall risk. Gross bilateral hip and knee strength (4+/5 to 5/5) and right knee flexion passive ROM (78 to 91 degrees) improved. LEFS increased by 26.5 points, reducing his disability (38.75% to 28.12%). Single-leg (3 to 9 seconds) and tandem stance (26 [firm surface] to 30 seconds [foam surface]) balance improved. Limitations to further progress included the patient’s lack of adherence to the HEP.

Conclusions: This patient appeared to benefit from comprehensive orthopedic and oncologic interventions based on improvements in all outcome measures. Complex case management requires a multi-faceted approach to rehabilitation for improvement across the cancer survivorship continuum.

A Case of Gastrointestinal Amyloidosis (GIA) Manifesting as Refractory Colonic Pseudo-obstruction

L. Emery, S. Muralikrishnan, N. Sobti, E. Bengtson
Dartmouth-Hitchcock Medical Center

Background: AL amyloidosis is a rare disease thought to coexist in about 10-15% of myeloma patients; estimated incidence is 10-12 cases/million person-years.1,2 Pathophysiology involves monoclonal light chain deposition throughout the body resulting in significant organ dysfunction. Among the many sites of disease, GIA is rare, occurring in 3-8% of patients.3,4,5 We present a case of GIA manifesting as refractory colonic pseudo-obstruction.

Case Report: A 70-year-old man presented to hematology clinic with an unusual pattern of ecchymosis involving his face and fingers. An SPEP identified monoclonal light chains; bone marrow biopsy confirmed a lambda restricted plasma cell myeloma (30% involvement). He was started on lenalidomide, bortezomib, and dexamethasone but developed worsening constipation/abdominal distension prompting evaluation. Work-up revealed massive colonic dilation, evidence of advanced amyloidosis/cardiac involvement (elevated troponin/proBNP, LV hypertrophy on echocardiogram), and persistently elevated free light chains (sFLC). He underwent urgent decompressive colonscopy revealing large subepithelial blood clots with friable mucosa/bleeding; biopsies showed diffuse amyloid deposition. He was started on cyclophosphamide, bortezomib and dexamethasone for treatment of amyloidosis with slight improvement in sFLC. Unfortunately, given disease progression and worsening performance status, treatment was aborted and he died shortly after. His course spanned ~6 months during which he only received two partial cycles of therapy.

Conclusions: GIA is a rare manifestation of systemic amyloidosis presenting with non-specific symptoms that require a high index of suspicion to make the diagnosis. This case highlights the clinical/diagnostic challenges associated with an uncommon presentation of systemic amyloidosis and the progressive/devastating organ damage that can occur.
Targeted Agents Advance the Treatment of Anaplastic Thyroid Cancer

V. Forbes, M. Chamberlin, K. Shirai
Dartmouth-Hitchcock Medical Center

Background: Anaplastic thyroid carcinomas (ATCs) are rare, highly aggressive, undifferentiated tumors that are almost uniformly fatal with a median survival of 5-12 months and a one-year survival of 20-40%. ATCs comprise 1-2% of all thyroid cancers, but cause 40-50% of all thyroid cancer-related deaths. In May 2018, the FDA granted approval of Dabrafenib and Trametinib in treating patients with unresectable or metastatic BRAF-V600E-positive ATC based on Phase II data.

Methods: Our patient is a 76-year-old male with a history of recurrent NSCLC now disease-free who presented with worsening right upper extremity pain and weakness, trouble swallowing, and right-sided ptosis and droop. Imaging showed a right supraclavicular mass with involvement of brachial plexus and esophagus. A FNA of a somewhat insufficient sample revealed metastatic carcinoma compatible with a pulmonary primary. Given his clinical picture, he was intubated and an emergent biopsy was obtained favoring ATC. Mutational testing was sent. He remained intubated and his diagnosis was unknown to him. His wishes were inferred by his family.

Results: Family discussions ensued and approval was sought for Dabrafenib and Trametinib after testing showed the mutation. Ultimately, a tracheostomy was pursued and he was able to articulate his wishes. He declined treatment and passed immediately after respiratory support was withdrawn.

Conclusions: Our patient illustrates the clinical challenge of treating ATC, need for a multidisciplinary approach, importance of clarifying goals of care early, promise of ongoing therapeutic studies, role for liquid biopsy to facilitate mutational testing, and urgent need for more effective therapies for this lethal cancer.

A rare case of isolated intracranial marginal zone lymphoma: A therapeutic challenge

M. Gergi, K. Landry
UVM Medical Center

Background: A minority of patients diagnosed with primary CNS lymphoma will have a low-grade lymphoma, with marginal zone lymphoma (MZL) being the most common histologic type. Very few cases were reported in the literature making diagnosis and treatment of this disease a challenge.

Methods: 64 years old presented for forgetfulness and confusion. PE and labs were unremarkable. MRI brain showed a large multifocal mass in the frontal lobe and crossing the corpus callosum, suggestive of high grade glioma. However, pathologic examination revealed B cell lymphoma with plasmacytoid differentiation positive for CD20, CD3 and CD5 negative, consistent with MZL. LP, bone marrow biopsy and
PET/CT showed no evidence of systemic disease. Debulking surgery was followed by ibrutinib therapy.

**Results:** Most CNS lymphomas are large B cell lymphomas (LBL), aggressive entity requiring treatment with high dose MTX and whole brain radiation (WBR). Primary CNS low-grade lymphomas are very rare. On MRI most MZL are dural based resembling meningiomas, but in our case the tumor was deep in the frontal area of the brain crossing the corpus callosum resembling a high-grade glioma which appears to be unusual for this tumor type. Treatment remains a challenge, as unlike in LBL these patients have longer survival therefore long-term neurotoxicity, which can be associated with MTX and WBR, is a major consideration. Local radiation in contrast to WBR can be considered. For chemotherapy Rituximab does not cross the blood brain barrier, however a phase II trial showed overall response rate of 48% with ibrutinib alone.

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**Blastomycosis masquerading as metastases in a man with testicular cancer**

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**Background:** Blastomyces dermatitidis is a dimorphic fungus endemic to North America. Pulmonary blastomycosis occurs when spores are inhaled, and can result in a solitary lung lesion that may be mistaken for cancer. Particularly immunocompromised patients may present with widespread disseminated disease with multiple involved organ systems.

**Methods:** Case presentation

**Results:** A 42-year-old landscaper presented with a firm 3.3 cm tender testicular mass. After orchiectomy, pathology confirmed a stage pT1b, pN0 seminoma. Staging CT showed multiple subcentimeter lung nodules along with innumerable tiny liver and spleen hypodensities that were initially concerning for possible metastatic spread. Biopsy of a pulmonary nodule showed “rare atypical cells” but did not confirm metastatic malignancy. One month later, the patient presented with unprovoked left knee swelling, and MRI showed a knee effusion and multiple bony lesions in the tibia, fibular head, and patella which were read as consistent with metastases. Biopsy of the tibia showed palisading granulomatous inflammation with fungal organisms morphologically resembling Blastomycosis. Blastomyces urine antigen was positive. The patient was started on itraconazole with planned duration of 1 year, with surveillance for response with CT every 3 months. **Conclusions:** This case of laboratory-proven PCH in a 27-year-old woman with hemolytic crisis, and delayed diagnosis of this rare condition resulted in unnecessary splenectomy. She had excellent response to steroids and recovered well.
Conclusions: Incidental discovery of pulmonary blastomycosis can raise concerns for metastatic or primary lung cancer. The co-occurrence of disseminated blastomycosis and cancer can complicate staging workup and treatment decisions. High degree of suspicion for alternate infectious etiologies should be maintained when patterns of metastatic spread are not typical. Early diagnosis is essential as treatment of blastomycosis portends a good prognosis.

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### CEA as a predictor of treatment response to TKIs in EGFR + lung cancer

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**Background:** Studies have shown that Carcinoembryonic antigen (CEA) levels correlate with the epidermal growth factor receptor (EGFR) mutated variant of non-small cell lung cancer (NSCLC). Here, we present a patient with EGFR + Stage IV lung adenocarcinoma, who was treated with a tyrosine kinase inhibitor (TKI) with an excellent response that was reflected by a downtrend in CEA levels.

**Case Presentation:** 55-year-old male presented with cough and dyspnea. CT chest demonstrated innumerable pulmonary nodules. Further imaging demonstrated metastatic disease in the spine, liver and brain. Gastrointestinal malignancy was considered; therefore, CEA was ordered and was 22.9 ng/ml. Liver biopsy was performed and revealed metastatic lung adenocarcinoma (EGFR exon 19 deletion).

Osimertinib, a TKI was started along with whole brain radiation. After 5 weeks, the CEA level decreased to 2.9 ng/ml with continuous downtrend to normal values. Surveillance MRI brain at 5 months revealed a decrease in size of the brain lesions. At 8 months, CT chest/abdomen/pelvis revealed stable systemic disease.

**Conclusions:** Elevated baseline CEA has been correlated with treatment response to TKIs in lung cancer. This association is of particular relevance with the EGFR exon 19 deletion as with our patient. We propose that baseline CEA and the subsequent trend offer much clinical value in EGFR + lung cancer, as this may allow a more efficient means of predicting progression or recurrence versus routine imaging. This is not yet the standard approach to surveillance, however substantial data has been emerging, which may warrant a paradigm shift.

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### Nivolumab-induced sarcoidosis in melanoma

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**Introduction:** Sarcoidosis is a systemic inflammatory disease, that is rarely affiliated with melanoma, particularly when immunotherapy is used. Here, we present a patient with metastatic melanoma who developed cutaneous and pulmonary sarcoidosis while being treated with Nivolumab.
Case Presentation: 69-year-old male presented with Stage IVa, BRAF wildtype melanoma of the scalp with occult primary. He was started on treatment with Nivolumab. After 3 cycles, he reported dyspnea which was attributed to pneumonitis. After 6 cycles, he reported a rash of his upper extremities. Topical steroids provided temporary relief, however the rash progressed which prompted further work up. Biopsy of the thigh lesion revealed subcutaneous sarcoidal-type granulomatous inflammation. Subsequent lung biopsy revealed non caseating granulomas, suggestive of sarcoidosis. Nivolumab was discontinued and corticosteroids were started.

Discussion: Immune-related adverse events (irAEs) such as rash and pneumonitis are known complications of immunotherapy.1,2 Given that clinicians often diagnose these toxicities in isolation, they may overlook systemic disorders. Immune related sarcoidosis is a multisystem inflammatory disease that encompasses cutaneous and pulmonary manifestations with an incidence of <1%. One theory behind immunotherapy induced sarcoidosis is that checkpoint inhibitors block Programmed Death-1 (PD-1) and thereby increase lymphocytes and the release of IFN-γ; which promote granuloma formation.3 In addition to identifying sarcoidosis as an immunotoxicity, it is important to know how to treat it. To date there is a lack of consensus guidelines for treatment of sarcoidosis, but isolated case reports as well as our known clinical observations, support the use of corticosteroids and permanent discontinuation of immunotherapy.

A Case of High-risk Myelodysplastic Syndrome with Transfusion Dependence treated with Venetoclax

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Background: MDS are characterized by ineffective hematopoiesis in one or more lineages of the bone marrow. They are a group of heterogeneous clonal stem cell malignancies with a high risk to progress to acute myeloid leukemia. Currently, there are no curative FDA-approved medications for MDS.

Methods: A 53-y.o male with a history of CAD s/p CABG. Following CABG, the patient’s blood counts remained low and in March 2012 he was diagnosed with MDS. Patient was started on azacitidine complicated by elevated LFTs and prolonged neutropenia. Low dose lenalidomide was initiated then stopped for prolonged cytopenia. He was evaluated for HCT but was ineligible due to comorbidities. He remained on active surveillance until August 2018 when he became dependent on twice weekly transfusions. In December 2018, single agent venetoclax 100 mg daily was started. After one month, he experienced no side effects, however, remained mildly neutropenic. The dose of venetoclax was increased to 200 mg daily. Transfusions were stopped in January 2019. He is tolerating venetoclax and remained transfusion independent.
Results: Patient with MDS refractory to current standard of care was treated with venetoclax. After three months of treatment the patient became transfusion independent. The development of new therapeutic strategies for MDS refractory to HMAs is important avenue of research and is being extensively studied in clinical trials.

Conclusions: Our case demonstrate the feasibility of venetoclax monotherapy for refractory MDS in hopes that in conjunction with the results of current and future clinical trials will become a standard of care option for these patients.

Acute myeloid leukemia with t(8:16) in a patient with NF1 germline mutation presenting with a clinical scenario resembling acute promyelocytic leukemia

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Background: Acute myeloid leukemia with t(8:16) is a unique entity with a typical clinical presentation, cytogenetic and molecular abnormalities. NF1 germline mutations are associated with several malignancies including leukemias and sarcomas.

Case Report: 29-year-old female with a past medical history of osteosarcoma status post chemotherapy with etoposide and ifosfamide who presented with a florid hemorrhagic syndrome with initial labs showing granular blasts and severe DIC. She was started empirically on ATRA. Once APL was ruled out, the patient was started on Liposomal Daunorubicin and Cytarabine achieving a complete remission that was very brief. She subsequently relapsed and received at least 6 more lines of treatment without any meaningful response.

Conclusions: Translocation (8;16) has been associated with a particularly aggressive therapy related AML with clinical presentation that mimics APL as in the case of this particular patient. Her young age and her clinical features raised suspicion for a germline mutation and germline testing revealed a NF1 mutation.

The early presentation of this leukemia at less than a year since exposure to etoposide could have been the result of a germline mutation with newly acquired driver mutation giving this very aggressive and refractory phenotype of AML.

This highlights the importance of including a comprehensive familiar cancer pedigree in these patients and more crucial to consider testing for germline mutations in young patients who present with aggressive hematological malignancies.
Pulmonary hemosiderosis secondary to hereditary hemochromatosis

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Background: Hereditary hemochromatosis is an autosomal recessive disease of increased intestinal absorption of iron leading to accumulation in tissues which may progress to organ damage, most commonly in the liver. Iron deposition in the liver can lead to cirrhosis and hepatocellular carcinoma. Other common manifestations of hemochromatosis include diabetes, bronzing of the skin, arthropathy and cardiomyopathy. Here we describe the first case reported in English language literature of pulmonary hemosiderosis secondary to hereditary hemochromatosis.

Methods: We reviewed a case of pulmonary hemosiderosis secondary to hereditary hemochromatosis and performed a relevant literature review.

Results: A 49-year-old male with no past medical history or family history of iron overload presented with fatigue, shortness of breath and chest pain after a recent finding of elevated ferritin. Patient was found to have biallelic C282Y mutations of the HFE protein and after further workup with laboratory tests and imaging, was diagnosed with hereditary hemochromatosis with secondary pulmonary hemosiderosis. The patient is receiving weekly phlebotomies and has had an overall improvement in his symptoms.

Conclusions: The presentation of hemochromatosis can vary widely dependent on severity of iron overload and presence of conditions that predispose organ dysfunction. Pulmonary hemosiderosis is a very rare manifestation of hereditary hemochromatosis. This report illustrates the various manifestations of this disease and provides insight on this rare presentation in order to improve its diagnosis.

Revising the Side Effect Profile Associated with Megestrol acetate (Megace)

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Background: Secondary adrenal insufficiency is a known complication of megace administration. Here, we present a case associated with megace withdrawal.

Methods: 50-year-old female with Diffuse Large B Cell Lymphoma (DLBCL) status post chemotherapy, with CNS relapse status post radiation, admitted for bone marrow transplantation.

During admission, the patient became lethargic and tremulous. Vitals were significant for systolic blood pressure of 78-82 mmHg. Examination showed physiologic tremor. Infections were ruled out per CXR and cultures. Brain and spine MRI were negative for
involvement. Hydration failed to improve hypotension, and discontinuation of megace 400mg daily was found to correspond with the onset of symptoms. This prompted an adrenal insufficiency workup. Morning cortisol was 0.6 mcg/dl with pretest ACTH of <5 pg/ml. Cosyntropin stimulation test revealed cortisol of 4.6 mcg/dl and 7.7 mcg/dl at 30 and 60 minutes respectively. The patient was diagnosed with secondary adrenal insufficiency. Oral hydrocortisone promptly resolved her symptoms.

Conclusions: Megace has been approved to treat cachexia in cancer patients. The mechanism of action includes binding to glucocorticoid receptors, which has led to reports of adrenal insufficiency. Leinung et al and Mann et al helped to further elucidate the underlying mechanism.

Megace induced adrenal insufficiency has been reported. However, our case is important as adrenal insufficiency was diagnosed after megace withdrawal, and brain radiation induced endocrinopathy was ruled out. It is imperative for Oncologists to be cognizant of not only megace administration, but also megace withdrawal predisposing to adrenal insufficiency, whereupon a slow taper is indicated to prevent complications.

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**Analysis of a rare PMS1 variant identified in discordant sibling pairs from hereditary breast cancer families**

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**Background:** Additional genes associated with hereditary breast cancer likely exist. We previously identified a rare and potentially pathogenic PMS1 variant in two affected sisters from hereditary breast cancer families. This variant was not present in the unaffected sister-pair. Published in silico analyses previously predicted that this variant may have functional clinical significance.

**Objectives:** 1.) To determine the genotype-phenotype correlation within the two families with the rare PMS1 variant. 2.) To sequence PMS1 mRNA from cell lines with and without the c.605G>A variant to test the hypothesis that the PMS1 c.605G>A germline variant disrupts PMS1 mRNA splicing.

**Methods:** 1.) Germline DNA from extended family members were collected and analyzed to determine if the PMS1 c.605G>A variant tracks with affected family members. 2.) Using NCI-H441 lung cancer cells heterozygous for the PMS1 c.605G>A variant we sequenced PMS1 mRNA and compared the results with cell lines harboring WT PMS1 to determine whether PMS1 c.605G>A impacts exon 6 utilization.

**Results:** The PMS1 c.605G>A variant did not track with cancer in either family. No PMS1 c.605G>A variant-dependent differences in exon 6 utilization were detected between PMS1 WT cell lines and the NCI-H441 cells.
Conclusions: Given the PMS1 c.605G>A variant did not segregate with disease and there was no variant-dependent impact on splicing; the PMS1 c.605G>A variant is likely benign. This information can help others investigating functional significance of either somatic or germline mutations.

A case of gastric leiomyosarcoma: Is p53 the culprit?

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Background: Gastric leiomyosarcomas (LMS) are rare, accounting for only 1-3% of primary gastric tumors. Due to the rarity of this entity, many of the biologic markers are poorly understood. Until recent advances in immunohistochemistry, many gastrointestinal stromal tumors (GIST) were misdiagnosed as LMS. With further insight, some literature suggests that p53 plays a role in the development of Gastric LMS.

Methods: A 63-year-old male with history of Wilms tumor, colon cancer and prostate cancer presented to the Emergency Department with melena and symptomatic anemia. His hemoglobin was critically low, requiring blood transfusion, and labs were consistent with iron deficiency anemia. He underwent an upper GI endoscopy with brush biopsy and CT scan both concerning for malignancy.

Results: Brush biopsy was consistent with pleomorphic leiomyosarcoma, based on positivity for desmin, actin, SMA and the lack of CD117 and DOG-1, excluding GIST. The patient underwent total gastrectomy, splenectomy and partial pancreatectomy, with histopathology demonstrating a 10.5 cm LMS originating in the stomach wall and ulcerating through stomach mucosa, invading adjacent structures. He remains stable under therapy.

Conclusions: True LMS are rare, and in the past many GIST were misdiagnosed as LMS. This patient has a history of multiple malignancies known to express p53, namely Wilms tumor, colon cancer and prostate cancer, though he does not meet criteria for Li-Fraumeni syndrome. This case highlights the importance of excluding GIST in order to avoid misdiagnosis, while also emphasizing the need to recognize shared genetic components across malignancies that may underlie disease behavior and help to guide therapy.

Inpatient Rehabilitation for a Cancer Survivor Following a Lumbar Spinal Fusion Secondary to a Pathological Fracture: A Case Report

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Background: Pathological fractures secondary to cancer often require medical management. Surgery is indicated for vertebral collapse with or without neurologic deficit, spinal instability, and/or pain that is non-responsive to conservative treatment. Physical therapy (PT) is also commonly prescribed following spinal surgery, but also for symptom management in cancer survivorship.
Methods: The patient was a 66-year old Caucasian man diagnosed with a pathological fracture of L2 secondary to a diagnosis of Cancer of Unknown Primary. He was admitted to the Skilled Nursing Facility status-post T12-L4 spinal fusion with the goal of discharge for additional cancer treatment. His primary symptoms post-operatively were generalized lower extremity weakness, impaired static and dynamic standing balance, pain and decreased cardiovascular endurance. The primary assessments used were the Six Minute Walk Text (6MWT), modified 30-second sit-to-stand (m30STS) and Numeric Pain Rating Scale (NPRS). Interventions included therapeutic exercise, neuromuscular re-education, gait training, therapeutic activity and patient education.

Results: Significant progress was made towards functional mobility goals for the 6MWT (73 meters [front wheeled walker] to 266 meters [single point cane]), m30STS (2 to 6 chair rises), and pain on the NPRS (8 to 3 on a scale of 0 to 10). However, the patient’s presentation became unstable as he was progressively unable to ambulate due to intractable pain. He was successfully referred back to the oncologist for further evaluation of progressive disease.

Conclusions: Survivors of advanced cancer can benefit from palliative care PT to manage symptoms. However, appropriate monitoring is required due to the potential for a rapidly changing presentation.

Follicular Lymphoma: A Not-So-Indolent Course

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Background: Follicular lymphoma (FL) is the most common indolent lymphoma and second most common subtype of Non-Hodgkin Lymphoma. Due to its indolent nature, FL is generally incurable with chemotherapy alone, though new therapies have improved the median survival to roughly 15-20 years. Unfortunately, some cases behave more aggressively, requiring multiple lines of therapy and rendering potentially curative allogeneic stem cell transplant more challenging.

Methods: We present the case of a 60 year old male with recalcitrant FL requiring multiple lines of therapy, then allogeneic stem cell transplant, with early post-transplant transformation to diffuse large B cell lymphoma (DLBCL).

Results: The patient’s clinical course was complex, requiring 6 different lines of therapy over a 7 year span. Treatment was complicated by Rituximab-induced pneumonitis after autologous transplant, precluding its further use. DLBCL was ruled out at each progression. He eventually underwent allogeneic transplant after PET/CT scan showing minimal residual disease and a negative bone marrow biopsy. Despite this, transformation to DLBCL was detected on day +24 post-transplant, with the patient ultimately declining further therapy.

Conclusions: Our case highlights an unusually aggressive course for a low-grade FL that was initially recalcitrant to multiple lines of therapy, then responsive, with pre-transplant stabilization, then aggressive post-transplant transformation that precluded
any development of a favorable graft-versus-tumor effect. This raises questions regarding alternative management strategies for such a scenario, including other monoclonal antibody-based regimens, immunotherapy and even chimeric antigen receptor T-cell therapy.

Comprehensive physical therapy management of a patient with lymphedema secondary to bladder cancer with multiple sclerosis: a case report

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**Background:** Rehabilitation therapy is an integral part of comprehensive oncology care. Cancer survivors experience a range of sequelae including lymphedema that result from their cancer or cancer treatments. This case study presents a unique patient that had advanced multiple sclerosis (MS) prior to the diagnosis of his bladder cancer and discusses the management of his lymphedema.

**Case Description:** The patient was a 69 year old male whose cancer was diagnosed when he presented with cellulitis of his lower extremity (LE) secondary to lymphedema. Biopsy and staging showed he had metastatic bladder cancer with multiple bone lesions. Interventions for the patient’s lymphedema included manual lymphatic drainage (MLD), compression garments, and patient/caregiver education.

**Outcomes:** The patient tolerated chemotherapy well; repeat imaging found shrinkage of the widespread lymphadenopathy, stable bone disease, and no evidence of disease progression. There was a 21% reduction in the volume of the LE lymphedema after treatment.

**Discussion:** This case demonstrates the relationship between lymphedema and metastatic cancer, and how treatment can be complicated by pre-existing co-morbidities. This case report covers the period of time from lymphedema onset and cancer diagnosis until the patient achieved control and independent management of his lymphedema. During this six week period of lymphedema intervention, comprehensive oncology rehabilitation provided by physical therapists was successful in improving his quality of life. Standard two-phase lymphedema management is a reasonable and effective course of treatment for complex cases due to co-morbidities such as MS and associated paraparesis.
Metastatic Malignant Paraganglioma: A Case Report

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Background: Paragangliomas are rare neuroendocrine tumors that arise from chromaffin-containing tissue. Though typically benign, non-secretory paragangliomas can become malignant and metastasize. There is currently no standard treatment for metastatic malignant paragangliomas and no form of chemotherapy is known to prolong survival. The use of radiolabeled somatostatin analogs remains investigational and may be considered for tumors that express somatostatin receptors.

Methods: A 69-year-old female underwent embolization and excision of a left-sided cervical paraganglioma. She then received stereotactic radiosurgery for recurrence of the primary tumor. Subsequent imaging showed progressive enlargement of the tumor and eventually metastasis to her lungs and spine. She underwent stereotactic ablative radiation therapy to her spine and was started on Denosumab.

Results: MRI scans obtained afterwards revealed growth of her spinal lesions. Positron emission tomography using a gallium-68-labeled somatostatin analog demonstrated somatostatin receptor expression by her metastatic tumors. She was then started on lutetium Lu 177-dotatate, a somatostatin analog.

Conclusions: Metastasis of non-secretory paragangliomas is rare and difficult to manage; they often progress following excision and chemotherapy. Patients whose metastatic paragangliomas express somatostatin receptors may benefit from therapy with radiolabeled somatostatin analogs.

ABSTRACT GROUP B: PROGNOSTIC MARKERS/GENETIC EVALUATIONS/INDICATIONS

Literature Review of Causative and Non-causative Risk Factors for Breast Cancer-Related Lymphedema

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Background: Secondary lymphedema is a topic of concern for both cancer survivors and their providers. Specifically, risk factors associated with breast cancer-related lymphedema (BCRL) have become controversial due to conflicting guidelines and evidence.

Methods: In collaboration with Maine Medical Center Cancer Institute, physical therapy students from the University of New England conducted a literature review of BCRL risk factors. Published studies from 2009-2019 were retrieved via online databases (CINAHL, Cochrane Library, PubMed). Seminal articles published prior to 2009 were referenced.
for historical perspective due to lack of new evidence. Forty-two studies investigating BCRL risk associated with axillary surgery, body mass index (BMI), cellulitis, air travel, blood pressure measurement, weight training, needle sticks, and extreme temperatures were summarized. An annotated bibliography including study design, strengths and weaknesses, participants and results, was created trichotomizing each risk factor as causative, non-causative, or insufficient evidence to determine.

**Results:** Axillary surgery, elevated BMI, cellulitis, lack of breast reconstruction surgery, radiation therapy to regional lymph nodes, and adjuvant chemotherapy were found to be causative for BCRL. Air travel, blood pressure measurement, insect bites, and weight training were found to be non-causative. Insufficient evidence exists regarding the BCRL risks associated with weight loss, extreme temperature exposure, needle sticks, and limb positioning.

**Conclusions:** These findings, in conjunction with patient-specific medical advice, may improve risk-reduction practices for breast cancer survivors. This information is intended for the development of both continuing education within the MaineHealth Breast Work Group and for evidence-based patient education tools for BCRL risk reduction practices.

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**Risk of treatment-related death in carriers of pathogenic DPYD polymorphisms treated with fluoropyrimidine chemotherapy: A systematic review and patient-level analysis**

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**Background:** Polymorphisms of the DPYD gene are present in 3-5% of the population and are associated with increased risk for grade ≥3 toxicity during treatment with fluoropyrimidine (FP) chemotherapy. Fatal toxicities in carriers of DPYD polymorphisms have been described in published reports, however reliable estimates of the risk of treatment-related mortality are lacking.

**Methods:** We conducted a systematic review of the MEDLINE databases to identify relevant manuscripts published before January 28, 2018. We searched for published studies of patients receiving standard-dose FP chemotherapy (5-fluorouracil or capecitabine) who had pre-treatment testing for ≥1 of 4 pathogenic DPYD polymorphisms (c.1236G > A/HapB3, c.1679T > G, c.1905+1G > A/*2A, and c.2846A > T) and who were systematically assessed for treatment-related toxicities. In the case of retrospective studies, we required that the cohort be defined by pre-treatment characteristics. Two reviewers extracted study- and patient-level data, with discrepancies resolved by consensus. The pooled data were analyzed to estimate the risk of treatment-related mortality among polymorphism carriers.
Results: Of the 1290 references screened, 37 publications were included in the interim analysis. Patient-level data identified 485 of 14,377 patients (3.4%) with pathogenic DPYD polymorphisms. There were 12 deaths among polymorphism carriers, resulting in a 2.5% risk of treatment-related mortality (95% CI 1.3-4.4%). 2 of the decedents were compound heterozygotes. Only 2 treatment-related deaths were reported in 13,892 patients without identified polymorphisms.

Conclusions: Patients with pathogenic DPYD polymorphisms treated with standard-dose FP chemotherapy are at significant risk for treatment-related mortality and can be prospectively identified through pharmacogenetic testing.

Advanced Cancer Prognostic Index Collaborative Project

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Background: Breast cancer patients in low-income countries often present with advanced stages and have poorer survival. Assessment of patient prognosis and performance status is subjective, and where chemotherapy is available, can lead to over-treatment. The contribution of clinical data to predict treatment benefit remains poorly understood in low-resource settings. Validated predictive tools such as the International Prognostic Index rely on laboratory tests not readily available in many settings. We aim to develop a prognostic index using clinical data readily available in low resource health systems.

Methods: Based on data available at the Butaro Cancer Center of Excellence in Rwanda, we obtained clinical data (weight, age, pulse, WBC, Hemoglobin, Platelets, Creatinine, Hormone Receptor Status, and Her2 Status) from a Dartmouth advanced breast cancer cohort. Kaplan-Meier survival curves were plotted for each variable. Bivariate and Multivariate Cox Proportional Hazard Regressions were done to determine the variables that maintained significance while adjusting for associations between the clinical data points.

Results: Our analysis revealed a significant decrease in survival in patients Age >50 and with Her2 Receptor Positivity (p<0.05)

Conclusions: Commonly collected data at the start of chemotherapy may predict survival in advanced breast cancer patients in low-resource settings. We will perform a similar analysis on the advanced breast cancer patient database at the Butaro Cancer Center of Excellence. From this analysis, we seek to create a prognostic index that will be validated in larger cohorts and may serve to guide chemotherapy versus palliation treatment decisions in low-income health system settings.
Capacity-Building for Molecular Analyses in Breast Cancer from Formalin Fixed Paraffin Embedded (FFPE) Tissue Samples from Rwanda

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**Background:** The global burden of cancer is rising in countries ill-equipped to manage it. Breast cancer mortality is higher in African than European women, but neither race nor access to care completely account for this. Molecular analysis could be informative, but is expensive and the feasibility of using archived samples from low-resource settings is unknown.

**Methods:** We present a retrospective tissue collection study of breast cancer patients diagnosed at the University of Rwanda to investigate the quality of DNA from FFPE. Fifty tumor blocks and eight sets of FFPE slides from 2014-2018 were transported from Rwanda in two batches. Pathology was reviewed, DNA was extracted, and quality was assessed. Bisulfite conversion and array hybridization protocols to detect 2.5% methylated DNA were used. Prior to quality control, the methylation data was pre-processed. To identify poor quality samples, a p-value of 1E-06 and a threshold of 5% low-quality data were set. Mean bisulfite intensity values and methylation beta-values were calculated to determine the proportion of methylated alleles.

**Results:** Pathology was 82% concordant. Samples in Batch 1 had >5% low quality CpG’s. Buffered formalin was not used after FFPE processing was reviewed. For Batch 2, 10% buffered formalin was delivered to Rwanda. Eight additional samples were obtained with six having <5% low-quality CpG’s.

**Conclusions:** Complex molecular studies are feasible with international collaboration. Optimal processing and quality checks are crucial for successful analysis. Capacity-building to improve DNA quality is the first step toward optimizing treatment and minimizing disparities as molecular profiling increasingly directs cost-effective treatment.

Factors Predicting Bimodality Versus Trimodality Therapy in Esophageal Cancer

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**Background:** Neoadjuvant chemoradiation followed by surgical resection (trimodality therapy, TMT) is the standard of care for resectable esophageal cancer, based on the phase III CROSS trial. However, little data exists to characterize the population of patients that receive TMT, compared to those treated with definitive chemoradiation (bimodality therapy, BMT).
**Methods:** We conducted a single institution retrospective review of consecutive patients with resectable esophageal cancer presenting to UVMMC Radiation Oncology treated with BMT or TMT from 2009-2019. Relevant clinical variables were analyzed for association with TMT using univariate logistic regression and multivariate logistic regression. Overall survival (OS) was analyzed using the log-rank test and cox proportional hazards regression.

**Results:** We identified 95 patients, of which 51 (54%) underwent resection. Of BMT patients, 14 (32%) declined resection or were deemed medically inoperable at presentation. Lower Charlson comorbidity index (p=0.01), adenocarcinoma histology (p=0.02), lower nodal-stage (p=0.01), dysphagia at presentation (p=0.081), no chemotherapy cycles held during radiation (p=0.003), and meeting CROSS-eligibility (p=0.007) were independently associated with TMT on multivariable analysis (MVA), after controlling for significant covariates. Improved OS was observed with TMT (p<0.001), with median OS of 38.8 months (95% CI=33.1-83.1) compared to 18.7 months (95% CI=14.6-25.2) for BMT. On MVA, only TMT was associated with improved OS (HR=0.38, 95% CI=0.22-0.64, p<0.001).

**Conclusions:** Our data affirms an OS benefit with TMT. We identified variables significantly associated with TMT, which may inform clinical decision-making. Targeted intervention strategies are warranted to mitigate effects of relevant variables and increase resection rates.

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**The effect of extended genomic panel testing on treatment decisions for patients with metastatic breast, lung or colon cancer**

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**Background:** Extended panel molecular testing (EPMT) is utilized increasingly in patients with advanced cancer for whom standard of care treatment options are no longer available. Recent research suggests that for a variety of reasons EPMT results affect treatment decisions only 5-10% of the time. Our study aimed to assess how many patients with breast, lung, or colon cancer in a community oncology practice undergo EPMT and the effect of test results on treatment decisions.

**Methods:** From 1/1/2016-7/1/2019, we identified patients with stage IV breast, lung or colon cancer for whom EPMT results were available. Test results and treatment decisions for each patient were recorded.

**Results:** A total of 195 patients with breast cancer, 162 patients with colon cancer, and 464 patients with lung cancer were identified. 15% (n=29) of breast cancer patients, 29% (n=134) of lung cancer patients, and 15% (n=24) of colon cancer patients had retrievable EPMT results. 6% (n=26) of lung cancer patients and 1% (n=2) of the breast cancer patients received treatment based on EPMT results, and no colon cancer patients received treatment based on EPMT results.
patients were treated based on their EPMT results. Data will be updated to include reasons for non-treatment.

Conclusions: EPMT is utilized more commonly in patients with stage IV lung cancer as opposed to patients with stage IV colon or breast cancer. Available treatment options, physician, and patient preference may be reasons for this disparity. We are currently further determining which factors are linked to treatment decisions.

Hospitalization risk during chemotherapy in advanced cancer: Use of a validated risk stratification tool in gastrointestinal cancer patients

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Background: A risk stratification tool (Parsimonious Model [PM]) was developed and found to reliably identify patients at high risk for hospitalization after their first chemotherapy treatment. The model is based on data that is routinely taken at treatment appointments: sodium and albumin. These lab values are inputted into the model and produce a risk percentage to predict the patient’s risk for hospitalization 30 days post treatment. The goal of this study was to test the effectiveness of this risk stratification tool in identifying advanced gastrointestinal (GI) cancer patients at the Norris Cotton Cancer Center (NCCC) at risk for hospitalization after chemotherapy.

Methods: A retrospective chart review was completed on GI cancer patients with advanced disease from May 1, 2017 through May 1, 2019. This study utilized the PM to compute a risk percentage for each patient and demographic data was collected. Hospitalizations and ER visits were recorded and analyzed 90 days post initial chemotherapy treatment.

Results:

• 6 of 20 high-risk patients were hospitalized within 90 days of chemo start (30%, [PPV = 30%])
• 8 of 50 low-risk patients were hospitalized within 90 days of chemo start (16%, [NPV = 84%])

Within the limitations of our modest sample size, “high-risk” patients were twice as likely to be hospitalized within 90 days as “low-risk” patients.

Conclusions: Testing the reliability of the PM risk assessment tool in a known patient population, patients with advance GI cancer, is useful for identifying at risk patients and proactively connecting the patient to available resources to prevent unwanted hospitalizations.
Expectant Management for Early Stage Lung Cancer

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**Background:** Data describing outcomes for patients with early stage lung cancer who undergo expectant management is lacking, despite evidence of a sub-population with indolent malignancies. We used the National Cancer Data Base (NCDB) to identify factors associated with active surveillance (AS) for early stage lung cancer. Additionally, we sought to describe the relationship between an expectant management care plan and overall survival (OS), comparing those who underwent AS with those who received no treatment (NT).

**Methods:** Patients diagnosed in 2010 to 2015 with early stage lung cancer (stage IA, T1N0M0) who underwent expectant management were retrospectively identified in the NCDB. Logistic regression was used to assess care plan selection. Cox proportional hazard was used to assess hazard ratio (HR). Kaplan Meier analyses were used to assess OS.

**Results:** We identified 6,794 patients that met our inclusion criteria: 5,943 patients (87%) received NT and 851 (13%) underwent AS. Carcinoid histology (OR:5.14; P<0.01), increased level of education (OR:1.68; P=0.03), and treatment at an academic facility (OR:1.66; P=0.03) were significant predictors of AS selection. Carcinoid histology (HR:0.43; P<0.01) and AS (HR:0.68; P<0.01) were associated with significantly improved OS. Kaplan Meier analysis revealed a longer median OS associated with AS compared to NT (P<0.001) at 56.5 months (95% CI: 48.8-66.7) vs. 23.8 months (95% CI: 22.6-25.2), respectively.

**Conclusions:** We identified a population of lung cancer patients who underwent expectant management with favorable outcomes. Additionally, we identified factors associated with AS selection. The selection of AS over NT was associated with significantly longer OS.

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PONTE: A Custom Automated Genomic Variant Storage and Classification System for Clinical and Research Utilization

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**Background:** Over the last decade there has been an explosion in genomics data with a proportional rise in resources needed to manage this data. Here we describe the implementation of PONTE, a bridge algorithm to allow automated extraction and cataloguing of next generation sequencing and clinical data.
Methods: Data from the pathology archives contained the medical record number, patient name, VCF file name, block accession, organ of origin, and testing date. Data was fed into PONTE to subset the pathology accession number and VCF files, removing all patient identifiers. PONTE then filtered VCF files and annotated them using the variant effector predictor, ensembl transcript assignment and protein domain localization resulting in a MAF file.

PONTE reformatted this file to allow a push to the genomics data portal accessible on the DHMC network using customized source code from the cbioportal project.

Variants were annotated with the OncoKB, CiVIC and COSMIC with a structure for custom annotation built in.

Results: 1866 VCF files were provided to PONTE. Processing time was < 3 hours. Access is browser based and samples are updated weekly through automation. Data can be sorted by variants, genes, cancer type etc with the ability to create custom outputs and graphs. V2.0 will integrate clinical data and send out tests.

Conclusions: PONTE provides rapid access to structured genomic data with clinical integration in a searchable intuitive format to support clinical decisions and research.

Myeloproliferative Neoplasm Quality of Life (MPN-QOL) Study Group: MPN Experimental Assessment of Symptoms by Utilizing Repetitive Evaluation (MEASURE) Trial

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Background: Myeloproliferative neoplasms (MPN) are clonal hemopathies characterized by burdensome symptoms. Outcome studies have historically focused on hematologic improvement and survival benefits of treatment; few have evaluated patient-reported symptoms and quality of life.

Methods: The MEASURE trial is a prospective international cohort study evaluating changes in symptoms for an anticipated 480 ET, PV, and MF patients receiving medical therapy and/or phlebotomy. Patients complete the MPN Symptom Assessment Form (MPN-SAF TSS), EORTC Quality of Life Questionnaire (EORTC QLQ-C30), and M.D. Anderson Symptom Inventory (MDASI) at enrollment and again six months later. Here we present interim results.

Results: To date, 270 patients (60% essential thrombocythemia, 29% polycythemia vera, 12% myelofibrosis) have completed both study visits. The most common therapies were hydroxyurea (67%), aspirin (24%), phlebotomy (9%), and ruxolitinib (8%). On the MPN-SAF TSS, the majority of symptoms did not change during treatment. Notable exceptions were a significant decrease in weight loss (TSS 2.0 vs. 1.7, p=0.0046) and increase in...
poor quality of life (TSS 3.6 vs. 3.8, p=0.0370). No improvements were seen for early satiety, abdominal discomfort, night sweats, fatigue, inactivity, poor concentration, bone pain, itching, or fever. These findings were congruent with the EORTC QLQ-C30, which showed no improvements in 5 domains of functioning. The MDASI revealed no improvement in symptom severity or distress scores.

**Conclusions:** MPNs are associated with numerous symptoms that significantly compromise quality of life. Interim results from the MEASURE trial suggest that standard treatments have limited impact on patient symptomatology, with no improvement in overall quality of life.

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**The Role of the Aryl Hydrocarbon Receptor in Obesity and Breast Cancer**

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**Background:** Obesity contributes to many diseases, including cancer. In mice the inhibition of the aryl hydrocarbon receptor (AHR) is effective in preventing and reversing obesity. We hypothesize that the AHR agonist kynurenine (Kyn), a metabolite of the amino acid tryptophan, causes obesity by activating the AHR in mice, and two, AHR-signaling is similar in humans and affected by both obesity and the presence or absence of malignancy.

**Methods:** Mice were fed low-fat chow with and without Kyn over a 20-week diet regimen. Women with body mass index (BMI) from lean to morbidly obese were consented to provide plasma and tissue samples of breast adipose tissue which were analyzed for Kyn and other biomarkers.

**Results:** Kyn caused mice to gain body mass. Downstream effectors of AHR-signaling were activated by the low-fat diet supplemented with Kyn. In women with breast cancer we see no correlation between BMI and AHR biomarkers but a possible relationship between BMI and TNFalpha, and malignancy and IFNg. Study is on-going.

**Conclusions:** Discussion: We propose that Kyn, or a metabolite thereof, is the ligand responsible for AHR-based obesity in mice, and that the Kyn-activated AHR is necessary but not sufficient to attain an obese state and may contribute to the malignant transformation in breast cancer. More data is needed to investigate whether inhibition of the AHR can impact obesity in humans, and in turn, alter the risk for breast cancer. AHR may provide a simple and effective intervention for the prevention and treatment of obesity.
Preliminary analysis of treatment outcomes for patients receiving genomic tumor testing (GTT) through the Maine Cancer Genomics Initiative (MCGI)

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**Background:** The Maine Cancer Genomics Initiative (MCGI), a statewide collaboration between JAX and community and academic oncology practices in Maine, provides cancer patients and oncologists access to genomic tumor testing (GTT) along with education and decision support through genomic tumor boards. The Initiative’s overall aim is to overcome implementation barriers for precision oncology and to understand outcomes of GTT.

**Methods:** A preliminary analysis of the first ~700 MCGI patients was performed to assess the prescription of targeted cancer therapies as a result of GTT. Genomic testing, treatment, and survey data were analyzed to ascertain the presence of actionable variants, targeted therapies prescribed, and clinicians’ assessment of the therapeutic impact of GTT.

**Results:** 492 patients’ genomic reports contained clinically actionable variants with at least one associated FDA-approved or off-label treatment option. 44 patients received a targeted therapy based on recommendations from the genomic test report. 34 patients received FDA-approved treatments on or off-label for their tumor type, and 12 enrolled in clinical trials (n=47 with two patients receiving two separate targeted therapies). For 37 patients who had not received targeted therapies after GTT, the clinician indicated that targeted therapies may be used in the future. For 73 other patients, the clinician stated that GTT changed the clinical management in some other way.

**Conclusions:** The MCGI, a statewide program to disseminate and implement GTT in community and smaller academic oncology practices, has had initial success in expanding access to targeted cancer therapies, highlighting the potential clinical benefit of a comprehensive implementation approach.
Efficacy and safety of talazoparib versus physician’s choice of chemotherapy (PCT) in US patients with HER2-negative germline BRCA1/2-mutated (gBRCA1/2mut) locally advanced/metastatic breast cancer (LA/MBC) in the EMBRACA study

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Background: Talazoparib is a poly(ADP-ribose) polymerase (PARP) inhibitor FDA approved for use in HER2-negative gBRCA1/2mut LA/MBC patients. Approval was based on the Phase 3 EMBRACA trial comparing efficacy and safety of talazoparib (1 mg/day) to PCT (capecitabine, eribulin, gemcitabine, vinorelbine). This analysis describes outcomes from enrolled US patients in the EMBRACA study.

Methods: Patient characteristics, progression-free survival (PFS), objective response rate (ORR), clinical benefit rate, and safety/adverse events (AEs) were assessed.

Results: Of 431 randomized patients, 156 (36%) were from the US (talazoparib: 99; PCT: 57). Patient characteristics were balanced, although a higher percentage receiving talazoparib had poorer prognostic features (triple-negative breast cancer; disease-free interval <12 months; more disease sites). Talazoparib improved PFS (median 9.0 months [95% CI, 7.0-12.9]) vs PCT (median 5.8 months [95% CI, 4.2-6.7]); hazard ratio 0.5 (95% CI, 0.3-0.7). ORR was 63.0% in patients receiving talazoparib and 24.4% in patients receiving PCT. Clinical benefit was observed in 68.7% (95% CI, 58.6-77.6) of talazoparib-treated patients and 33.3% (95% CI, 21.4-47.1) of PCT-treated patients; odds ratio (95% CI), 4.7 (2.2-10.6). Median duration of response was 5.0 months for talazoparib and 3.1 months for PCT. Most common AEs in the talazoparib arm included anemia, neutropenia, thrombocytopenia, fatigue, nausea, alopecia, and headache; hematologic Grade 3/4 AEs occurred more often than nonhematologic AEs. Discontinuations occurred in 6/99 (6.1%) patients receiving talazoparib and 6/43 (14.0%) patients receiving PCT.
Conclusions: In US patients with HER2-negative gBRCA1/2mut LA/MBC, talazoparib demonstrated significant improvements in outcomes vs PCT with a manageable safety profile.

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- Clinical trial identification: NCT01945775
- Funding: This study was sponsored by Medivation, which was acquired by Pfizer Inc. in September 2016.

Disclosures:

- Sami Diab: Speaker and advisor for Pfizer, Novartis, Puma, Eli Lilly, Clovis, Genentech, AstraZeneca, Genomic Health, and Agendia
- Hope S Rugo: Contracted research funding to the University of California from Eisai, Genentech, GlaxoSmithKline, Eli Lilly, MacroGenics, Merck, Novartis, OBI Pharma, Pfizer, and Plexxikon; and travel expenses from Eli Lilly, Mylan, and Puma
- Lida A Mina: Nothing to disclose
- Shannon Puhalla: Consulting or Advisory Role: AbbVie, MedImmune, Celldex, Puma Biotechnology, Pfizer, AstraZeneca, Eisai, and NanoString Technologies; institutional-contracted research from AbbVie, Pfizer, Eli Lilly, Novartis, Incyte, Covance/Bayer, AstraZeneca, Genentech, and Medivation
- Reshma Mahtani: Contracted research funding from Genentech; consultant for Pfizer, Eli Lilly, Novartis, Celgene, Eisai, AstraZeneca, Puma, and Amgen
- N. Lynn Henry: Institutional-contracted research from AbbVie, Innocrin Pharmaceuticals, and Pfizer
- Neelima Denduluri: Institutional-contracted research from ASCO; Research Funding; Amgen, Novartis, and Genentech
- Denise Yardley: ASCO Speakers Bureau: Genentech, Novartis, Eisai
- Yao Wang: Employee of Pfizer and reports ownership interest in Pfizer
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- Akos Czibere: Employee of Pfizer and reports ownership interest in Pfizer
- Jennifer K Litton: Grant or research support from Novartis, Medivation/Pfizer, Genentech, GlaxoSmithKline, EMD-Serono, AstraZeneca and MedImmune; participation in speaker bureaus for Med Learning Group, Physician’s Education Resource, prlME Oncology, Medscape, and Clinical Care Options; is an employee of the University of Texas MD Anderson Cancer Center; has received honoraria from UpToDate; has Board memberships for AstraZeneca and Pfizer (both uncompensated), and has served on review panels for NCCN, ASCO, NIH, and PDQ
- Sara A Hurvitz: Grants/support from Ambrx, Amgen, Bayer, BI Pharma, BioMarin, Cascadian, Daiichi Sankyo, Dignitana, Genentech, GlaxoSmithKline, Eli Lilly, MacroGenics, Medivation, Merrimack, Novartis, OBI Pharma, Pfizer, Pieris, Puma, Roche, and Seattle Genetics
Comparative effectiveness of palbociclib (PAL) + letrozole (LET) vs LET for metastatic breast cancer (mBC) in US real-world clinical practices

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**Background:** PAL in combination with endocrine therapy (ET) has become standard of care for HR+/HER2– advanced/mBC. No studies have examined the relative effectiveness of PAL + ET versus ET alone in real-world settings.

**Methods:** This retrospective cohort study utilized data derived from the Flatiron Health longitudinal database to compare real-world progression free survival (rwPFS) in patients with HR+/HER2– mBC treated with PAL + LET vs LET in routine clinical practice in the US. Between February 2015 and August 2018, 1416 patients with HR+/HER2– mBC started PAL + LET (n=798) or LET (n=618) as first-line therapy. Patients were followed from the start of PAL + LET or LET to November 2018, death, or last visit, whichever came first. rwPFS was defined as months from start of treatment to death or disease progression based on clinical assessment or radiographic scan/tissue biopsy. Propensity score (PS) matching was used to balance patient characteristics.

**Results:** 906 patients were 1:1 PS matched (453 per cohort). Median follow-up was 16.8 months, median age was 68.0 years; 70% of patients were white, 49.7% had visceral disease. Median rwPFS was 24.5 months (95%CI=20.7–32.7) with PAL + LET and 17.1 months (95%CI=13.7–19.8) with LET (HR=0.68, 95%CI=0.56–0.84, p=.0003).

**Conclusions:** The first comparative analysis of a CDK4/6 inhibitor in combination with ET compared to ET alone provides real-world evidence confirming the PFS benefits demonstrated in clinical trials of palbociclib in diverse clinical practices.

**Funding:** Pfizer

Previously presented at ESMO 2019, FPN 329P, Layman et al. Reused with permission.

Node positivity in older patients with early stage hormone receptor positive breast cancer: Are we comfortable omitting sentinel node biopsy and radiation therapy?

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**Background:** Standard treatment for most patients >70 with early stage breast cancer has been lumpectomy with sentinel lymph node biopsy (SLNB) followed by radiation therapy (RT) and endocrine therapy. Choosing Wisely guidelines from 2016 recommend omitting SLNB in clinically node-negative patients over age 70 with hormone receptor positive breast cancer. RT can also be omitted in these patients if endocrine therapy is planned as per NCCN guidelines. Before adopting omission of
both SLNB and RT, we aimed to identify potential high risk features that might predict for positive SLNB.

**Methods:** This study was performed as a retrospective, single institution, chart review from 2013-2017 including patients over age 70 with cT1, ER positive, Her2neu negative, breast cancer treated with breast surgery and SLNB.

**Results:** 146 patients met inclusion criteria. Total SLNB positive rate was 11% (16/146). Pathologic evidence of lymphovascular invasion (LVI) was identified as a significant predictor for positive SLNB, where 55% (5/10) of patients with LVI also had a positive SLNB (p < 0.01). Proliferation index (PI) was also identified as a potential predictor of SLN positivity, where 20% (5/25) of patients with a high PI had a positive SLNB, although this did not reach statistical significance (p = 0.19). Neither tumor grade nor histologic subtype of breast cancer correlated with SLN positivity.

**Conclusions:** LVI and/or a high PI are associated with a high rate of SLN positivity in patients >70 with cT1, ER positive, Her2neu negative breast cancer. We caution omitting both SLNB and RT in these patients.

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**EMBRACA and prior platinum treatment: comparison of efficacy/safety of talazoparib vs physician's choice of chemotherapy (PCT) in patients with HER2-negative germline BRCA1/2-mutated (gBRCA1/2mut) locally advanced/metastatic breast cancer (LA/MBC)**

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**Background:** Talazoparib is a poly(ADP-ribose) polymerase (PARP) inhibitor FDA approved for use in HER2-negative gBRCA1/2mut LA/MBC patients based on the Phase 3 EMBRACA trial comparing efficacy/safety of talazoparib (1 mg/day) with PCT (capecitabine, eribulin, gemcitabine, vinorelbine).

**Methods:** Clinical outcomes were assessed in patients who had either received prior platinum (PP) or no prior platinum (NPP) treatment.
**Results:** Of 431 randomized patients, 76 received PP (46 talazoparib; 30 PCT); 355 were NPP (241 talazoparib; 114 PCT). Talazoparib demonstrated an improvement vs PCT in progression-free survival (hazard ratio [95% CI] PP: 0.76 [0.40, 1.45], P = 0.41; NPP: 0.52 [0.39, 0.71], P < 0.0001) and objective response rate (odds ratio [95% CI] PP: 3.16 [0.88, 15.67], P = 0.0456; NPP: 5.36 [2.89, 9.89], P < 0.0001). Median duration of response (DOR) in talazoparib-treated patients was 4.2 months for PP and 5.4 months for NPP; patients receiving PCT had DOR of approximately 3.0 months, regardless of PP. Patients receiving talazoparib achieved a clinical benefit rate at 24 weeks of 59% (PP) and 77% (NPP); the odds ratio significantly favored talazoparib over PCT in both groups. For talazoparib, nausea was the most common adverse event (AE) in PP patients (59%) and anemia in NPP patients (53%). Serious AEs occurred in PP patients (33%) and NPP patients (32%) taking talazoparib.

**Conclusions:** In patients with HER2-negative gBRCA1/2mut LA/MBC, talazoparib demonstrated significant improvements in clinical outcomes for PP and NPP subgroups vs PCT. Although talazoparib treatment benefitted both groups, benefit was greater if talazoparib was used when there was no prior platinum therapy.

**Notes:** Clinical trial identification: NCT01945775

**Funding:** This study was sponsored by Medivation, which was acquired by Pfizer Inc. in September 2016.


**Disclosures:**

Miguel Martin: Research grants from Novartis, Puma and Roche; consulting/advisory fees from AstraZeneca, Amgen, Eli Lilly, Novartis, Pfizer, PharmaMar, Puma, Roche/Genentech, and Taiho Oncology; and speakers’ honoraria from AstraZeneca, Amgen, Daiichi Sankyo, Novartis, Pfizer, and Roche/Genentech

Wolfgang Eiermann and Rinat Yerushalmi: Nothing to disclose

Hope S Rugo: Contracted research funding to the University of California from Eisai, Genentech, GlaxoSmithKline, Eli Lilly, MacroGenics, Merck, Novartis, OBI Pharma, Pfizer, and Plexxikon; and travel expenses from Eli Lilly, Mylan, and Puma

Johannes Ettl: Consulting fees from Pfizer, Novartis, Eli Lilly, Roche, and Teva and contracted research from Pfizer, Eli Lilly, Novartis, Seattle, AstraZeneca, Roche, and Odonate

Sara A Hurvitz: Grants/support from Ambrox, Amgen, Bayer, BI Pharma, BioMarin, Cascadian, Daiichi Sankyo, Dignitana, Genentech, GlaxoSmithKline, Eli Lilly, MacroGenics, Medivation, Merrimack, Novartis, OBI Pharma, Pfizer, Pieris, Puma, Roche, and Seattle Genetics

Anthony Gonçalves: Travel, accommodation, and meeting registration support from Pfizer, Novartis, Roche, MSD, AstraZeneca, and Celgene

Iulia C Tudor and Denka Markova: Former employees of Pfizer

Joanne L Blum: Consulting fees from Pfizer, Medivation, and Amgen

Jennifer K Litton: Grant or research support from Novartis, Medivation/Pfizer, Genentech, GlaxoSmithKline, EMD-Serono, AstraZeneca and MedImmune; participation in speaker bureaus for Med Learning Group, Physician’s Education Resource, prIME Oncology, Medscape, and Clinical Care Options; is an employee of the University of Texas MD Anderson Cancer Center; has received honoraria from UpToDate; has Board memberships for AstraZeneca and Pfizer (both uncompensated), and has served on review panels for NCCN, ASCO, NIH, and PDQ
Nursing collaboration in the development of a chimeric antigen receptor t-cell therapy program at Dartmouth-Hitchcock Medical Center

Dartmouth-Hitchcock Medical Center

Background: Chimeric Antigen Receptor T-cell (CAR T) therapy is a novel treatment designed to target a unique antigen on a cancer cell. There are 2 FDA approved products for use in CD19 positive malignancies. They are only available under a risk evaluation and mitigation strategy (REMS) program due to the serious risk of neurotoxicity and cytokine release syndrome. DHMC has been working towards certification to offer this therapy to patients in Northern New England. Nursing participation across care areas is required in the development of a CAR T-cell program, given the complexity of the patient’s clinical course, risk of complications, and need for staff and patient education.

Methods: Phone interviews were conducted with 4 other Cellular Therapy centers to obtain key nursing information pertinent to the building of a CAR T-program. Hematology RN leadership, nurse practitioners, and outpatient nurses collaborated to develop patient education materials, care pathways, and nurse training. We had multidisciplinary meetings with physicians and nurse leaders to create pathways for CAR T cell patient identification and treatment. We instituted a group of staff nurses to review processes, order sets and care plans. We developed training for nurses in ancillary care areas.

Results: One hundred percent of RNs who will administer CAR T-cell are REMS certified. Ancillary nursing services education is ongoing, with expanded training for ICU and ED. Patient education processes have been developed.

Conclusions: Collaboration with nursing across the hospital spectrum was crucial to the successful launch and implementation of a CAR T-cell program at DHMC.
Providing Food Assistance to Early Stage Breast Cancer Patients with Food Insecurity Significantly Improves Their Adherence to Adjuvant Therapy

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New England Cancer Specialists (NECS)

Background: Nationally, Maine has the third highest rate of food insecurity (FI) and may be an important factor in successfully completing adjuvant therapy for cancer patients. NECS has partnered with a Food Bank to help FI patients access food assistance. We hypothesized that FI might adversely impact stage 0-II breast cancer patients’ ability to complete their adjuvant treatment and that such patients might be able to complete their treatment after receiving food aid.

Methods: From 1/1/17-6/1/19, we assessed the number of patients with early stage (0-II) breast cancer undergoing adjuvant therapy (hormone and/or chemotherapy) who disclosed food insecurity and how many FI patients received food assistance (food packages) in the office. Food secure (FS) case controls matched for disease, stage, gender, and age were identified. The number of months on treatment was determined for all patients.

Results: The average number of months on adjuvant treatment for FI patients (12 months) was 7.4 months shorter than FS patients. FI patients not receiving food assistance were on therapy 8 months shorter than FS patients (Figure 1, p < 0.05). FI patients receiving assistance were on treatment for 16.8 months, not significantly different from FS controls (Figure 1, p > 0.05).

Conclusions: FI patients with early stage breast cancer experience a statistically significantly shorter duration of adjuvant therapy compared to FS patients; however, the duration of treatment for FI patients may increase significantly by providing food assistance to these patients. We conclude that receiving food assistance may help food insecure patients to successfully complete their adjuvant therapy.

Exercise maintenance and psychosocial outcomes among cancer survivors in a remote, technology-based intervention: Secondary outcomes of a pilot RCT

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Background: We aimed to examine pre-post changes in psychosocial and health-related outcomes after a health coach, text message, and Fitbit intervention and determine the effect on moderate-to-vigorous (MVPA) maintenance during the intervention.
Methods: Participants were recruited after completing an exercise-based oncology rehabilitation program and randomly assigned to the intervention (n=34) or Fitbit-only control groups (n=32). In total, 58 cancer survivors completed the program (81% female; mean age 61.4±9.0). Changes in psychosocial outcomes, including self-efficacy, social support, self-regulation (e.g., goal setting, time management, relapse prevention) and health outcomes (fatigue interference, sleep disturbance) were calculated pre-post intervention and assessed within groups using paired t-tests and between-groups using ANCOVA. Additionally, we examined mean weekly Fitbit-derived MVPA levels during the intervention.

Results: Intervention participants had significant improvements in goal setting, relapse prevention, and social support (all P<0.05), compared to no change in the Fitbit-only group. There was no change in other psychosocial and health outcomes for either group. Intervention participants had a mean daily average of 30 or more minutes of MVPA for each week of the intervention whereas the control group did not achieve the 30-minute recommended daily threshold for any of the eight weeks of the intervention.

Conclusions: The findings demonstrate that a remote intervention delivered through health coaching, text messages, and Fitbit can foster maintenance of MVPA at recommended levels and improvement in some psychosocial outcomes associated with exercise behavior. Additional research is warranted to examine long-term impacts and efficacy in a more diverse population of cancer survivors.

Results of a Statewide Survey of Cancer Survivors in New Hampshire

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Background: The New Hampshire Department of Health and Human Services (NH DHHS) used existing population surveillance data to understand health issues and risk behaviors of cancer survivors in New Hampshire. These data were used to guide the NH DHHS development of a strategic plan to increase awareness of these needs and to develop systems of care to address them.

Methods: NH Behavioral Risk Factor Surveillance System data were analyzed to compare individuals who have been diagnosed with cancer to those who have never been diagnosed (NBD) with cancer. Factors assessed included the prevalence of comorbid conditions, self-reported physical and mental health status, and cancer screening rates.

Results: Cancer survivors aged 18 to 39 are 2.2 times more likely than NBD individuals to be depressed and are 4.5 times more likely to report being physically unhealthy. 30.7% of young survivors report that poor physical or mental health prevents them from their usual activities. 12.6% of young survivors have a diagnosis of diabetes compared with 1.5% of NBDs. 18% of young survivors had a diagnosis of hypertension compared with 8.8% of their NBD counterparts. 36.5% of young survivors are current smokers compared with 20% of NBDs. Young survivors are 8.3 times more likely than NBDs to report being unable to work.
Conclusions: Use of a surveillance system for analysis of cancer survivors provides useful information to guide clinical decision-making and public health planning and programming. Young cancer survivors, experience larger disparities in many health outcomes and risk factors than other adults their age that have not been diagnosed with cancer.

Implementation of an embedded clinical pharmacist in an outpatient hematology/oncology clinic: A summary of pharmacist interventions and patient satisfaction

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Background: Pharmacists play an important role in patient care by providing medication education, identifying drug-drug/herbal interactions, and recommending strategies to optimize pharmacotherapy. Studies have shown a benefit in having a pharmacist in the outpatient oncology setting. A pharmacist was embedded in the outpatient hematology/oncology clinic at Dartmouth-Hitchcock Medical Center in June, 2019. Here we report on the type of pharmacist interventions, and patient satisfaction responses collected during the first six weeks of the pilot.

Methods: A pharmacist was paired with provider teams in the outpatient hematology/oncology clinic, and participated in patient visits by providing medication management support and education. The pharmacist also met with patients scheduled for cycle 2 of chemotherapy to address questions and provide additional education on the risks and management of treatment-related toxicities. Reports in the electronic health record were created to capture patients with cycle 2 infusion appointments. The pharmacists’ interventions were documented in an Excel spreadsheet. Cycle 2 patients were sent a satisfaction survey to assess whether their interaction with the pharmacist was valuable.

Results: A total of 232 pharmacist interventions were made. Intervention types included: chemotherapy counseling (n=85), supportive care recommendations (n=47), medication reconciliation (n=43), drug information questions (n=35), supportive care counseling (n=12), drug interaction reviews (n=8), and other (n=2). There was a 95% acceptance rate of pharmacist recommendations by providers. Seven patients completed the satisfaction survey, and all responses reported were positive.

Conclusions: Our pilot of an embedded pharmacist in the outpatient hematology/oncology setting demonstrated favorable results in support of this service by both patients and providers.
Experience and Attitudes Regarding Medical Aid in Dying, Act 39, Among Vermont Physicians

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Background: In 2013 the Vermont legislature passed Act 39: The Patient Choice and Control at End of Life Act, which legalized medical aid in dying (MAID) for terminally ill Vermont residents. In the five years since the law was passed, 52 patients in Vermont have been prescribed medications to hasten death, however important information regarding physicians’ experiences with this process are lacking.

Objective: To survey the physicians to better understand the physicians’ attitudes and experiences as well as the utilization of Act 39 in Vermont.

Methods: Physicians practicing Primary Care, Hematology/Oncology, Neurology, and/or Palliative Care at the University of Vermont Medical Group and affiliated hospitals in the state of Vermont were invited to participate. Participants were contacted via email to complete blinded surveys and responses were collected.

Results: The attitudes and practices related to Act 39 were collected from 44 primary care and 37 specialty physicians in Vermont. 72% of specialty and 79% of primary care physicians supported MAID via Act 39, however many felt they could use more information and resources to counsel a patient (57% specialty and 56% primary care) and complete the paperwork and prescription for life-ending medication (66% specialty and 65% primary care).

Conclusions: This is the first study to collect information regarding physicians’ attitudes and experiences regarding Act 39 in Vermont. Most respondents supported Act 39, but there is a need and desire for more physician education and resources regarding patient counseling and paperwork.

Navigating Herbal Dietary Supplement-Oral Chemotherapy Drug Interactions in a Community Cancer Center

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Background: The number of FDA-approved oral chemotherapy medications has continued to increase as has their incorporation into cancer treatment plans. Oncology pharmacists play an integral role in assessing and navigating drug interactions for patients. At Southcoast Centers for Cancer Care (SCCC), oncology pharmacists meet with patients to review/counsel on newly initiated oral therapy. One of the areas assessed during the visit is the use of herbal nutritional supplements. Pharmacists utilize available institutional resources to assess potential interactions and collaborate with the University of Rhode Island (URI), Drug Information Services (DIS), when information is not readily available.
Methods: Patient responses about utilization of herbal dietary supplements during pharmacist-patient counseling sessions were assessed. All positive responses triggered a drug-supplement interaction screen. Number of patients taking herbal dietary supplements was tabulated and their use was characterized.

Results: From October 2016-June 2019, 187 patients were counseled. Of these, 44/187 (24%) were taking herbal dietary supplements. SCCC pharmacists consulted the URI DIS on 10/44 (23%) patients to assist in identifying, researching, and recommending a care plan. The most frequently used supplements were melatonin and marijuana/CBD oil. The most frequently used supplements that required further consultation included Curcumin (Turmeric), Ginger, and Licorice root.

Conclusions: Consistent with findings from the general population taking prescription medications, we found that approximately 25% of patients taking oral chemotherapeutic medications were also actively taking herbal dietary supplements. Little data exists regarding oral chemotherapy agents and herbal dietary supplement interactions. Careful questioning/review/research of potential interactions is needed to prevent interactions and maximize effectiveness of oral chemotherapy.

The Costs of Cancer Caregiving: An Analysis of Caregivers’ Post-Transplant Expenditures

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We previously analyzed out-of-pocket costs for caregivers of patients that received an autologous stem-cell transplantation (NNECOS 2018). In the second part of this trial, we focused on the costs incurred by caregivers of patients that received an allogeneic stem-cell transplantation. Allogeneic transplantation is a more aggressive treatment that is associated with increased morbidity and mortality. Weekly surveys assessed the out-of-pocket costs in the four weeks after discharge following an allogeneic transplantation. Caregivers identified the amount of money spent or lost in each of the following categories: missed work, lost wages, travel (mileage, time, or fuel) and additional costs (prescriptions, co-payments, or accommodations). Nineteen caregivers were surveyed. Eleven of nineteen caregivers worked and missed 6.6 hrs of work/week (mean; range:3-12 hours/week) and lost $153.51/week in wages (mean; range:$33.33-360). Caregivers traveled 135.62 miles/week (mean; range:6-422), which took 2.9 hours/week (mean; range:.5-9.33) and cost $21.51/week for gas (mean; range:$7-65). Additional costs for copayments or prescriptions included $29.25/week (mean; range:$2.10-120). Meal and day care costs were minimal. Despite more aggressive treatment associated with allogeneic transplantation, the out-of-pocket costs for caregivers of patients of both types of transplantation are very similar. For both types of transplantations, the majority of expenses included lost wages, costing approximately $155/week. For caregivers, the cost of cancer care is high, especially regarding lost wages, distance traveled and time spent traveling.
Operationalizing Comprehensive Survivorship Care Plans (SCP)

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*MaineHealth Cancer Care Network*

**Background:** The Commission on Cancer currently requires comprehensive SCPs be completed on at least 50% of eligible patients for accredited institutions. Yet, implementing SCPs remains a challenge for busy oncology practices working at full capacity. A project was launched to make the creation and delivery of SCPs as feasible and efficient as possible.

**Methods:** With a plan to build multiple disease site-specific templates, stakeholders and provider champions were identified to assist in obtaining the clinical requirements for each template. The templates were then designed and organized in a standardized format that included all essential components and a consistent patient education section. Working closely with the IT analysts, a process was developed to extract data from the EMR (Epic) that would auto-populate as many fields as possible in the electronic SCP templates. A process map was created to assist in workflow analysis.

**Results:** Nine disease-site specific templates and one generic template have been completed to date, with a standardized process for the creation of each template. Seven fields in the treatment summary section auto-populate with relevant data from the EMR, completing most of the essential elements. All clinicians have access to the template and multiple team members can assist in creating a SCP. Minor enhancements to the SCP are being completed as more providers utilize the templates and feedback is obtained.

**Conclusions:** Leveraging the power of the EMR and standardizing workflows can minimize staff time required to create and disseminate comprehensive SCPs.

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Development of a supportive care intervention for caregivers of patients undergoing hematopoietic stem cell transplantation: The Ready to CARE program

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**Background:** Hematopoietic stem cell transplantation (HSCT) is a lengthy treatment for cancer that requires the presence of a family caregiver. We conducted a pilot study to develop the Ready to CARE (Connect, Actively Relax, and Exercise) program and determine its feasibility, acceptability, and potential effectiveness.
### Methods
Twenty caregivers completed measures of self-efficacy, coping style, and distress upon enrollment (~4 weeks before admission), upon hospital admission, and at 30 and 100 days post-stem cell reinfusion. Caregivers engaged in the six-session Ready to CARE program beginning when the stem cell transplant recipient was admitted to the hospital for reinfusion.

### Results
Forty-one caregivers were approached and 20 (49%) enrolled and completed the baseline assessment. The second assessment was difficult for caregivers to complete due to time demands (50% retention rate), but 19 (95%) and 17 (85%) caregivers completed the third and fourth assessments, respectively. Fourteen caregivers (70%) completed the six-session program within eight weeks. Caregivers set an average of 8.3 goals (range 1-19, sd = 4.6) during the program and addressed an average of 2.9 different topics (range 1-5, sd = 1.3) with those goals. Caregivers most often set goals related to exercise (75% of participants), caregiving activities (40%), and stress management (40%), with fewer caregivers addressing leisure (25%), nutrition (20%), sleep (20%), self-care (20%), communication (20%), and social support (15%).

### Conclusions
The Ready to CARE program was feasible to deliver and acceptable to participants and will be refined prior to further testing, based upon the ongoing analysis of potential effectiveness.

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### Connecting Maine patient navigators with Project ECHO

**A. Sheikh, H. Drake**  
Maine Cancer Foundation

#### Background
A cancer diagnosis upends lives, not only medically, but psychosocially, physically, and financially. Patient navigators play a crucial role in the life of a cancer patient by guiding them through the health care system, assisting in decision-making, and linking them to resources and supports. It is extremely important navigators have opportunities to learn from one another and share resources to continuously improve overall outcomes for their patients.

#### Methods
In Maine, navigators may have opportunities to work with colleagues within their own health system, but if they are from a small health system or work in a community health setting, this opportunity may not exist. In 2018, Maine Cancer Foundation (MCF) determined Project ECHO could be a valuable tool for convening patient navigators. Project ECHO utilizes a hub and spoke model to connect professionals using technology and case-based learning to increase best practices and enhance skill sets.

#### Results
In May 2019, MCF launched their Cancer Patient Navigator Project ECHO with over 20 professionals involved in the navigation of cancer patient care from 17 health settings across the state. Attendees meet monthly to learn from didactic presentations, case studies, and discussion. The number of participants continues to grow, expanding professional networks and learning.

#### Conclusions
We anticipate continued expansion of skills, increased networking between healthcare provider locations, and ultimately improved care for Maine cancer patients.
Assessing patient satisfaction after comprehensive medication review including oral chemotherapy adherence with an oncology pharmacist at the Southcoast Centers for Cancer Care (SCCC)

P. Skeffington, L. Haynes, H. McCarthy  
*Southcoast Center for Cancer Care*

**Background:** Use of oral chemotherapy has increased dramatically over the past few years. Patients often are required to obtain their oral chemotherapy from a third party specialty pharmacy while continuing to receive their other medications from other pharmacies. Many community pharmacists lack knowledge about oral chemotherapy, safe practices, or effective counseling of these medications.

**Methods:** A program was designed at SCCC whereby all patients starting oral chemotherapy are scheduled for an appointment with a clinical oncology pharmacist to update medication lists, evaluate adherence, and conduct a "brown bag" visit where patients are allowed to voice concerns and ask questions. After each appointment, patients are asked to fill out a short survey, The Patient Satisfaction with Pharmacist Services Questionnaire (PSPSQ2.0).

**Results:** PSPSQ2.0 uses a Likert scale ranging from 1 to 4. From October 2016 to June 2019, 174 patients had appointments and 55 returned their surveys yielding a 30% response rate. Average scores hovered around 1 (strongly agree) for each question except question 11 (the only negatively worded question). Question 11 averaged 3.1; Disagree.

**Conclusions:** Patients who were seen by an oncology clinical pharmacist to evaluate adherence, participate in a brown bag clinic and open discussion, found the appointment worthy of their time.

**Notes:** Objective: To assess patient perception and satisfaction of a pharmacist 1 on 1 appointment when starting oral chemotherapy

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Swallowing Therapy During Head and Neck Cancer Treatment: An Effective, Integrated Approach

M. Towey, Z. Kennedy  
*Voice & Swallowing Center of Maine Waldo County General Hospital*

**Background:** This presentation describes a program providing swallowing evaluation and treatment prior to chemo radiation/surgery for head and neck cancer. The program was developed at a small rural hospital as a collaborative approach across a large regional cancer care network. The program linked together facilities more than 100 miles apart and provides swallow rehabilitation/treatment via telemedicine visits to patients in their homes in distant statewide locations.

Effective early swallow intervention helps preserve swallow function and muscle/tissue
integrity during and after chemoradiation/surgery for head and neck cancer. Effective intervention helps maintain improved oral nutrition and reduce the need for PEG tube feedings.

**Methods:** This presentation will outline how speech pathologists from a rural Maine community have achieved delivery of high level care for patients with head and neck cancer, and created inter-organization connections to ensure best patient care practices.

**Results:** Data will be presented that shows patients receiving pretreatment swallow evaluation and ongoing therapy return to improved oral feedings earlier with improved nutrition.

This presentation also describes a unique treatment approach utilizing pharyngeal manometry to provide bio-feedback to patients about pharyngeal muscle function during treatment and serves as a force multiplier in effective rehabilitation of swallow function.

**Conclusions:** Typical practices of a speech pathologist treating this patient population will be reviewed as well as discussing challenges that occurred in the development of integrating speech pathologists into standard treatment in facilities across Maine.

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**Extending access to cancer genetic counseling to the geographically underserved: Project HBOC ECHO**

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**Background:** There is a practice gap in provision of cancer genetic counseling nationally, especially in rural majority states like Maine with limited access to these services. Novel models of cancer genetic care in rural settings are needed.

**Overall goal:** To examine the clinical and practice gap impact of implementing the validated Project ECHO\(^8\) (Extension for Community Healthcare Outcomes) hub-and-spoke telementoring model to improve point-of-care hereditary breast and ovarian cancer (HBOC) genetic counseling access among MaineHealth Cancer Care Network (MHCCN) sites.

**Methods:** In partnership, Maine Medical Center (MMC), The Jackson Laboratory (JAX), and MaineHealth are implementing the ECHO model and examining its impact to i) increase rates of point-of-care HBOC assessment, counseling, and testing, and ii) facilitate appropriate test result use to direct guidelines-based risk reduction, screening and medical management at a health system level. The ECHO model facilitates hub-and-spoke knowledge-sharing via multipoint virtual clinics to build capacity of clinicians at community-based MHCCN sites (spokes) to provide best-practice cancer genetic care in conjunction with hub specialists (i.e., MMC's Cancer Risk and Prevention Clinic and JAX's Clinical and Continuing Education Program staff).
Results: Clinical processes and tools have been developed to promote universal risk assessment, increase point-of-care genetic counseling and testing, support guidelines-based care for gene-positive patients, and track clinical outcomes.

Conclusions: Long-term outcomes will include HBOC-ECHO impact on the MHCCN practice gap; surveys will measure knowledge gain, implementation barriers/facilitators, and program satisfaction. This work promises to serve as a model for other NNECOS state-affiliates and rural states/regions nationally.

Evaluation of the relationship between psychological distress and risk for breast cancer

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Background: Women at increased risk for breast cancer have greater distress levels which may impact both quality of life (QOL) and screening behavior. We investigated levels of cancer-related distress among different risk groups and examined the stability of distress levels over time.

Methods: The Impact of Events Scale (IES) was used to measure distress related to an identified stressor (risk for breast cancer). Individuals enrolled in the UVM High-Risk Breast Program and who completed the (IES) at baseline were eligible for inclusion in this study. T-tests were used to examine change in distress over time and to compare distress levels between risk groups.

Results: The cohort comprised 323 individuals at increased risk for breast cancer due to a strong family history (85%), a genetic mutation (11%) or benign breast disease (BBD) (19%). Fourteen percent of these women had multiple risk factors. At study entry, mean IES score was 16.33 (95% CI: 15.01, 17.65) and indicates high cancer-related distress levels in this cohort. IES scores decreased significantly over time (p=0.010 and 0.006 after 4 and 8 years, respectively), and were higher in subjects who were not currently married or partnered (p=0.047). Importantly scores did not differ by risk group.

Conclusions: We demonstrate that distress is similar among different risk categories and that distress decreases over time. To our knowledge no study has examined cancer related distress among women with BBD or compared distress levels among different risk groups. Targeting women with highest distress levels may improve both QOL and screening adherence.
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