ANNUAL REPORT

APRIL 2015 - MARCH 2016

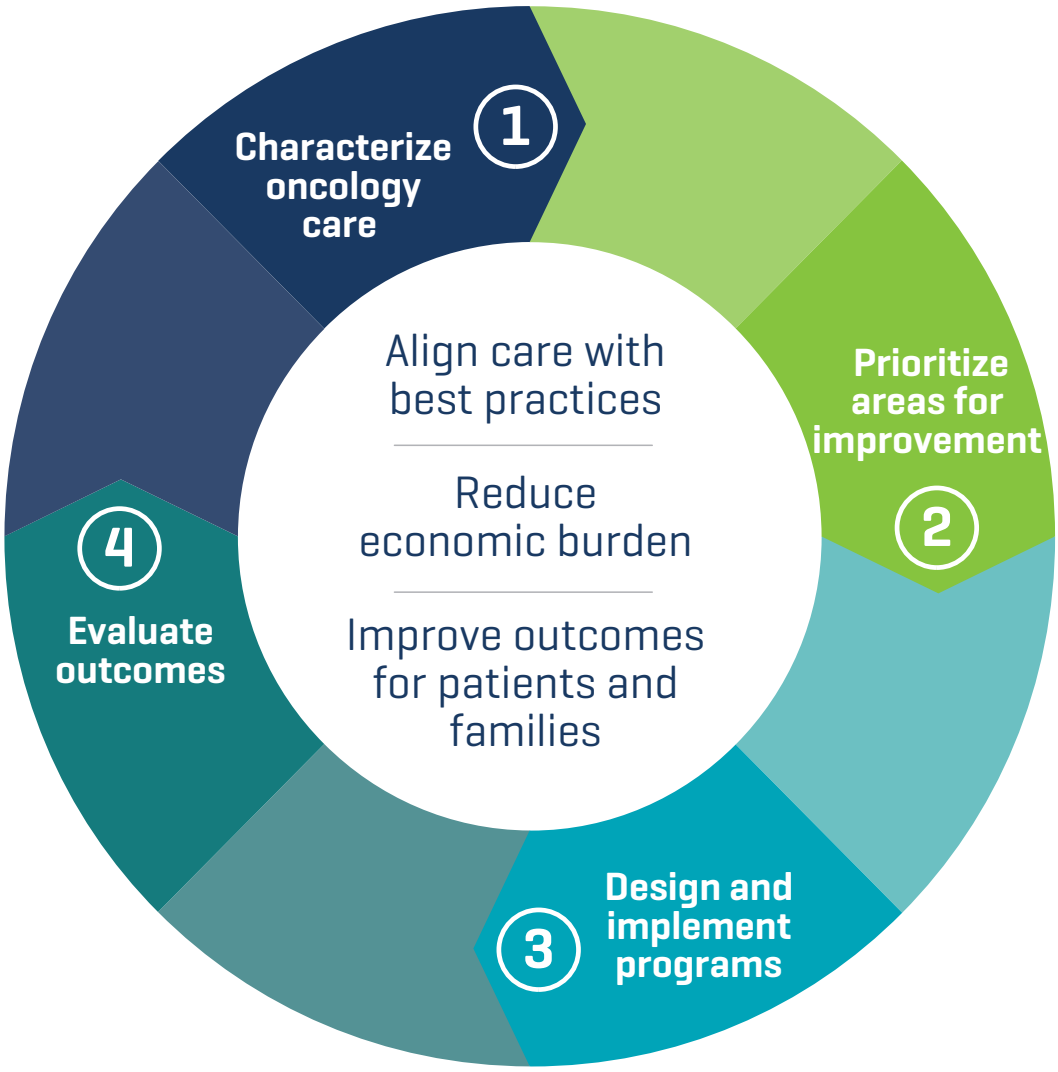
FRED HUTCH

HICOR

HUTCHINSON INSTITUTE FOR CANCER OUTCOMES RESEARCH

HICOR MODEL

HOW WE WORK



1

2015 Summit Reports

- ASCO Choosing Wisely 2012 "5 Things Physicians and Patients Should Question"

2015 Palliative Care Summit Reports

- End of Life Measures

2016 Summit Reports

- Updated ASCO Choosing Wisely and End of Life Measures
- Cost of Care Measures

2

2014 Summit

- Top six broad priority areas identified

2015 Summit

- Top three priority areas identified and refined
  - Breast Cancer Surveillance
  - Hospitalizations During Treatment
  - Cancer Care at End of Life

3

2013 Regional Pilot Launched

- Improving Appropriate Use of Breast Cancer Surveillance and Colony Stimulating Factors

2015 National Study Funded in Partnership with SWOG

- Improving Adherence to Evidence-Based Guidelines for Colony Stimulating Factors

4

Evaluate Outcomes

- Evaluate expected change in practice patterns, patients' outcomes, costs and value

FROM THE DIRECTORS

Scott Ramsey MD, PhD

Director

Scott Ramsey is a practicing internist, an internationally recognized health economist and a leader in comparative and cost-effectiveness research.

Gary Lyman MD, MPH

Co-Director

Gary Lyman is a practicing medical oncologist, an internationally recognized clinical oncology researcher and a leader in clinical practice guidelines and cancer policy.

The HICOR team is committed to finding solutions to reduce the economic burden of cancer for patients, families and society. We view this critical issue through the lens of value — asking ourselves how our work can contribute to ensuring that patients receive the highest quality care and the best possible results without the financial devastation that too often accompanies a cancer diagnosis.

We started with the simple yet vital concept of measurement. Could we gather and analyze the data necessary to create a picture of how cancer care is delivered in our community? The short answer, built on the hard work and expertise of our data and clinical analytics team, is yes. Thanks to their efforts, HICOR partners have access to routinely updated performance metrics through our web-based user portal known as HICOR IQ.

HICOR has shown that we can measure what matters in oncology. But how can we use this information to improve patient experience and outcomes, lower costs and increase the quality of care? This year, we established community-based working groups to tackle those questions. Payers, providers, patients and health system leaders actively worked together to develop intervention proposals in three clinical areas and presented their work at the 2016 Value in Cancer Care Summit. Patient voices were essential to shaping these proposals, and as we look ahead to implementation, we are honored that a number of thoughtful patient partners continue to dedicate their time and expertise to this work.

On the national stage, this year marked the launch of our Patient-Centered Outcomes Research Institute (PCORI)-sponsored pragmatic trial to improve adherence to evidence-based guidelines for prescription of colony stimulating factors (CSF). Conducted within the cancer clinical trials group SWOG, the trial will test a systems-based intervention to improve guideline-adherent CSF prescribing. The launch of this trial is both a marker of our progress and a guide for our future. It is a culmination of our early efforts to measure adherence to ASCO Choosing Wisely guidelines, identify areas for improvement, and test interventions to change practice. We also envision it as the first in an ongoing portfolio of pragmatic clinical trials focused on the factors influencing the delivery and outcomes of cancer care.

Our scientific team continues to grow. This year we welcomed new Staff Scientist Laura Panattoni, PhD, who brings expertise in health economics and the costs of practice transformation, an essential ingredient to our efforts to launch health care delivery experiments in real world clinical settings. We look forward to continued growth of our faculty team and the collaboration it inspires.

Scott Ramsey

Gary Lyman

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CANCER, BANKRUPTCY AND DEATH: STUDY FINDS A LINK

BY DIANE MAPES
Fred Hutch News Service Story Excerpt

A January 2016 study conducted by HICOR researchers has found that the financial toxicity resulting from the high cost of cancer care can be deadly for cancer patients.

"It varies from cancer to cancer, but for cancer patients who face bankruptcy — and about 2.5 percent of cancer patients go bankrupt — the risk of dying goes up dramatically," said lead author Dr. Scott Ramsey.

Ramsey and colleagues linked patient data from the Western Washington Cancer Surveillance System (part of the national SEER cancer registry) with federal bankruptcy records to see how bankruptcy affected patients' survival.

Bankruptcies are a proxy of sorts for cancer's heavy financial toll; since filings are tracked and measurable, researchers can use them to determine how skyrocketing cancer costs impact society. In a watershed study published in 2013, Ramsey found that cancer patients, on average, were about 2.7 times more likely to declare bankruptcy as those without cancer.

This latest study, published in the Journal of Clinical Oncology, showed that cancer patients who go bankrupt have an 80 percent higher mortality risk than patients with the same cancer who don't. Some cancers had even higher mortality rates. Prostate cancer patients who filed for bankruptcy were almost twice as likely to die; bankrupt colorectal cancer patients were 2.5 times more likely to die as those not done in by debt.

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JOURNAL OF CLINICAL ONCOLOGY

ORIGINAL REPORT

Financial Insolvency as a Risk Factor for Early Mortality Among Patients With Cancer

Scott D. Ramsey, Aasthaa Bansal, Catherine R. Fedorenko, David K. Blough, Karen A. Overstreet, Veena Shankaran, and Polly Newcomb

Listen to the podcast by Dr Zafar at www.jco.org/podcasts

ABSTRACT

Purpose
Patients with cancer are more likely to file for bankruptcy than the general population, but the impact of severe financial distress on health outcomes among patients with cancer is not known.

Methods
We linked Western Washington SEER Cancer Registry records with federal bankruptcy records for the region. By using propensity score matching to account for differences in several demographic and clinical factors between patients who did and did not file for bankruptcy, we then fit Cox proportional hazards models to examine the relationship between bankruptcy filing and survival.

Results
Between 1995 and 2009, 231,596 persons were diagnosed with cancer. Patients who filed for bankruptcy (n = 4,728) were more likely to be younger, female, and nonwhite, to have local- or regional- (v distant-) stage disease at diagnosis, and have received treatment. After propensity score matching, 3,841 patients remained in each group (bankruptcy *v* no bankruptcy). In the matched sample, mean age was 53.0 years, 54% were men, mean income was $49,000, and majorities were white (86%), married (60%), and urban (91%) and had local- or regional-stage disease at diagnosis (84%). Both groups received similar initial treatments. The adjusted hazard ratio for mortality among patients with cancer who filed for bankruptcy versus those who did not was 1.79 (95% CI, 1.64 to 1.96). Hazard ratios varied by cancer type: colorectal, prostate, and thyroid cancers had the highest hazard ratios. Excluding patients with distant-stage disease from the models did not have an effect on results.

Conclusion
Severe financial distress requiring bankruptcy protection after cancer diagnosis appears to be a risk factor for mortality. Further research is needed to understand the process by which extreme financial distress influences survival after cancer diagnosis and to find strategies that could mitigate this risk.

J Clin Oncol 34:980-986. © 2016 by American Society of Clinical Oncology

INTRODUCTION

For the 1.5 million persons diagnosed with cancer each year, financial stress can be protracted and severe. At the extreme end of financial stress are those whose economic situation deteriorates to the point where they must seek protection from creditors. In a previous study, we found that patients are 2.5 times more likely to file for bankruptcy after a cancer diagnosis compared with individuals who have not been diagnosed with cancer.[1]

The term financial toxicity has been coined in reference to the growing recognition that high out-of-pocket expenditures during cancer treatment are putting many families into severe financial distress and, in some cases, leading to refusal of treatment or nonadherence to recommended treatments.[2] Although some have called for clinicians to be more aware of the problem and to take proactive steps to reduce adverse financial impacts,[3] clinicians are ill prepared to advise patients because they typically have little knowledge of their patients' health insurance or general financial circumstances, and patients may be reluctant to discuss their financial concerns with providers. Altering the status quo would require substantial changes in doctor-patient discussions and may have broader implications for policies that affect out-of-pocket liabilities for patients with cancer. It is therefore reasonable to ask whether financial distress can lead to poorer outcomes, particularly survival, for patients with cancer.

> "To me, it's one thing if you go bankrupt. Financially, you're really in bad shape but you come out of it with your cancer treated. But what if it actually is a double hit, where your very survival is affected? That is profound."
>
> **— Scott Ramsey**

Photo illustration by Robert Hood / Fred Hutch

"That blows away the survival benefits of many, if not most, treatments," said Ramsey. "To me, it's one thing if you go bankrupt. Financially, you're really in bad shape but you come out of it with your cancer treated. But what if it actually is a double hit, where your very survival is affected? That is profound."

The study, which looked at two groups of around 3,800 cancer patients (one group bankrupt, the other not) diagnosed between 1995 and 2009, found that the mortality rate was not related to whether patients were diagnosed with metastatic disease. It also hinted that cancer patients who had "financial difficulty short of bankruptcy" might also be at risk.

The study raises two questions: how this happens, and what can be done to reduce the risk. Answering these questions are now priority areas for HICOR researchers. To address the first, HICOR is proposing a study to look deeply into the care of patients who experience severe financial distress, asking questions about whether patients skipped or cut back on treatments, or delayed their care while they took care of their financial crisis. To address the second, HICOR investigator Veena Shankaran is conducting a pilot study to identify cancer patients who are at risk for financial catastrophe and to intervene early with financial counseling to reduce that risk.

ENHANCING THE IMPACT OF CLINICAL TRIALS

In its report "A National Cancer Clinical Trials System for the 21st Century," the National Cancer Institute called for improving selection, prioritization and completion of clinical trials, and for bolstering participation of both patients and physicians. The development of methodological tools to predict trial accrual, quantify the value of proposed trials to aid trial selection, and increase trial participation is a cornerstone of the HICOR research agenda.

DESIGNING HIGH-IMPACT CLINICAL TRIALS

Despite the importance of clinical trials in advancing cancer care, only 3-5 percent of cancer patients enroll in them, according to a 2010 report from the Institute of Medicine.

In addition, nearly one in five studies supported by the National Clinical Trials Network close due to poor accrual. Trials with low accrual are often unable to answer the clinical question being studied and result in wasted financial and human resources. With limited funds available for cancer research, the design and prioritization for funding of high-impact, feasible studies that can meet their enrollment targets are crucial.

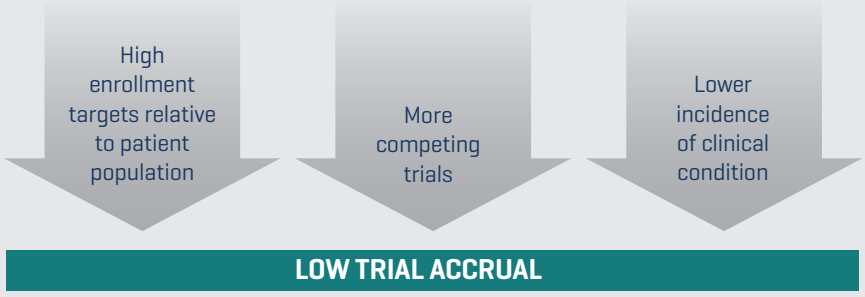
HICOR Affiliate Dr. Carrie Bennette and colleagues identified twelve key predictors of low trial accrual and developed a preliminary prediction model published in the Journal of the National Cancer Institute in December 2015. This foundational work is envisioned to support development of tools to help researchers design more successful studies and aid sponsors in trial selection and portfolio management.

BREAKING DOWN BARRIERS TO TRIAL PARTICIPATION

In October 2015, HICOR collaborator and SWOG investigator Dr. Joe Unger released a study showing that patients with lower household income are 32 percent less likely to participate in clinical trials. "We know that financial burden impacts patients' experience and outcomes; this is another aspect of that equation," said Dr. Unger. "It is critically important that clinical trials are accessible to patients at all income levels."

Clinical Trials by the Numbers

KEY PREDICTORS OF LOW TRIAL ACCRUAL

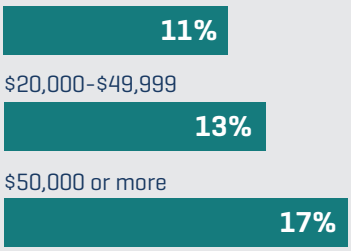


TRIALS CLOSING

1 in 5 clinical trials close due to low accrual

HOUSEHOLD INCOME AFFECTS PARTICIPATION

The new study found that the lower a patient's income, the lower the chance that he or she will take part in a clinical trial. Just 11 percent of those surveyed making less than $20,000 a year took part in clinical trials, compared with 13 percent of those making between $20,000 and $49,999 and 17 percent of those making more than $50,000.



ECONOMIC PERSPECTIVES ON PRECISION ONCOLOGY

Precision medicine — which promises to tailor therapies to specific molecular profiles of disease — has emerged as a national priority through the President's Precision Medicine Initiative and the National Cancer Moonshot Initiative. Realizing the promise of precision medicine requires the development of diagnostics, including biomarkers and imaging technologies, to accurately identify patients for whom a targeted therapy is likely to work.

Dr. Lotte Steuten, HICOR Associate Member

A NATIONAL ROADMAP FOR DIAGNOSTICS

HICOR Co-Director Gary Lyman served on the Institute of Medicine (IOM) panel assessing the potential of precision medicine to impact patient care. IOM's 2016 report "Biomarker Tests for Molecularly Targeted Therapies" issued 10 key recommendations designed to move precision medicine forward in a way that will ensure patients have timely access to appropriate and accurate tests and also prevent the potential harm from poorly validated or inappropriately used tests. "You need good science to establish that the test is reliable, that the test is associated with the disease and an outcome of interest and finally that the treatment actually improves patient outcomes compared to standard treatment or usual care," said Dr. Lyman. First among the committee's recommendations is the development of common evidence standards to demonstrate that diagnostics improve patient outcomes in real world clinical practice.


Dr. Gary Lyman, HICOR Co-Director

ACCELERATING DIAGNOSTIC DEVELOPMENT

The journey from discovery to clinical realization of new personalized medicine approaches is typically long, costly and uncertain. Along this process the challenge is to select, from a multitude of options, those diagnostics that are most likely to add value. HICOR investigator Dr. Lotte Steuten has developed methods to evaluate diagnostics at each phase of the development pipeline. In the exploratory phase we determine which candidate markers should be prioritized based on expected health and economic value. In the design phase we determine which specific parameters drive the expected value, e.g., prevalence of the marker, treatment effectiveness or financial aspects. As these require the most precise data, this informs the design and optimal sample size of further studies. Finally, we assess the effectiveness and cost to individual patients, payers and society. This is crucial information to inform fair reimbursement and pricing decisions.

Stages of diagnostic evaluation

EXPLORATION
Prioritize candidate based on expected health and economic value

DESIGN
Identify parameters driving expected value of diagnostic

EVALUATION
Assess effectiveness and cost for patients, payers and society to inform decisions

2016 VALUE IN CANC

PATIENT VOICES HELP DRIVE CHA

The 2016 Summit focused on developing interventions to improve cancer care, understanding the ethical implications of introducing value in the patient/provider relationship, and measuring the costs of care. A broad range of attendees — from patient partners, to payers, to clinicians, researchers and others — shared perspectives and debated key issues in this highly interactive forum.

President and Founder of Cierra Sisters Bridgette Hempstead

Panelists from left to right: Dr. Jer

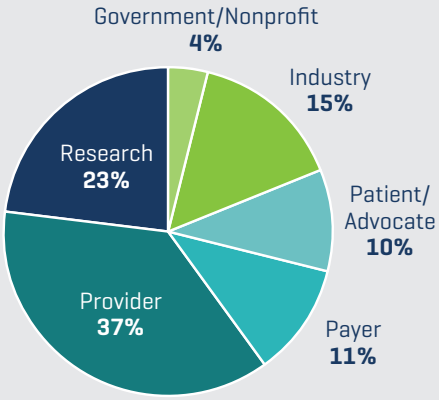
University of Washington bioethicist Dr. Wylie Burke and patient activist Janet Freeman-Daily

PHOTOS BY ROBERT HOOD

VCC by the numbers

48 ORGANIZATIONS IN ATTENDANCE

147 ATTENDEES



225 **MINUTES**, or nearly half of summit agenda, dedicated to discussion and stakeholder feedback

42 WORKING GROUP MEMBERS

13 PATIENT PARTICIPANTS

9 COST METRICS PRESENTED

3 PHASES OF CARE

456 DATA POINTS SHARED

85 TWEETS

4.5 TWEETS PER TWITTER PARTICIPANT

#ValueSummit2016 #HICOR

ER CARE SUMMIT

ANGE IN CANCER CARE

nnie Crews, Dr. Patricia Dawson, Diane Mapes, and Courtney Preusse

"Often providers will start a conversation with, 'How do you want to be remembered?' Instead they should ask, ***'What matters to you?'*** *We need to help patients think about what is important to them. What are their values and goals of care?"*

— Janet Freeman-Daily

Keynote speaker Dr. Craig Earle of Cancer Care Ontario and the Ontario Institute for Cancer Research

Community-based **Intervention Working Groups** collaborated to propose improvements to cancer care in three priority areas.

GOALS OF CARE / END OF LIFE

GOALS OF CARE DISCUSSION

Initial conversations within 6 weeks of diagnosis
Population: Stage IV cancer patients with solid tumors

PROVIDER/CLINIC TRAINING FOR:

Reimbursement via CPT codes
Promote awareness and provide training
Support IT functionality

PROVIDER TRAINING FOR:

How to have a goals of care discussion
Distribute conversation guides
Provide education to clinicians

EVALUATION

Track conversations via CPT codes and compare outcomes

APPROPRIATE TESTING, IMAGING AND CARE AFTER BREAST CANCER TREATMENT

To intervene on provider-driven testing

BENCHMARKING
Repeated measurement of compliance with guidelines allows for measurable improvement as systems and provider behaviors change.

PROVIDER EDUCATION
Provide clinicians with a robust provider/patient guideline instruction set.

To intervene on patient-driven testing

POST-ACTIVE TREATMENT CARE
Implement a comprehensive post-active treatment care program to address the specific needs that patients experience at this time.

REDUCE PREVENTABLE HOSPITALIZATIONS AND ER USE DURING TREATMENT

SYMPTOM SELF-MANAGEMENT TOOLS FOR PATIENTS

- Pre-weekend assessment
- Symptom self-management plan(s)
- Online/e-resources

TELERESOURCE

- Outgoing: actively reaching out to patients at key timepoints
- Incoming: 24/7 centralized, oncology-staffed call line

ONCOLOGY URGENT CARE CAPACITY

- In clinic
- Ability to give IV fluids
- Regional shared capacity

Symptom Management for Cancer Patients in Treatment

FROM QUALITY MEASUREMENT TO CARE TRANSFORMATION

Over the past three years HICOR has established a growing presence at the American Society of Clinical Oncology Quality Care Symposium, an annual event which brings together top leaders in the field to share strategies and methods for measuring and improving the quality and safety of cancer care.

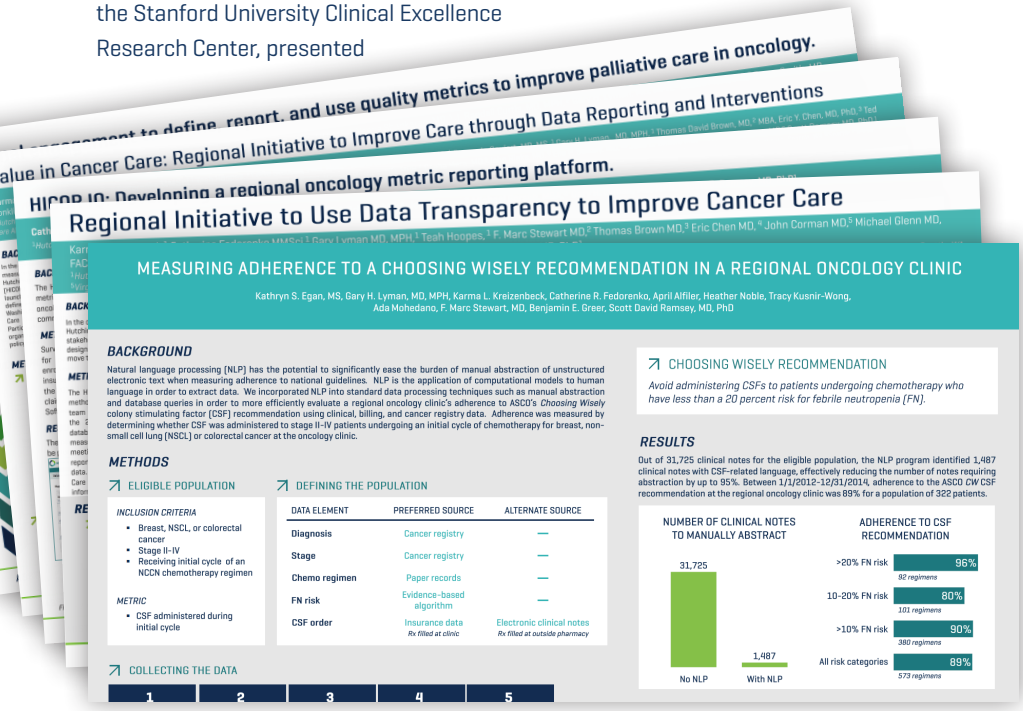
At the February 2016 symposium, the HICOR team presented a number of flagship initiatives, including our data transparency and performance reporting efforts, and methods for engaging stakeholders in intervention design. In addition, the team presented on regional collaboration efforts in palliative care and on HICOR's Choosing Wisely project to measure guideline adherence using natural language processing.

The translation of quality improvement efforts into practical, applied programs that can positively impact patients' lives is a key theme of HICOR's endeavors. Our colleague Melora Simon, a collaborator from the Stanford University Clinical Excellence Research Center, presented

HICOR team member Kristine Stickney, right, presents results.

HICOR data on "Bright Spot" clinics — those with high-quality outcomes and low costs — that represent positive outliers in oncology care. These efforts led to documentation and sharing of best practices among cancer care delivery systems in the Pacific Northwest.

"While we have seen tremendous recent advances in cancer treatments, there is more work to be done to ensure health care delivery systems can provide these lifesaving measures to patients with consistent, high-quality care," said HICOR Director Scott Ramsey. "Our goal has been to develop and test strategies to address these issues with regional partners and bring our successes to the national forum."



HICOR team members Karma Kreizenbeck, left, and Kathryn Egan, middle, present results.

HICOR IQ

HICOR IQ is an oncology informatics platform that integrates cancer registry and health insurance claims data to enable performance reporting in oncology.

TRUSTED, TRANSPARENT REPORTING SOURCE

John Rieke, MD

The analytics generated by HICOR IQ are derived from a common, integrated, multisource data platform. Shared data and standardized methodologies ensure that results are comparable across institutions, which supports collaboration and partnership across the region.

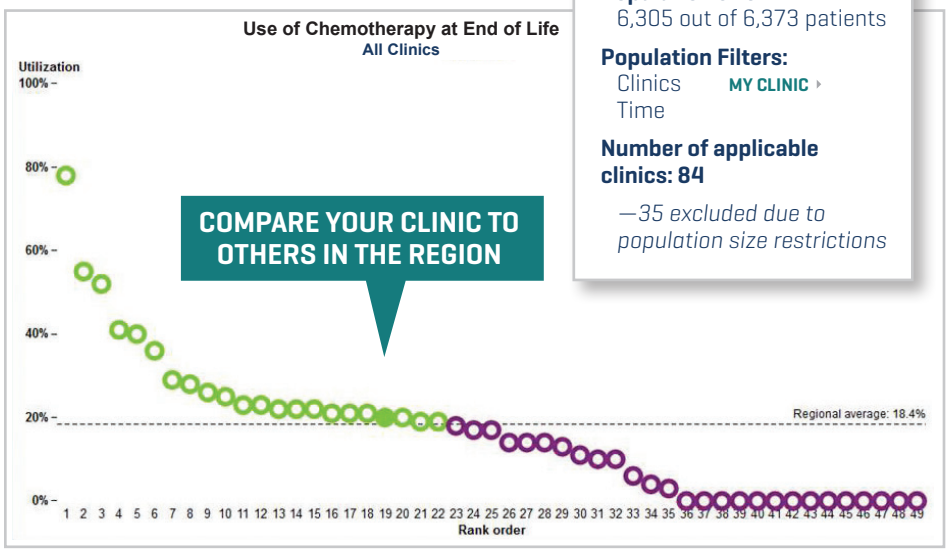
"HICOR IQ allows us to visualize how patients are treated in our system. The reports provide new insights that are not available elsewhere, and we use that information to improve quality in our clinics."

— John Rieke, MD
Medical Director, MultiCare Regional Cancer Center

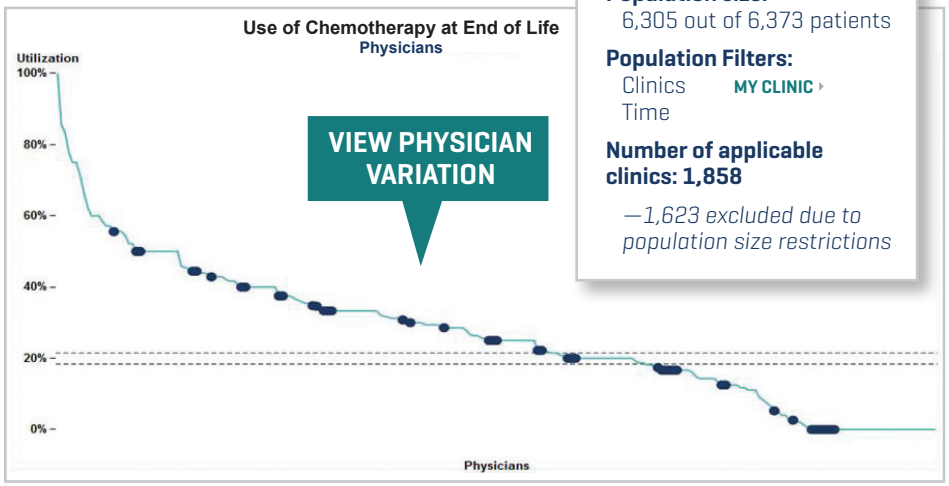
MEASURING WHAT MATTERS

HICOR looks to our partners in the cancer care community to prioritize metrics for inclusion in HICOR IQ. Regional partners and national experts review our measurement algorithms to ensure that reports are clinically valid and meaningful.

Clinic Identification and Filtering



Physician Reporting



Explore HICOR IQ at ***hicoriq.org***

PARTNERS MAKE IT POSSIBLE

Data partners are critical to the success of this effort. HICOR IQ combines cancer outcomes data from the Cancer Surveillance System — which is part of the Surveillance, Epidemiology, and End Results (SEER) program of the National Cancer Institute — with claims information provided by Premera Blue Cross and Regence BlueShield.

SELECT PUBLICATIONS

Culakova E, **Poniewierski MS**, Wolff DA, Dale DC, Crawford J, **Lyman GH**. The impact of chemotherapy dose intensity and supportive care on the risk of febrile neutropenia in patients with early stage breast cancer: a prospective cohort study. SpringerPlus. 2015;4:396.

Mewes JC, **Steuten LM**, Groeneveld IF, et al. Return-to-work intervention for cancer survivors: budget impact and allocation of costs and returns in the Netherlands and six major EU-countries. BMC Cancer. 2015;15:899.

Goulart B. Lung cancer CT screening is cost-effective but implementation matters. Evidence-Based Medicine. 2015;20(2):78.

Dinan MA, Mi X, Reed SD, Hirsch BR, **Lyman GH**, Curtis LH. Initial trends in the use of the 21-gene recurrence score assay for patients with breast cancer in the Medicare population, 2005-2009. JAMA Oncology. 2015;1(2):158-166.

Shankaran V, Ramsey S. Addressing the financial burden of cancer treatment: from copay to can't pay. JAMA Oncology. 2015;1(3):273-274.

Lyman GH, Reiner M, Morrow PK, Crawford J. The effect of filgrastim or pegfilgrastim on survival outcomes of patients with cancer receiving myelosuppressive chemotherapy. Annals of Oncology: Official Journal of the European Society for Medical Oncology / ESMO. 2015;26(7):1452-1458.

Ramsey SD, Fedorenko C, Chauhan R, McGee R, **Lyman GH, Kreizenbeck K, Bansal A**. Baseline estimates of adherence to American Society of Clinical Oncology/American Board of Internal Medicine Choosing Wisely initiative among patients with cancer enrolled with a large regional commercial health insurer. Journal of Oncology Practice / American Society of Clinical Oncology. 2015;11(4):338-343.

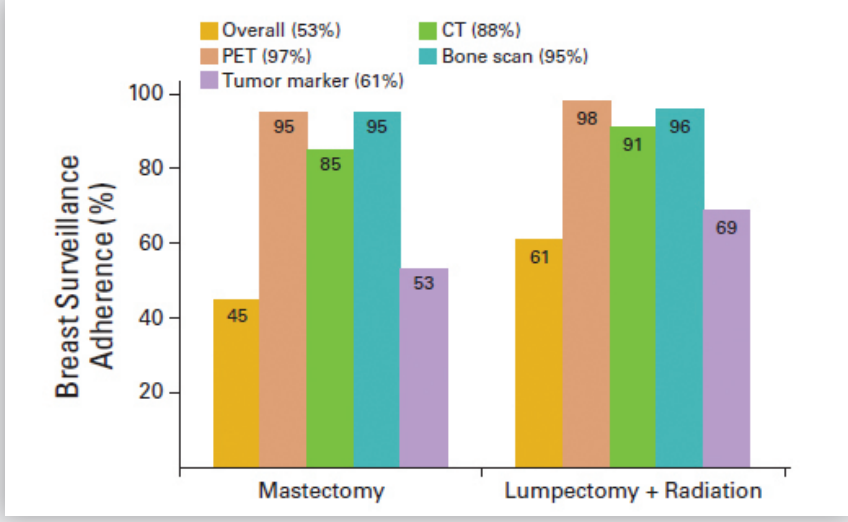
Roth JA, Sullivan SD, **Goulart BH**, Ravelo A, Sanderson JC, **Ramsey SD**. Projected clinical, resource use, and fiscal impacts of implementing low-dose computed tomography lung cancer screening in Medicare. Journal of Oncology Practice / American Society of Clinical Oncology. 2015;11(4):267-272.

Shiovitz S, **Bansal A**, Burnett-Hartman AN, **Karnopp A,** Adams SV, Warren-Mears V, **Ramsey SD.** Cancer-directed therapy and hospice care for metastatic cancer in American Indians and Alaska Natives. Cancer Epidemiology, Biomarkers & Prevention: A Publication of the American Association for Cancer Research, cosponsored by the

MEASURING ADHERENCE TO ASCO CHOOSING WISELY

Two large datasets, the Surveillance, Epidemiology and End Results (SEER) registry and enrollment and claims data from a large regional commercial insurance plan, were linked to measure adherence to the American Society of Clinical Oncology (ASCO)/ American Board of Internal Medicine (ABIM) Choosing Wisely measures. The ASCO/ ABIM Choosing Wisely recommendations prioritize appropriate use of treatment and interventions, discouraging the use of interventions that do not improve the quality of cancer care that patients receive. The large retrospective data linkage and analysis study, led by Dr. Scott Ramsey and Dr. Gary Lyman in collaboration with colleagues at HICOR and Premera Blue Cross, found that adherence rates varied widely both across measures and within each measure (i.e., by stage and cancer site). Additionally, an increased cost of $29 million for the nonadherent population, as compared to the adherent population, was observed in analyzing differences in total reimbursements between the two groups.

The study was among the first to characterize adherence to the ASCO/ABIM Choosing Wisely measures and garnered much interest, becoming one of the most downloaded articles on the Journal of Oncology Practice website. The study is a part of a larger effort within HICOR to analyze adherence rates in an effort to identify and develop value-based interventions that will improve the quality of cancer care patients receive.



American Society of Preventive Oncology. 2015;24(7):1138-1143.

Deeg HJ, **Steuten LM**. Therapy for hematologic cancers in older patients, quality of life, and health economics: difficult decisions. JAMA Oncology. 2015;1(5):571-572.

Miquel-Cases A, **Steuten LM**, Retel VP, van Harten WH. Early stage cost-effectiveness analysis of a BRCA1-like test to detect triple negative breast cancers responsive to high dose alkylating chemotherapy. Breast (Edinburgh, Scotland). 2015;24(4):397-405.

Schnipper LE, Davidson NE, Wollins DS, Tyne C, Blayney DW, Blum D, Dicker AP, Ganz PA, Hoverman JR, Langdon R, **Lyman GH**, et al. American Society of Clinical Oncology statement: A conceptual framework to assess the value of cancer treatment options. Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology. 2015;33(23):2563-2577.

Shankaran V, Ortendahl JD, Purdum AG, et al. Cost-effectiveness of cetuximab as first-line treatment for metastatic colorectal cancer in the United States. American Journal of Clinical Oncology. 2015.

Denduluri N, Patt DA, Wang Y, Bhor M, Li X, Favret AM, Morrow PK, Barron RL, Asmar L, Saravanan S, Li Y, Garcia J, **Lyman GH**. Dose delays, dose reductions, and relative dose intensity in patients with cancer who received adjuvant or neoadjuvant chemotherapy in community oncology practices. Journal of the National Comprehensive Cancer Network: JNCCN. 2015;13(11):1383-1393.

Dinan MA, Mi X, Reed SD, **Lyman GH**, Curtis LH. Association between use of the 21-gene recurrence score assay and receipt of chemotherapy among Medicare beneficiaries with early-stage breast cancer, 2005-2009. JAMA Oncology. 2015;1(8):1098-1109.

Roth JA, **Ramsey SD,** Carlson JJ. Cost-effectiveness of a biopsy-based 8-protein prostate cancer prognostic assay to optimize treatment decision making in Gleason 3 + 3 and 3 + 4 early stage prostate cancer. The Oncologist. 2015;20(12):1355-1364.

Deverka P, Messner DA, McCormack R, **Lyman GH**, et al. Generating and evaluating evidence of the clinical utility of molecular diagnostic tests in oncology. Genetics in Medicine: Official Journal of the American College of Medical Genetics. 2015.

Runowicz CD, Leach CR, Henry NL, Henry KS, Mackey HT, Cowens-Alvarado RL, Cannady RS, Pratt-Chapman ML, Edge SB, Jacobs LA, Hurria A, Marks LB, LaMonte SJ, Warner E, **Lyman GH**, Ganz PA. American Cancer Society/American Society of Clinical Oncology Breast Cancer Survivorship Care Guideline. Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology. 2016;34(6):611-635.

Henrikson NB, **Shankaran V**. Improving price transparency in cancer care. Journal of Oncology Practice / American Society of Clinical Oncology. 2016;12(1):44-47.

Kircher SM, Meeker CR, Nimeiri H, Geynisman DM, Zafar SY, **Shankaran V**, et al. The parity paradigm: can legislation help reduce the cost burden of oral anticancer medications? Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research. 2016;19(1):88-98.

Steuten LM. Early stage health technology assessment for precision biomarkers in oral health and systems medicine. OMICS: A Journal of Integrative Biology. 2016;20(1):30-35.

Unger JM, Gralow JR, Albain KS, **Ramsey SD**, Hershman DL. Patient income level and cancer clinical trial participation: prospective survey study. JAMA Oncology. 2016;2(1):137-139.

Bennette CS, Ramsey SD, McDermott CL, Carlson JJ, Basu A, Veenstra DL. Predicting low accrual in the National Cancer Institute's Cooperative Group clinical trials. Journal of the National Cancer Institute. 2016;108(2).

McDougall J, Ramsey SD, Radich J. What happens when imatinib goes generic? Journal of the National Comprehensive Cancer Network: JNCCN. 2016;14(2):128-131.

Oosterhoff M, van der Maas ME, **Steuten LM**. A systematic review of health economic evaluations of diagnostic biomarkers. Applied Health Economics and Health Policy. 2016;14(1):51-65.

Ramsey SD, Lyman GH, Bangs R. Addressing skyrocketing cancer drug prices comes with tradeoffs: pick your poison. JAMA Oncology. 2016;2(4):425-426.

Runowicz CD, Leach CR, Henry NL, Runowicz CD, Leach CR, Henry NL, Henry KS, Mackey HT, Cowens-Alvarado RL, Cannady RS, Pratt-Chapman ML, Edge SB, Jacobs LA, Hurria A, Marks LB, LaMonte SJ, Warner E, **Lyman GH**, Ganz PA. American Cancer Society/American Society of Clinical Oncology Breast Cancer Survivorship Care Guideline. CA: A Cancer Journal for Clinicians. 2016;66(1):43-73.

Bansal A, Radich J. Is cure for chronic myeloid leukemia possible in the tyrosine kinase inhibitors era? Current Opinion in Hematology. 2016;23(2):115-120.

Unger JM, Barlow WE, **Ramsey SD**, LeBlanc M, Blanke CD, Hershman DL. The scientific impact of positive and negative phase 3 cancer clinical trials. JAMA Oncology. 2016;2(7):875-81.

Ramsey SD, Bansal A, Fedorenko CR, Blough DK, Overstreet KA, **Shankaran V**, Newcomb P. Financial insolvency as a risk factor for early mortality among patients with cancer. Journal of Clinical Oncology: Official Journal of the American Society of Clinical Oncology. 2016;34(9):980-986.

Cohen EE, LaMonte SJ, Erb NL, Beckman KL, Sadeghi N, Hutcheson KA, Stubblefield MD, Abbott DM, Fisher PS, Stein KD, **Lyman GH**, Pratt-Chapman ML. American Cancer Society Head and Neck Cancer Survivorship Care Guideline. CA: A Cancer Journal for Clinicians. 2016;66(3):203-39.

Roth JA, Gulati R, Gore JL, Cooperberg MR, Etzioni R. Economic analysis of prostate-specific antigen screening and selective treatment strategies. JAMA Oncology. 2016;2(7):890-8.

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