Improving Oncology Quality Measurement in Accountable Care

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Improving Oncology Quality Measurement in Accountable Care

Glossary

AAD	American Association of Dermatology
ACA	Patient Protection and Affordable Care Act
ACO	Accountable Care Organization
ACR	American College of Radiology
ACS	American College of Surgeons
ADT	Androgen Deprivation Therapy
AGA	American Gastroenterological Association
AHIP	America's Health Insurance Plans
AHRQ	Agency for Healthcare Research and Quality
AJCC	American Joint Committee on Cancer
ALK	Anaplastic Lymphoma Kinase
APM	Alternative Payment Model
ASBS	American Society of Breast Surgeons
ASC	Ambulatory Surgical Center
ASCO	American Society of Clinical Oncology
ASH	American Society of Hematology
ASTRO	American Society for Radiation Oncology
AUA	American Urological Association
CAHPS	Consumer Assessment of Healthcare Providers and Systems
CAP	College of American Pathologists
CDC	Centers for Disease Control and Prevention
CEA	Carcinoembryonic Antigen
CEHRT	Certified Electronic Health Record Technology
CML	Chronic Myelogenous Leukemia
CMMI	CMS Center for Medicare and Medicaid Innovation
CMS	Centers for Medicare & Medicaid Services
CoC	Commission on Cancer
COME HOME	Community Oncology Medical Home
CQMC	Core Quality Measure Collaborative
CRPC	Castration-Resistant Prostate Cancer
DLBCL	Diffuse Large B-Cell Lymphoma
EGFR	Epidermal Growth Factor Receptor
EHR	Electronic Health Record
ESBCS	European Society of Breast Cancer Specialists

FFS	Fee-For-Service
HAC	Hospital-Acquired Condition
HCP-LAN	Health Care Payment Learning & Action Network
HIT	Health Information Technology
HHS	U.S. Department of Health and Human Services
Hospital IQR	Hospital Inpatient Quality Reporting Program
Hospital OQR	Hospital Outpatient Quality Reporting Program
ICHOM	International Consortium for Health Outcomes Measurement
IHC	Immunohistochemistry
IP	Intraperitoneal
IRF	Inpatient Rehabilitation Facilities
LTCH	Long-Term Care Hospital
MACRA	Medicare Access and CHIP Reauthorization Act of 2015
MEOS	Monthly Enhanced Oncology Services
MIPS	Merit-based Incentive Payment System
MMA	Medicare Modernization Act
MSSP	Medicare Shared Savings Program
NCCN	National Comprehensive Cancer Network
NCQA	National Committee for Quality Assurance
NHL	Non-Hodgkin Lymphoma
NQF	National Quality Forum
NSCLC	Non-Small Cell Lung Cancer
OCM	Oncology Care Model
OMH	Oncology Medical Home
ONC	Office of the National Coordinator for HIT
ONS	Oncology Nursing Society
PCHQR	PPS-Exempt Cancer Hospital Quality Reporting
PCMH	Patient-Centered Medical Home
PFS	Physician Fee Schedule
PPS	Prospective Payment System
PQRS	Physician Quality Reporting System
PRO	Patient-Reported Outcome
PROM	Patient-Reported Outcome Measure
PRO-PM	Patient-Reported Outcome Performance Measure
PSA	Prostate-Specific Antigen
QCDR	Qualified Clinical Data Registry
QOPI®	Quality Oncology Practice Initiative
QPCR	Quantitative Polymerase Chain Reaction
QPP	Quality Payment Program
SSO	Society of Surgical Oncology
TKI	Tyrosine Kinase Inhibitors
UHC	United Healthcare
VBP	Value-Based Payment

Improving Oncology Quality Measurement in Accountable Care

Table of Contents

Executive Summary

Quality-Based Incentives for Improving Oncology in Accountable Care

Health care payment, including payment for oncology care, is moving from volume-based fee-for-service (FFS) to value-based accountable care. This shift is intended to give providers greater flexibility and resources to transform to more patient-centered care delivery, while instilling accountability for improving quality and lowering costs. These objectives are aligned with the Department of Health and Human Services' National Quality Strategy (NQS), and with the value-based payment (VBP) provisions of the Patient Protection and Affordable Care Act of 2010 (ACA) and the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA).

New alternative payment models (APMs) link innovative care delivery transformation and quality improvement with VBP. Oncologists and other clinicians are increasingly incentivized to improve quality and reduce costs as participants in accountable care organizations (ACOs), bundled or episode-based payment models, and patient-centered medical homes (PCMHs) and patient-centered specialty practices (PCSPs). In addition, the Centers for Medicare & Medicaid Services' (CMS) Center for Medicare and Medicaid Innovation (CMMI) has implemented the Oncology Care Model (OCM), a voluntary episode-based payment model for oncology practices providing chemotherapy. The OCM incentivizes oncology practices to manage costs under a benchmark to earn shared savings, while offering enhanced payment for patient-centered care delivery and performance results. The Medicare OCM also aligns with commercial VBP efforts in the oncology space to incentivize high-quality cancer care while lowering costs.

Oncology Measurement Challenges and Gaps

Quality measures are a key element of accountable care. Payers and other stakeholders, including patients and health care purchasers, use quality measures to evaluate whether care delivery comports with clinical guidelines and standards, and whether important outcomes are being achieved. In oncology, accountable care and VBP approaches leverage quality measures developed by specialty organizations, such as the American Society of Clinical Oncology (ASCO), and others to ensure that care is evidence-based and to promote quality improvement. These measures assess whether patients with cancer are screened appropriately; receive necessary tests and treatments (e.g., chemotherapy, radiation therapy, surgery); have their pain managed; or experience adverse outcomes (e.g., unexpected hospitalizations).

Gaps in accountable care quality measure sets may cause missed signals about problems in care and missed opportunities for improvement. In accountable care, quality measures balance financial incentives for lowering volume-based costs and are needed to monitor for underuse of treatment. Ensuring access to appropriate treatment is important for oncology, where high-cost and increasingly targeted diagnostics and therapeutics are used to treat patients with complex and individualized needs. However, gaps in oncology quality measures persist, particularly with respect to clinical outcomes and patient-centered measures, such as shared decision-making. These gaps are compounded by challenges in oncology measure development related to risk adjustment, attribution, and accounting for small numbers in some cancer populations.

Key Findings

This white paper examines the use of existing measures and measure "gaps," or areas where measures have not yet been developed or, if they have been developed, are not in use in measure sets. Specifically, Discern Health examined the quality measure landscape for 10 high-impact cancer diagnoses, as well as cross-cutting measures that assess clinical processes and outcomes across more than one condition, including multiple types of cancer. This gap analysis identified a number of important findings:

- Accountable care measure sets for cancer typically include important cross-cutting measures for pain quantification and treatment planning, depression screening, inpatient and outpatient utilization rates, and radiation dose limits and use of radiation for palliative care.

- Despite a historical focus on development of process-related quality measures for cancer care, few measures exist or are in use beyond the breast, colorectal, and prostate cancer clinical areas.

- Numerous measure gaps for cancer-specific treatment processes exist, particularly for appropriate mutational and biomarker testing, imaging utilization, initiation and adherence to therapies, and initiation of radiation therapy.

- Other high-priority cross-cutting measure gaps remain, particularly for patient-reported outcome performance measures (PRO-PMs), stage- and tumor-specific data collection, survival and disease recurrence, and adherence to appropriate clinical pathways.

A multi-stakeholder Roundtable of oncology and measurement subject matter experts reviewed and considered the measure gap findings and opportunities for improving oncology measurement during a one-day meeting. The recommendations in this white paper reflect the group's deliberations.

Focus on Cancer Cross-Cutting Measures

A primary finding of the gap analysis and multi-stakeholder review was that overreliance on the few relevant process measures for cancer in accountable care measure sets is problematic because of the rapidly shifting evidence for newly developed innovative treatments and the increasing personalization of care for the heterogeneous cancer population. As a result, the findings and group discussion suggested that a new approach is needed to more effectively measure cross-cutting priorities in cancer care, including clinical outcomes, patient-recorded outcomes (PROs), safety issues, and structural capabilities. The group also saw opportunities to aggregate cancer condition-specific measures, such as appropriate initiation of therapy and adherence to treatment, and standardized oncology clinical pathway adherence. Figure 1 summarizes the group's priorities for leveraging existing cross-cutting measures and developing new measures.

Figure 1. High-Priority Cross-Cutting Measures

Patient-Reported Outcome Performance Measures (PRO-PM)

- Health status (pain, symptoms, psychosocial health)
- Symptom control (nausea, dyspnea, fatigue)
- Participation in defining treatment goals
- Assessment of meeting shared treatment goals
- Change in psychosocial distress/financial toxicity

Clinical Outcome Measures

- Disease-free/progression-free survival rate
- Management of residual disease findings (hematologic cancer)
- Cancer recurrence rate
- Use of chemotherapy within the last 14 days of life

Process Measures

- Stage, tumor status, genetic information collected
- Appropriate chemotherapy dosing (aggregated)
- Adherence to prescribed oral drug therapy (aggregated)
- Pre-treatment symptom and fertility preservation counseling

Safety Measures

- Unexpected hospitalization or emergency room (ER) visit rate
- "Never event" radiation or chemotherapy dosing errors
- "Never event" failure to provide timely notification of potential treatment-related loss of bodily function or fertility

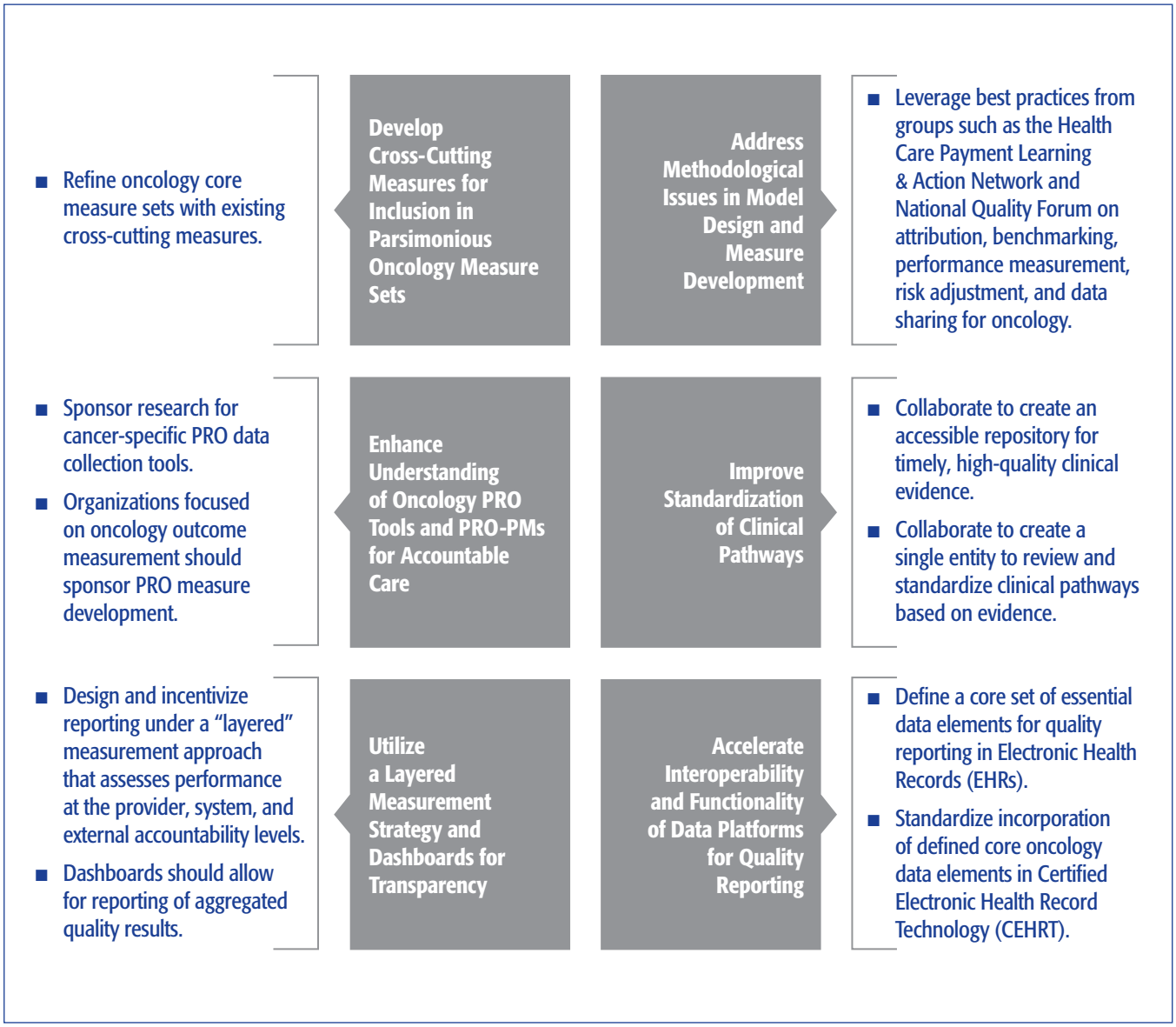
Structural Measures

- 24/7 access to appropriate care
- Adherence to clinical pathways
- Ability to meet palliative care standards

Recommendations and Near-Term Action Steps for Improving Accountable Care Measure Sets

This white paper recommends strategies and near-term action steps (see Figure 2) to address identified measure gaps, promote development of effective and meaningful cross-cutting measures, and improve the state of oncology quality measurement in accountable care models generally. These recommendations build on the findings for improving accountable care measure sets laid out in the 2014 National Pharmaceutical Council (NPC) and Discern Health white paper, "Accountable Care Measures for High-Cost Specialty Care and Innovative Treatment." See *Appendix A: Accountable Care Measures for High-Cost Specialty Care and Innovative Treatment: 2014 White Paper Executive Summary* for a summary of the 2014 white paper.

Figure 2. Strategies and Action Steps for Improving Oncology Measurement



As accountable care continues to evolve, measurement for specialty care, including oncology, must keep pace. Physicians, payers, patients, health care purchasers, and industry all have roles to play in promoting development of meaningful quality measures for use in accountable care measurement. Transformation to accountable care is an important step in optimizing oncology care delivery, and measurement must effectively reflect the quality of care and facilitate better care and reduced spending.

Background

Accountable Care and Oncology

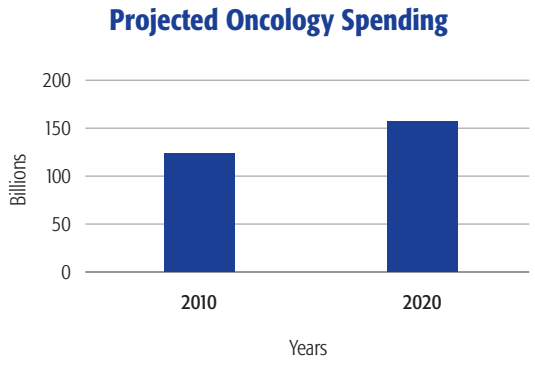
The Cost of Cancer Care

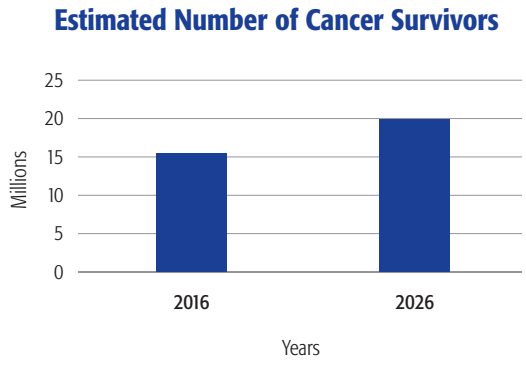
National health expenditures in the U.S. have increased significantly over the past several decades, without corresponding improvement in quality. As explored in the NPC and Discern Health 2014 white paper "Accountable Care Measures for High-Cost Specialty Care and Innovative Treatment," FFS is an often-cited driver of cost and quality problems. In response, policymakers have taken substantial steps toward innovative payment and care delivery models, including accountable care models, to replace volume-based reimbursement.[1]

Accountable care models encourage organization and delivery of health care services whereby providers are incentivized to achieve quality and financial benchmarks for a specified population. The movement to accountable care has spawned patient-centered delivery models, such as PCMHs and ACOs, that promote improved coordination and communication between primary care and the "medical neighborhood" of specialist, inpatient, and post-acute care. VBP is used by public and private payers to drive transformation to accountable care. VBP typically rewards providers based on their ability to reduce spending and meet defined quality standards. These incentives may range from pay-for-reporting (P4R) or pay-for-performance (P4P) to population-based shared savings or episode-based bundled payments.

Care for patients with cancer is a significant driver of rising costs, with cancer representing one of the five most costly conditions as a percentage of total health expenditures at 6% of costs.[2] Policymakers predict that costs will continue to grow, anticipating a 26.4% increase in cancer care costs from 2010 spending to 2020 spending ($125 billion to $158 billion, respectively) (see Figure 3).[3]

Figure 3. U.S. Cancer Spending and Survival





These increases are being driven in part by advances in the diagnosis and treatment of cancer and the evolution of innovative precision-oriented medicines that target the changes in cancer cells that cause them to spread (see Figure 4).[4]

Figure 4. Example Innovations in Cancer Treatment[5]

Immune Checkpoint Inhibitors for Advanced Melanoma

- Immune checkpoint pathways, such as cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) and programmed cell death protein 1 (PD-1), led to the development of a new class of medicines called immune checkpoint inhibitors.
- This immunotherapy, along with other targeted therapies, can help reduce side effects from treatment and increase survival rates.

HER2-Targeted Therapy for Breast Cancer Subtypes

- New medicines build on the success of HER2-targeted therapy trastuzumab to disrupt the activity of underlying genetic mutations.
- Targeted therapies offer improved survival, reduced side effects, and less dosing and patient burden for administration.

Targeted Therapies for Non-Small Cell Lung Cancer

- Anaplastic lymphoma kinase (ALK) inhibitors, like crizotinib, and epidermal growth factor receptor (EGFR) inhibitors, like erlotinib, gefitinib, and afatinib, have created new treatment options for subsets of non-small cell lung cancer (NSCLC) patients.
- Immunotherapies are also being used for NSCLC treatment, including PD-1 inhibitors.

Advances in Cancer Treatment

While these advances have added costs to the health care system, they also provide important benefits. A 2015 study found that advances in treatments, screening, and diagnoses are likely contributors to improvements in the proportion of patients surviving longer after diagnosis. Men and women ages 50-64 who were diagnosed in 2005-2009 had a 39% to 68% lower risk of dying than for patients diagnosed in 1990-1994.[6] As survival improves, there will be a growing pool of patients who need to maintain treatment or receive follow-up care. A recent report by the American Cancer Society estimates that current figures of 15.5 million cancer survivors will grow to more than 20 million by 2026, a nearly 30% increase (see Figure 3).[7] Cancer will remain one of the most common and deadly diseases in the U.S., with more than 1.6 million new cases diagnosed and an estimated 600,000 dying from cancer in 2016.[8]

Opportunity for VBP

Advances in cancer care combined with a substantial projected rise in spending have created an opportunity and imperative for oncology-based delivery models that promote value for high-cost care. CMS and the CMMI have led efforts among payers to design value-based, patient-centered payment models. As explored in the NPC and Discern Health 2014 white paper, these payment arrangements may include the following[1]:

- **Pay-for-performance**—Providers receive bonus payments or other rewards—or avoid payment penalties—if they meet certain financial, clinical, or other internally measured benchmarks or combinations of benchmarks. The financial incentives encourage improvement in measured aspects of care.

- **Bundled payment**—Providers receive an overarching payment for a specific episode of care defined by a set of diagnostic and procedure codes and a time window. By converting FFS payments to a more fixed payment, bundled payment gives providers flexibility to redirect resources to services that may benefit some patients but that are not reimbursed (e.g., care coordination) while also encouraging cost reductions.

- **Shared savings programs**—An organization of providers enters into an arrangement whereby providers who achieve quality benchmarks and savings beneath a certain threshold are entitled to receive a percentage of the savings. A shared savings arrangement may be coupled with shared risk, in which the organization loses money if savings are not achieved. Shared savings programs encourage cost reduction by providing additional payments if savings are achieved, or (in some cases) negative financial consequences if savings are not achieved. Shared savings enable providers to provide support activities that reduce costs but would not be reimbursed under FFS.

- **Global payment**—Providers receive a prospective lump sum payment that is expected to cover all medical care for a certain population of patients for a time period, usually a year. This approach encourages providers to be fiscally restrained so that the total cost of care for the population is less than the global payment; it also enables them to redirect more resources to achieve cost savings.

These VBP approaches may apply to providers and facilities that provide primary, inpatient, or outpatient care to general populations that include patients with cancer, or they may apply to providers and facilities, such as general oncology practices or cancer treatment centers, that exclusively provide care to patients with cancer. For example, the Medicare Shared Savings Program (MSSP) for ACOs provides payment for integrated health systems that reduce spending. ACO participants may include oncology specialty physicians or practices whose patient costs are included in the shared savings assessment of the overall ACO. Other models, including the new Merit-based Incentive Payment System (MIPS) under the Quality Payment Program (QPP), incentivize improvements in quality and cost performance for physicians and also include considerations for individual specialists and sub-specialists, including oncologists. Other quality reporting and payment programs, such as the Home Health Quality Reporting program and the Hospice Quality Reporting Program, affect providers who serve high-need or severely ill populations, which may include patients with cancer.

In recent years, CMS has sought to expand its VBP efforts to include oncology-specific models. As mandated through the ACA, CMS created a quality reporting program for the cancer hospitals that are exempt from the inpatient Prospective Payment System (PPS). The PPS allows CMS to make prospective payments to the majority of hospitals on the basis of the clinical classification of

each service. Certain cancer hospitals were exempted from this scheme on the basis of their services exclusively to cancer patients, and payments are made on the basis of facilities' reported costs.[9] The PPS-Exempt Cancer Hospital Quality Reporting (PCHQR) program is intended to provide beneficiaries with quality information about the facilities, and to incentivize quality improvement among the 11 PPS-excluded facilities.[10]

CMS has also expanded its approach to develop the OCM, a multi-payer, episode-based payment model for oncology practices treating patients undergoing chemotherapy. The OCM, which builds on the experience of commercial payer bundled payment initiatives such as UnitedHealth Group's Cancer Care Payment Model (see box),[11] requires participating practices to transform care to a patient-centered model, providing a per-beneficiary Monthly Enhanced Oncology Services (MEOS) fee for patients undergoing chemotherapy episodes. The model also offers a performance-based payment for episodes with reduced expenditures below a benchmark, or defined target price. The percentage of the performance-based payment that oncology practices earn is based on 12 performance measures, addressing issues such as utilization, pain management, and appropriate initiation of treatment. The OCM includes higher-volume cancers, with the episode beginning on the date of an initial Medicare Part B or Part D chemotherapy claim and ending six months later.[12]

UnitedHealth Group (UHG) Cancer Care Payment Model

Under a VBP pilot for cancer care, UHG paid oncologists for treatment episodes using up-front bundled payments based on the expected costs for a standard regimen. In 2015, a three-year study of the pilot program found that, while the cost of chemotherapy was $13 million higher for clinicians reimbursed through bundled payments, the overall total cost of medical care was reduced by 34%, resulting in savings of $33 million.

Appendix B: Federal Value-Based Payment Models and *Appendix C: Commercial Value-Based Payment Oncology Care Models* of this white paper provide a summary of relevant VBP models currently in use, including those directed toward populations inclusive of patients with cancer, such as MSSP, and those directed toward populations that exclusively include patients with cancer, such as OCM. *Appendix D: Other Oncology Care Delivery Models* provides an overview of other types of oncology-specific care delivery approaches that may be distinct from payment approaches.

While these VBP initiatives create the incentives to reduce cost, the incentive to improve quality must also be addressed. In any VBP arrangement, there is a risk that misaligned incentives will result in negative consequences. As explored in the NPC and Discern Health 2014 white paper, these issues may manifest in various ways[1]:

- Pay-for-performance programs assess quality only for select conditions, leaving assessments for care for many other conditions ambiguous.
- Bundled payment programs may not address the appropriate use of the bundle, incentivizing providers to treat a high volume of low-risk patients while avoiding high-risk and costly patients.
- Shared savings programs generally focus on one year, so costly tests and interventions that have longer timeframes for cost savings may not be prioritized by clinicians.

If incentives are created to save money by doing less, the use of costly but effective treatments could decrease without awareness among providers that the decrease is occurring. This concern is particularly pronounced for oncology, where the price for diagnostics and treatments is escalating, but the value produced by the service may extend beyond the one-year time horizon frequently used in VBP models. Further, misaligned incentives in oncology VBP could negatively affect disadvantaged patients with social risk factors who are often diagnosed at later stages and who tend to have lower survival rates.[13]

These concerns underline the importance of quality measurement in VBP. Without adequate or meaningful quality measures, VBP efforts could promote inappropriate or ineffective care delivery. As this white paper will explore, there are many challenges associated with meaningful oncology care quality measurement, and many opportunities for improvement.

Measuring Quality in Oncology Care

Overview

Quality measurement serves many roles in health care delivery, primarily providing data and information to stakeholders seeking to improve performance or monitor progress over time. As outlined in NPC's 2014 white paper, measures may[1]:

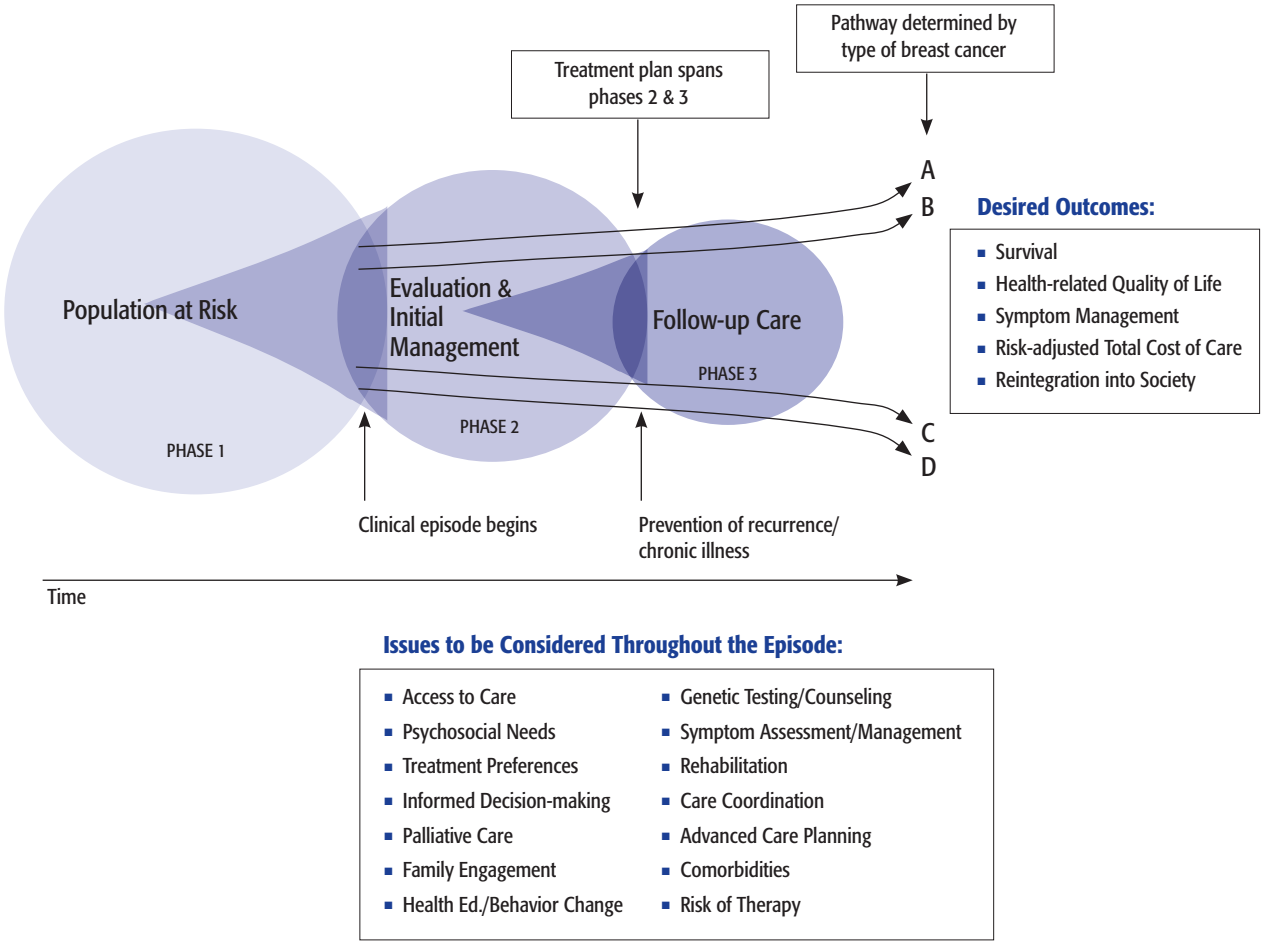
- Support payment models that reward health care providers delivering high-quality care and/or reducing costs;
- Inform patients, purchasers, and other stakeholders about which providers deliver the highest value, promoting competition on value;
- Highlight opportunities for improvement;
- Drive performance improvement processes within health care organizations; and/or
- Monitor for undesirable consequences from financial incentives.

There are many choices available in terms of what and when to measure for cancer care. Measures are needed for:

- Population-level screening to ensure timely diagnosis;
- Initial diagnostic services, staging, genetic or mutational testing, and access-related issues (e.g., appropriate and timely access to surgeons or radiologists);
- Treatment-related issues, such as appropriate initiation of therapies, surgery, or radiation, as well as assessment of treatment-related outcomes (e.g., effects of chemotherapy or outcomes of surgical procedures);
- Follow-up care for recurrence or chronic complications from treatment; and
- Palliative care, including planning and managing pain associated with cancer diagnoses.

The National Quality Forum (NQF) developed an overview of the measurement opportunities across cancer episodes of care (see Figure 5)[14]:

Figure 5. Considering Measurement in Cancer Episodes of Care (Breast Cancer Example)



Measurement Issues for Oncology

Quality measurement poses challenges for stakeholders in reporting, collecting, and interpreting relevant data for any clinical topic. Measurement for oncology presents unique issues within these challenges that stakeholders, including measure developers, providers, and payers, must consider when implementing measures in accountable care sets.

Adjustment of Outcomes for Patient Risk Factors

Adjusting oncology quality measures for fairness in accountability models is a key area of concern. Outcomes, particularly those associated with cancer treatment effectiveness and survival, need to be understood in the context of the comorbidities and unique characteristics of the patients in the measure denominator. Socioeconomic factors should also be accounted for, as these factors may be associated with poorer outcomes for reasons outside of the provider's control. Program implementers must be cautious that inclusion of outcome measures does not discourage providers from caring for patients with lower socioeconomic status or cancers that are more difficult to treat.

Provider Attribution

Provider attribution is an area of potential concern in the shifting environment of volume-based care to value-based care. In the current environment, physicians are paid on a FFS basis and patients may see a disconnected team of medical, radiation, and surgical oncologists in addition to primary care providers. This fragmentation imposes challenges to accurate attribution. For example, if a patient has undergone chemotherapy and radiation therapy treatment, how should clinical outcomes be attributed to the medical and radiation oncologists? How should cancer care costs and quality be attributed to primary care providers?

Population Heterogeneity and Small Numbers

Collecting data on cancer-specific quality measures is complicated by the issue of small numbers. There may be very few patients available for a given measure denominator, which may lead to inaccurate and unreliable results. Even larger provider groups will have small sample sizes for many cancers, and as a result, the ability to distinguish between delivery of high- and low-quality care is impaired at the level of some specific cancers. In spite of this issue, there are elements of condition-specific treatment that should ideally be measured, such as appropriate use of evidence-based treatment for certain cancers, occurrence of adverse events associated with the delivery of treatment, risk-adjusted recurrence of disease activity, and disease-free or overall survival.

Data Availability, Reporting, and Collection

Essential data elements for measuring patient-reported or clinical outcomes for cancer are not currently included as structured fields in Electronic Health Records (EHRs), and there is a lack of standardization and interoperability among systems used by different oncology providers and among practice settings. In addition, there are particular challenges associated with collecting and reporting PRO data. Specifically, different PRO assessment tools (also called patient-reported outcome measures, or PROMs) are used based on physician preference, which may complicate comparisons. Completing PRO surveys also represents an additional burden for patients and providers.

Disparities and Access

Patients with cancer may not have access to appropriate care due to gender, race, or socioeconomic issues. As a result, diagnosis delays that ultimately impact treatment and outcomes may occur. Ensuring access to appropriate screening has been an important focus of VBP and quality measurement. These measures must align with evidence-based national guidelines, which reflect the appropriate populations to screen and help ensure that over-screening or over-diagnosing, where a diagnosis is not likely to reduce

mortality or improve outcomes, does not occur. Accounting for socioeconomic status for patients with cancer should be considered when developing quality measures and VBP incentives. Programs should drive appropriate care delivery and not incentivize limiting care for disadvantaged patients from groups that have typically experienced poorer outcomes.

Current Oncology Quality Measure Landscape

There have been significant efforts to drive the development of quality measurement in the context of both practice improvement and VBP. Most notably, ASCO has established its Institute for Quality (iQ) to promote quality, value, and accountability in cancer care.[15] As part of this work, ASCO has developed the Quality Oncology Practice Initiative (QOPI®), a quality-based assessment program designed to help practices examine their results and identify opportunities for improvement.

QOPI includes more than 180 measures within 15 domains that reflect team-based care provided to patients with cancer in the outpatient oncology setting. Modules assess key aspects of cancer care delivery:

- Pathology and staging;
- Pain assessment;
- Chemotherapy planning, consent, and treatment;
- Smoking cessation;
- Emotional well-being;
- Symptom/toxicity management;
- Care at end of life;
- Palliative care; and
- Disease-specific modules, including breast cancer, colorectal cancer, gynecological cancers, non-Hodgkin lymphoma (NHL), and non-small cell lung cancer (NSCLC).

Several of the QOPI measures are endorsed by the NQF or adapted from endorsed measures stewarded by ASCO or other organizations. A number of the QOPI quality measures are currently in use in public and commercial payer VBP models. In addition, ASCO provides a three-year certification for outpatient hematology-oncology practices that meet or exceed defined scoring requirements on QOPI measures. Under the iQ umbrella, ASCO has also developed CancerLinQ, a nonprofit subsidiary and health information technology (HIT) platform that tracks the quality of care for reported QOPI measures. Real-time data allows oncologists and researchers to gain insights into care trends from de-identified information on thousands of patients.

In addition to ASCO's efforts, other oncology-related specialty societies, including the American Society for Radiation Oncology (ASTRO) and the Society of Surgical Oncology (SSO), have developed sets that include measures used to benchmark and assess quality performance among radiation and surgical oncologists. Other specialty societies, such as the American Association of Dermatology (AAD) and the American Gastroenterological Association (AGA), have also developed measures that focus on individual body systems affected by cancer (e.g., melanoma and colorectal cancers). Further, organizations including the American College of Surgeons (ACS), PCPI®, and the National Committee for Quality Assurance (NCQA) have identified oncology as an area of focus and have developed quality measures addressing specific issues.

Appendix E: Oncology Measure Developers and Measure Sets provides an overview of these organizations and their respective efforts to develop oncology quality measures.

Oncology Quality Measure Gaps

Though organizations have pursued and developed numerous quality measures for oncology and though program implementers have included many of these quality measures in their accountable care sets, these measures typically assess care delivery for a limited set of cancer types and are primarily focused on processes rather than outcomes. As a result, important measure gaps remain. Measure gaps are areas of opportunity for quality measurement where (1) measures are not currently available, or (2) currently available measures are not in use. Effectively addressing a gap requires identifying it as such, determining its importance, and selecting or developing the right measure to fill it.

Stakeholders seeking to improve quality measurement, including NQF, CMS, and America's Health Insurance Plans (AHIP), have undertaken efforts to assess the current quality measure space and analyze gap areas where measures are needed, including measures for assessing cancer care. Notably, NQF has conducted three oncology measure gap analyses to date in alignment with its measure endorsement schedule.[16,17,18] CMS, through a contract with the Brookings Institution and the MITRE Corporation, conducted an analysis of VBP issues and quality measure gaps in oncology.[19] In addition, CMS, AHIP, and others jointly formed the Core Quality Measure Collaborative (CQMC) to reach consensus on core performance measures for payment, including a core set for medical oncology and future areas for measure development.[20]

The CQMC's recent efforts identified 14 core quality measures in oncology (see Table 1):

Table 1. CQMC Core Oncology Quality Measures

NQF #	Steward	Measure Title
0559	ACS	Combination chemotherapy is considered or administered within 4 months (120 days) of diagnosis for women under 70 with American Joint Committee on Cancer (AJCC) T1c, or Stage II or III hormone receptor negative breast cancer
1857	ASCO	Patients with breast cancer and negative or undocumented human epidermal growth factor receptor 2 (HER2) status who are spared treatment with trastuzumab
1858	ASCO	Trastuzumab administered to patients with AJCC Stage I (T1c) – III and human epidermal growth factor receptor 2 (HER2)-positive breast cancer who receive adjuvant chemotherapy
0223	ACS	Adjuvant chemotherapy is considered or administered within 4 months (120 days) of diagnosis to patients under the age of 80 with AJCC III (lymph node-positive) colon cancer
1859	ASCO	*KRAS* gene mutation testing performed for patients with metastatic colorectal cancer who receive anti-epidermal growth factor receptor monoclonal antibody therapy
1860	ASCO	Patients with metastatic colorectal cancer and *KRAS* gene mutation spared treatment with anti-epidermal growth factor receptor monoclonal antibodies
0210	ASCO	Proportion receiving chemotherapy in the last 14 days of life
0211	ASCO	Proportion with more than one emergency room (ER) visit in the last 30 days of life
0213	ASCO	Proportion admitted to the intensive care unit (ICU) in the last 30 days of life
0215	ASCO	Proportion not admitted to hospice
0216	ASCO	Proportion admitted to hospice for less than 3 days
0384	PCPI	Oncology: pain intensity quantified–medical oncology and radiation oncology
0389	PCPI	Prostate cancer: avoidance of overuse of bone scan for staging low-risk prostate cancer patients
1853	College of American Pathologists (CAP)	Radical prostatectomy pathology reporting

Though the CQMC core measures represent consensus for important issues to be assessed, the group also highlighted gaps where future measure development is needed. These areas included:

- Pain control, functional status, or quality of life;
- Patient experience and shared decision-making;
- Appropriate use of chemotherapy and under- or over-treatment;
- Utilization, including emergency room (ER) utilization and inpatient hospital admission rates;
- Clinical outcome measures, including disease-free survival and five-year cure rate; and
- Reporting of cancer stage.

Appendix F: Key Identified Oncology Measure Gaps provides a synthesis of the priority gaps commonly identified through the earlier efforts of NQF, CMS, and the CQMC. This white paper seeks to build on the foundation provided by these analyses, identify additional areas for development, and recommend strategies for filling gaps in oncology measurement for accountable care.

Purpose

This white paper builds on the broader findings identified in the NPC and Discern Health 2014 white paper exploring measure gaps in accountable care measure sets relevant to selected specialty care clinical areas. The earlier white paper provided recommendations and potential solutions to address segments of populations with high-cost conditions that are not currently measured adequately or at all. This white paper provides further discussion for specific improvements relevant to oncology as a subset of specialty care.

This oncology-focused white paper assesses the adequacy of accountable care measure sets specific to cancer care delivery. It provides an opportunity to explore the future of oncology measurement and specifically examines the use of existing quality measures and measure gaps for oncology. Finally, it recommends strategies and near-term action steps to improve oncology measurement under accountable care.

Methods

Overview

To develop a deeper understanding of the implications of current accountable care measurement and measure gaps for oncology, we conducted research through two processes:

1. An analytical process, where we reviewed measures and gaps for specific types of cancer through measure scans and literature and clinical guideline review; and

2. A qualitative feedback process, where we received input on the results of our analytical process from subject matter experts and national experts through key informant interviews and a one-day Roundtable session.

The analytical processes used to achieve the goals of this work included three steps:

1. Selecting 10 types of cancer as the focus of our research, to serve as illustrations of the availability of quality measures that inform the value of treatment for oncology more broadly;

2. Applying a logic model to each type of cancer to understand gaps in accountable care measure sets and gaps in existing measures. Through application of the logic model, we identified clinical guidelines and relevant literature for each cancer, measurement gaps in representative accountable care measure sets, available measures to address gaps in the accountable care set, and measure gaps that are not covered by available measures; and

3. Examining results across all 10 cancer types to identify patterns in measure gaps, and to identify cross-cutting measurement areas that could fill gaps for multiple conditions.

Condition Selection

To build the list of conditions for our study, we first conducted a literature search for lists of high-impact cancers from authoritative sources, including the American Cancer Society and the National Institutes of Health's National Cancer Institute. These lists included cancers that fell into categories of high incidence and prevalence, those with high mortality rates, and cancers that place a large financial and logistical strain on the health care system.

We compiled these resources into a comprehensive list and prioritized cancers that most consistently fell into the top tiers for each category. Where available, we further identified the most commonly occurring type for each prioritized cancer.

Using resources from the National Comprehensive Cancer Network (NCCN), American Cancer Society, and National Cancer Institute, we also identified the most commonly used treatment modalities, including drug therapy, radiation therapy, and surgery. Categories of drug therapy included chemotherapy, hormone therapy, immunotherapy, and targeted or precision therapy. Our

objective was to include cancers that require a diverse set of treatment services. Finally, we assessed the prioritized cancers that presented socioeconomic, racial, or access-oriented challenges for patients, as well as a diverse range of short- to long-term episodes in care.

In order to finalize the list of priority types of cancer, we conducted interviews with oncology clinical and industry experts to review the list and provide qualitative feedback on the relative priority of each cancer type. The experts included representatives from ASCO, the MD Anderson Cancer Center, and the Dana-Farber Cancer Institute. Based on these interviews, we finalized the list of 10 cancers.

For an overview of the relevant factors for the selected conditions, see *Appendix G: Condition Selection Summary.*

Selected Conditions

- **Breast cancer**
- **Chronic myelogenous leukemia (CML)**
- **Colon cancer**
- **Kidney cancer**
- **Malignant melanoma**
- **Non-Hodgkin lymphoma (diffuse large B-cell)**
- **Non-small cell lung cancer (NSCLC)**
- **Ovarian cancer**
- **Pancreatic cancer**
- **Prostate cancer**

Identification of Representative Accountable Care Measure Sets

To compare the influence of current quality measures in accountable care programs to each cancer's treatment objectives, and to determine additional measures needed to promote appropriate oncology care, we sought representative sets of measures to use for the analysis. We selected and organized accountable care measure sets into three categories: provider level, episode level, and system level.

- **Provider level**–We reviewed quality measures finalized for inclusion in MIPS, which are largely aligned with the measures from the Physician Quality Reporting System (PQRS). MIPS is a component of the QPP, a physician quality program that adjusts Medicare Part B Physician Fee Schedule payments for professional services based on measured performance.

- **Episode level**–We reviewed quality measures finalized for the CMMI's OCM episode payment initiative. The OCM provides oncology practices with episode payments for physicians undergoing chemotherapy for a defined subset of cancers. To contrast the federal example, we reviewed the quality measures included in the United Healthcare (UHC) oncology episode payment commercial pilot.

- **System level**–We reviewed the quality measures included in the MSSP ACO measure set. The MSSP is one of three CMS ACO programs or models, and represents the largest share of ACOs in the Medicare space. In addition to the MSSP, we reviewed quality measures included in the PCHQR, a program that requires hospital-level reporting from 11 major cancer centers.

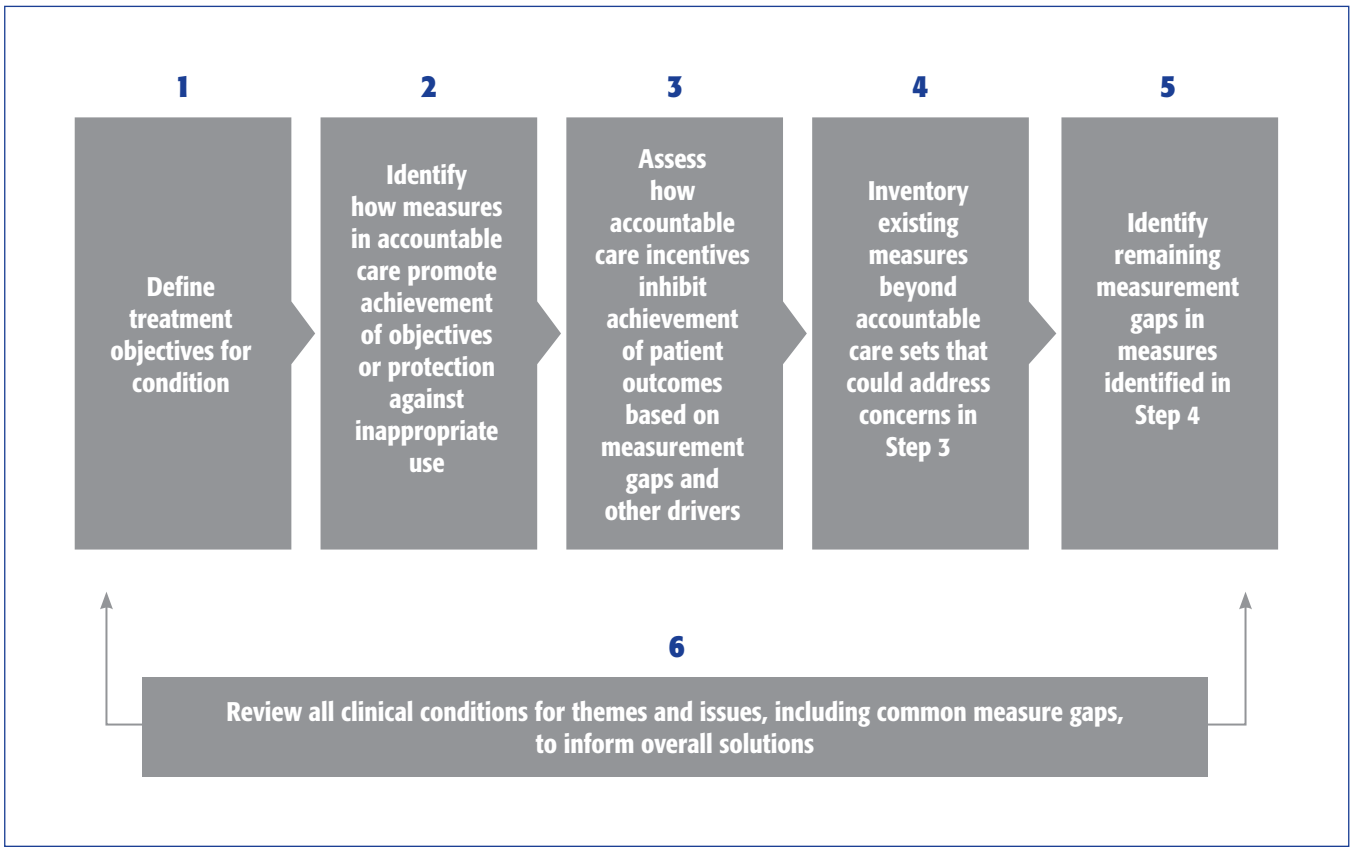
For an overview of the measures included in each of the representative accountable care measure sets, see *Appendix H: Representative Accountable Care Measure Sets.*

Application of Study Logic Model

To identify the implications of accountable care quality measurement and incentives for the 10 prioritized cancers, we developed a step-wise logic model (see Figure 6). The logic model was structured to produce comparable results across the analysis for each cancer. Specifically, the purpose of the logic model was to obtain the following data:

- Priority objectives of care that represent measurement opportunities;
- Applicable measures in accountable care sets;
- Possible areas at risk for inappropriate use based on a lack of measures in accountable care sets;
- Identification of other relevant quality measures beyond those used in accountable care programs;
- Identification of gaps in other available measures; and
- Common measure gaps and issues across conditions.

Figure 6. Study Logic Model



Our approach to executing the logic model steps for each cancer type is described below:

Step 1: We identified diagnostic and treatment clinical practice guidelines developed or endorsed by medical specialty societies and patient advocacy groups. We prioritized guidelines developed and maintained by NCCN and supplemented our review by assessing guidelines developed by ASCO, ASTRO, American Cancer Society, and SSO. We searched the Agency for Healthcare Research and Quality's (AHRQ) National Guidelines Clearinghouse to identify additional guidelines for each cancer. For a full list of guidelines reviewed, see *Appendix I: Oncology-Specific Clinical Guidelines.*

By reviewing clinical guidelines, we defined the objectives that treatment should achieve for patients with these specific types of cancer. While we identified objectives broadly across the entire episode of care, we focused our research on the specific objectives of treatment following diagnosis and emphasized treatments applicable to patients with later-stage illness. We also identified objectives that cut across types of cancer for early-stage illness, as well as for palliative/end-of-life care.

Step 2: We compared the results of Step 1 to the available measures in the selected accountable care program sets to understand where measures aligned with the measure opportunities identified for each type of cancer. We organized directly applicable measures under each cancer topic if the diagnosis was included in the measure denominator. We further identified applicable cross-cutting measures that applied to multiple types of cancer, or to issues that could be important to different types of cancers.

Step 3: By comparing the available measures in accountable care measure sets to the prioritized measure opportunities, we identified gaps in measure sets (i.e., measure opportunities that were not represented in accountable care measure sets). These quality measure gaps represent areas where inappropriate treatment could occur with imbalanced accountable care incentives.

Step 4: We assessed the measure opportunities defined in Step 3 and conducted a scan of available measures that would address measure set gaps. To identify measures, we conducted cancer condition-specific searches using the NQF Quality Positioning System (QPS) tool and the AHRQ National Quality Measures Clearinghouse. Further, we supplemented this research by engaging with relevant medical specialty societies and other measure developers to identify additional measures or measure concepts under development.

Step 5: We identified remaining gaps in measurement between the measure opportunities identified in Step 3 and the measures available for potential use found in Step 4. These gaps indicated cancer condition-specific measurement opportunities where measures are not currently available, and where measures could potentially be developed to improve measure sets.

Step 6: After completing the first five steps, we reviewed and summarized our cancer condition-specific results and compared the results for all types of cancer to identify themes and issues, including common measure gaps, for accountable care quality measure sets. We supplemented this cross-cutting assessment of condition-specific results by identifying cross-cutting measure opportunities through a review of general oncology care guidelines. See *Appendix I: Oncology-Specific Clinical Guidelines* for a list of these guidelines.

Multi-Stakeholder Roundtable

In September 2016, NPC and Discern Health convened a multi-stakeholder Roundtable in Washington, D.C., on the topic of "Improving Oncology Measurement." The purpose of the Roundtable was to review the initial logic model findings for the 10 identified cancer conditions; discuss potential quality measurement challenges and their unique impact in the oncology space; and refine initial recommendations and strategies for improving existing oncology quality measures and accountable care measure sets. Roundtable participants represented accountable care system leaders, health care purchasers, cancer patient advocates, medical and radiation oncologists, cancer hospitals, hematology and oncology pharmacists, palliative care providers, and measure developers.

Prior to the Roundtable convening, NPC and Discern Health hosted a preparatory webinar and shared the initial findings from the application of the logic model. During the Roundtable, NPC and Discern Health collected qualitative feedback on the findings, with discussion primarily centered on opportunities to improve cross-cutting measurement.

For a list of Roundtable participants, see *Appendix J: Improving Oncology Measurement: Roundtable Participants.*

Findings

This section contains the results of our review of the oncology measure landscape and gap analysis. Specifically, our findings include: (1) a review of available oncology measures and gaps in the representative accountable care measure sets; (2) condition-specific oncology measures, gaps, and opportunities for development for each of the 10 conditions analyzed, relevant to the representative accountable care measure sets; and (3) a summary of available cross-cutting oncology measures across cancer types in use in relevant accountable care measure sets, and gaps and priorities for cross-cutting oncology measure development.

Available Oncology Measures and Gaps in Representative Measure Sets

Through our gap analysis, we assessed and quantified the number of cross-cutting and condition-specific measures in each of the representative accountable care measure sets. For the purposes of this analysis, "condition-specific" refers to any quality measure that includes patients with a specific cancer type (e.g., breast cancer) in its denominator, and "cross-cutting" refers to any relevant measure that includes general populations of patients (including "patients with cancer" generally) in its denominator. See Table 2 for a summary of the findings. See *Appendix H: Representative Accountable Care Measure Sets* for a full list of each program's or model's measures:

Table 2. Cancer Measures in Representative Accountable Care Measure Sets

	Number of Measures				
Cancer Type	**MIPS**	**CMS ACO**	**OCM**	**PCHQR**	**UHC**
Breast	10	1	3	1	1†
Chronic Myelogenous Leukemia	-	-	-	-	-
Colon	8	1	1	1	1†
Kidney	-	-	-	-	-
Melanoma	3	-	-	-	-
Non-Hodgkin Lymphoma	-	-	-	-	-
Non-Small Cell Lung Cancer	2*	-	-	-	1*,†
Ovarian	-	-	-	-	-
Pancreatic	-	-	-	-	-
Prostate	3	-	1	3	-
Cross-Cutting	9	-	7	12	4‡

* General lung cancer diagnoses, including both small cell and non-small cell

† Includes four measures (total cost of care, ER visit rates, hospitalization rates, and drug costs) for each cancer episode

‡ Includes an aggregate 17-component composite measure

Measures in common use across two or more of the accountable care measure sets examined are detailed in Table 3.

Table 3. Commonly Used Cancer Measures in Accountable Care

NQF ID	Measure Title	Program Use
Breast		
0559*	Timeliness of Combination Chemotherapy for Hormone Receptor Negative Breast Cancer	OCM and PCHQR
1858*	Trastuzumab Received by Patients with AJCC Stage I (T1c) to III HER2/neu-Positive Breast Cancer	MIPS and OCM
2372	Breast Cancer Screening	MIPS and CMS ACO
Colon		
0034	Colorectal Cancer Screening	MIPS and CMS ACO
0223*	Timeliness of Adjuvant Chemotherapy for Colon Cancer	OCM and PCQHR
Prostate		
0389*	Avoidance of Overuse of Bone Scan for Staging Low-Risk Prostate Cancer Patients	MIPS and PCHQR
0390	Adjuvant Hormonal Therapy for High-Risk Beneficiaries	MIPS, OCM, and PCHQR
Cross-Cutting		
0382	Radiation Dose Limits to Normal Tissues	MIPS and PCHQR
0383	Plan of Care for Pain–Medical Oncology and Radiation Oncology	MIPS, OCM, and PCHQR
0384*	Plan of Care for Pain–Pain Intensity Quantified	MIPS, OCM, and PCHQR
0418	Screening for Clinical Depression and Follow-Up Plan	CMS ACO† and OCM

* CQMC Medical Oncology Core Measure

† Use in the CMS ACO models reflects denominators that include patients without cancer diagnoses

Condition-Specific Oncology Measures

Through application of the logic model, we derived cancer-type-specific results detailing the measures in the representative measure sets that assess recommended services to achieve treatment goals, as well as the general availability of measures not in the measure sets that could be used to fill gaps in those sets.

The cancer-specific summaries below are organized alphabetically by condition, with the first section of each summary providing an overview of the condition, care priorities from the reviewed guidelines, and details on unique or key treatment modalities. The second section of each summary provides discussion of the identified measure opportunities derived through our review of the guidelines, available measures specific to each opportunity and their use in accountable care measure sets, and remaining measure gaps (i.e., areas where measures are not in use in accountable care measure sets or have not been developed). Evidence supporting the measure opportunity refers to page numbers in the NCCN Guidelines® referenced. For a more detailed list of available identified quality measures for each condition-specific opportunity identified, see *Appendix K: Available Condition-Specific Quality Measures Aligned with Measure Opportunities.*

In parallel to these sections, call-out boxes provide cancer-specific statistics, as well as a qualitative assessment of measure availability (low, moderate, high, or none) relative to other conditions for the following categories: (1) number of condition-specific measures in use in accountable care measure sets, (2) number of available condition-specific measures that are not in use in accountable care measure sets, (3) number of outcome measures included in the identified available measures, and (4) number of remaining gaps where measures are not yet available. While this assessment provides a frame for understanding available measures, use of measures, and measure development priorities, we acknowledge that the adequacy of the measures may vary depending on the condition. For example, while a "low" number of outcome measures indicates that there were a small number of these types of measures identified for the condition, it does not necessarily indicate that these measures are insufficient for comprehensively measuring condition-specific outcomes.

Breast Cancer

Overview

Breast cancer is the most frequently diagnosed cancer globally and is the leading cause of cancer-related death in women. Clinicians divide breast cancer into four categories:

- Pure noninvasive carcinomas, which include lobular carcinoma in situ and ductal carcinoma in situ (Stage 0);
- Operable, locoregional invasive carcinoma with or without noninvasive carcinoma (clinical Stage I, Stage II, and some Stage IIIA tumors);

Breast Cancer Statistics[21]

- **Estimated New Cases (2016): 246,660**
- **% of New Cancer Cases: 14.6%**
- **Estimated Deaths (2016): 40,450**
- **% of All Cancer Deaths: 6.8%**
- **% Diagnosed During Lifetime: 12.4%**
- **Living with Breast Cancer (U.S.): 3,053,450**

- Inoperable locoregional invasive carcinoma with or without associated noninvasive carcinoma (clinical Stage IIIB, Stage IIIC, and some Stage IIIA tumors); and
- Metastatic (Stage IV) or recurrent carcinoma.

Number of Available Measures

- **Direct Oncology VBP: High**
- **Other Available: High**
- **Outcome: None**
- **Remaining Gaps: Low**

Breast cancer management depends on the stage of the cancer and various risk factors, including age and prognosis. Treatment most typically involves surgery, which may be followed by chemotherapy, radiation therapy, or both. Some breast cancers require estrogen to continue growing, identified by the presence of estrogen and progesterone hormone receptors (ER/PR), and may be treated with hormone blocking therapy. Monoclonal antibodies, most notably for HER2 cell receptors, or other immune-modulating treatments may be administered in advanced stage or metastatic breast cancer.

Measure Findings

Breast cancer has been a priority focus of oncology measure development based on its prevalence and impact. Numerous measures are in use in accountable care measure sets, particularly appropriate testing for, and use of monoclonal antibody treatment for, HER2 receptor-positive breast cancer. Based on our guideline review, we identified the following priority measurement opportunities that existing measures currently address to varying degrees:

Measures Available

Measure Opportunity	Evidence[22]	Available Measure(s)	Program Use
HER2 Testing	MS-4 MS-24	■ NQF 1855 ■ NQF 1878 ■ QOPI® 54	■ MIPS ■ PQRS
Diagnostic and Surveillance Mammography	MS-6 MS-7 MS-11	■ NQF 0623 ■ NQMC 009623	N/A
Combination Chemotherapy for Hormone Receptor-Negative Cancer	MS-33 MS-34	■ NQF 0559 ■ CoC MAC	■ OCM ■ PCHQR
Use of Tamoxifen or Aromatase Inhibitors for ER-Positive Cancer	MS-11	■ NQF 0220 ■ NQF 0387 ■ NQMC 007413 ■ QOPI 58 ■ QOPI 59 ■ QOPI 60	■ OCM ■ PCHQR ■ PQRS

Measure Opportunity	Evidence[22]	Available Measure(s)	Program Use
Use of Appropriate Axillary Lymph Node Dissection	MS-16 MS-17 MS-46	■ NQF 0222 ■ NQMC 007407 ■ NQMC 007411 ■ NQMC 007412	N/A
Use of Appropriate Radiation Therapy Following Surgery	MS-19 MS-20	■ NQF 0219 ■ NQMC 007408 ■ CoC BCSRT ■ CoC MASTRT	N/A
Use of HER2-Targeted Therapy	MS-36 – MS-38	■ NQF 1857 ■ NQF 1858 ■ NQMC 007415 ■ QOPI 55 ■ QOPI 56(a) ■ QOPI 57	N/A

Of the high-evidence priorities for breast cancer treatment, we noted few opportunities that were not addressed by existing measures. Among the remaining priorities, immunohistochemistry (IHC) testing for ER/PR tumor status may be a lower priority for payers and physicians, as this process is a high priority for directing treatment in practice.[23] Use of radiation boost in whole-breast radiation is controversial, lacking consensus on its utility in improving care compared with other identified priorities.

Measure Gaps

Measure Opportunity	Evidence[22]
Use of IHC Testing to Determine ER/PR Tumor Status	MS-3 MS-4 MS-45
Use of Radiation Boost to the Tumor Bed in Whole-Breast Radiation	MS-8 MS-14 MS-17

Chronic Myelogenous Leukemia (CML)

Overview

Chronic Myelogenous Leukemia (CML) is a cancer of the white blood cells that is characterized by proliferation of myeloid cells in the bone marrow and accumulation of these cells in the blood. There is no standard staging system for leukemia. CML is divided into three phases based on clinical characteristics and laboratory findings:

- Chronic phase,
- Accelerated phase, and
- Blast phase.

While bone marrow transplant or allogeneic stem cell transplant is the only curative treatment, there are other treatment approaches for CML, including treatment with tyrosine kinase inhibitors (TKIs), myelosuppressive or leukaphresis therapy, splenectomy, and interferon alfa-2b treatment. The development of TKIs has dramatically improved survival rates and outcomes for newly diagnosed CML patients. Bone marrow cytogenetics and quantitative polymerase chain reaction (QPCR) testing are used to monitor response to TKI therapy. Point mutations in kinase domains are mechanisms of resistance for certain TKI therapy, and analyses should be conducted to direct treatment.

CML Statistics[24,25]

- Estimated New Cases (2016): **8,220**
- % of New Cancer Cases: **0.5%**
- Estimated Deaths (2016): **1,070**
- % of All Cancer Deaths: **0.2%**
- % Diagnosed During Lifetime: **0.2%**
- Living with CML (U.S.): **70,000**

Number of Available Measures

- Direct Oncology VBP: **None**
- Other Available: **Low**
- Outcome: **None**
- Remaining Gaps: **High**

Measure Findings

CML has not been a focus of measure development or use in accountable care measure sets, likely due to its relatively low prevalence and the standardized treatment pathway focused on appropriate use of TKI therapy. The only measure identified with potential applicability for CML is a process measure assessing appropriate baseline cytogenetic testing performed on bone marrow, though this measure is specified for myelodysplastic syndrome, which is not inclusive of CML diagnoses.

Measures Available

Measure Opportunity	Evidence[26]	Available Measure(s)	Program Use
Use and Timing of Bone Marrow Cytogenetics	MS-17	■ NQF 0377	■ MIPS ■ PQRS

Based on the evidence, measurement of CML could include process measures promoting appropriate monitoring and testing using standardized approaches, such as QPCR or mutational analyses, to assess effectiveness of TKI use and potential resistance that may redirect TKI selection. While initiation of appropriate TKI therapy is an important process of care, adherence is also important, particularly where treatment may cause challenging toxicity-related side effects. Potential outcome measures establishing response to treatment could be important for determining whether a provider's approach to care has been effective.

Measure Gaps

Measure Opportunity	Evidence[26]
Use and Timing of QPCR	MS-17 MS-21 MS-22
Initiation of TKI Therapy for Patients with Chronic Phase CML	MS-18 MS-19 MS-39
Use of Mutational Analyses to Guide Treatment	MS-30 MS-33
Selection of ALL-Type or AML-Type Chemotherapy for Lymphoid or Myeloid Type Blast Phase CML	MS-40 MS-41
Achievement of Complete Cytogenetic Response	MS-19 MS-20
Achievement of Molecular Response	MS-21 MS-22

Overview

Colon cancer is the development of cancer in the large intestine. It is the fourth most frequently diagnosed cancer and the second leading cause of cancer death in the U.S. Colon cancer is staged according to tumor (T), node (N), and metastasis (M) classifications, with the following groupings:

- Stage 0, or cancer in situ;
- Stage I, where cancer has invaded the muscular layer of the colon;
- Stages IIA, IIB, and IIC, where cancer has grown past the wall of the colon but has not reached the lymph nodes;
- Stages IIIA, IIIB, and IIIC, where cancer has grown past the wall and into lymph nodes but has not spread to other parts of the body; and
- Stages IVA and IVB, where cancer has spread to other parts of the body.

Colorectal Cancer Statistics[27]

- Estimated New Cases (2016): **134,490**
- % of New Cancer Cases: **8.0%**
- Estimated Deaths (2016): **49,190**
- % of All Cancer Deaths: **8.3%**
- % Diagnosed During Lifetime: **4.4%**
- Living with Colon Cancer (U.S.): **1,177,556**

Number of Available Measures

- Direct Oncology VBP: **Moderate**
- Other Available: **Moderate**
- Outcome: **None**
- Remaining Gaps: **Low**

Treatment of colon cancer may include surgery, radiation therapy, chemotherapy, and targeted therapy, such as angiogenesis inhibitors and epidermal growth factor receptor (EGFR) inhibitors. Selection of treatment methods may depend on whether the cancer is curable (in early-stage disease) or not curable (in late-stage metastatic disease), when the focus shifts toward symptom control and improving quality of life.

Measure Findings

There are a significant number of measures used to assess colon cancer treatment. Measures in use in accountable care measure sets focus on use and timing of colonoscopy following treatment and appropriate use of adjuvant chemotherapy in later-stage cancer. Other measures promote appropriate selection and use of targeted therapies and genotyping to direct treatment, as well as carcinoembryonic antigen (CEA) testing and lymph node assessments. A draft measure proposed by NCQA assesses adherence to NCCN Guidelines for treatment of late-stage metastatic colon cancer.

Measures Available

Measure Opportunity	Evidence[28]	Available Measure(s)	Program Use
Avoiding Concurrent Use of Anti-EGFR and Anti-Vascular Endothelial Growth Factor (VEGF) Agents	MS-32	■ NQF 1859 ■ NQF 1860 ■ QOPI 74 ■ QOPI 75(a)	N/A
Minimum Assessment of 12 Lymph Nodes	MS-6	■ NQF 0225 ■ QOPI 70 ■ CoC 12RLN	N/A
Use and Timing of CEA Determination Testing	MS-10 MS-55 – MS-57	■ QOPI 66	N/A
Use of Adjuvant Chemotherapy in Appropriate Stage III or Otherwise High-Risk Patients	MS-12	■ NQF 0223 ■ NQF 0385 ■ QOPI 67 ■ QOPI 68 ■ QOPI 72 ■ CoC ACT ■ CoC RECRTCT	■ OCM ■ PQRS ■ PCHQR
Use and Timing of Colonoscopy	MS-10 MS-55 MS-56	■ NQF 0572 ■ NQF 0659 ■ QOPI 73	■ MIPS ■ PQRS
Use of *KRAS/NRAS* and *BRAF* Genotyping of Tumor Tissue in All Patients with Metastatic Disease	MS-39 MS-40 MS-42	■ NQF 1859 ■ QOPI 65(a-c) ■ QOPI 74	N/A
Use of Systemic Chemotherapy for Advanced or Metastatic Disease	MS-28	■ NCQA Colon	N/A

There is a lack of measures assessing appropriate initiation of surgical procedures for resecting the colon as a preliminary step in localized early-stage cancer. Further, guidelines recommend IHC testing to help direct testing for Lynch syndrome, or hereditary nonpolyposis colorectal cancer, a genetic condition and cancer syndrome that signifies increased risk for colon and other cancers. Microsatellite instability testing is an important process that should be performed to guide selection of chemotherapy regimens in Stage II colon cancer.

Measure Gaps

Measure Opportunity	Evidence[28]
Use of Colectomy and En Bloc Removal of Lymph Nodes	MS-10
Use of IHC Testing to Determine Necessity of Testing for Lynch Syndrome	MS-3 MS-4
Use of MSI or DNA MMR Testing in Patients with Stage II Disease to Guide Adjuvant Therapy	MS-14 MS-15

Kidney Cancer

Overview

The two most common types of kidney, or renal, cancer are renal cell carcinoma (typically originating in the renal tubule) and transitional cell carcinoma (typically originating in the renal pelvis). Kidney cancer may be grouped into the following stages:

- Stage I, where the tumor is 7 cm or smaller;
- Stage II, where the tumor is larger than 7 cm;
- Stage III, where the tumor has grown into one of the veins and there may be cancer cells in a lymph node; and
- Stage IV, where the cancer has spread to other parts of the body.

Kidney cancer treatment commonly begins with surgery, most often a partial or radical (complete) nephrectomy, as kidney cancer may not respond well to chemotherapy or radiotherapy. Biologic therapies or immunotherapy, including interferon and interleukin-2, may be successful modalities in some cases. Adjuvant use of small-molecule, multi-targeted receptor TKIs, such as sunitinib and pazopanib, may also be indicated.

Kidney Cancer Statistics[29]

- **Estimated New Cases (2016): 62,700**
- **% of New Cancer Cases: 3.7%**
- **Estimated Deaths (2016): 14,240**
- **% of All Cancer Deaths: 2.4%**
- **% Diagnosed During Lifetime: 1.6%**
- **Living with Kidney Cancer (U.S.): 394,336**

Number of Available Measures

- **Direct Oncology VBP: None**
- **Other Available: None**
- **Outcome: None**
- **Remaining Gaps: High**

Measure Findings

Our review did not identify any available measures developed or in use for kidney cancer. Based on our review of the clinical guidelines and recommendations, we identified and prioritized opportunities for kidney cancer measure development for appropriate imaging in diagnosis; selection of patients for radical or partial nephrectomy, particularly in considering the impact on loss of renal function for patient quality of life; and initiation of lymph node dissection when indicated. While adjuvant or second-line biologic therapy may not be appropriate for all patients, we noted measure opportunities for monitoring toxicity associated with use of pazopanib. Retention of long-term renal function is an important outcome measure to consider, though its use in accountable care should be weighed carefully with the ultimate control a physician or system may have in preventing loss of function.

There are numerous measures of care delivery for patients with chronic kidney disease and end-stage renal disease and use of dialysis, though we viewed those conditions as outside the scope of kidney cancer.

Measure Gaps

Measure Opportunity	Evidence[30]
Appropriate Use of Abdomen and Pelvic CT and Chest Imaging in Initial Kidney Cancer Workup	MS-3
Avoidance of Radical Nephrectomy Where Nephron-Sparing Surgery Can Be Achieved in Stage I (pT1a and pT1b) Patients	MS-4
Use of Radical Nephrectomy in Patients with Stage II and III Tumors	MS-5 MS-6
Regional Lymph Node Dissection for Patients with Palpable or Enlarged Lymph Nodes	MS-4
Monitoring Liver Function Before and After Treatment with Pazopanib	MS-12
Retention of Long-Term Renal Function	MS-3

Overview

Malignant melanoma is a type of cancer that develops from melanocytes, or pigment-containing cells, most often in the skin. Melanoma is grouped into the following stages:

- Stage 0, or melanoma in situ;
- Stage I/II, or invasive melanoma;
- Stage II, or high-risk melanoma;
- Stage III, or melanoma with regional metastasis; and
- Stage IV, or melanoma with distant metastasis.

Clark level and Breslow's depth, which refer to the microscopic depth of tumor invasion, are also important markers for staging.

Melanoma of the Skin Statistics[31]

- Estimated New Cases (2016): **76,380**
- % of New Cancer Cases: **4.5%**
- Estimated Deaths (2016): **10,130**
- % of All Cancer Deaths: **1.7%**
- % Diagnosed During Lifetime: **2.1%**
- Living with Melanoma (U.S.): **1,034,460**

Number of Available Measures

- Direct Oncology VBP: **Low**
- Other Available: **Low**
- Outcome: **None**
- Remaining Gaps: **Moderate**

Melanoma is often confirmed through skin biopsy, which may be followed by a wider excision of the scar or tissue to clear margins, which often cures early-stage disease. Sentinel lymph node biopsy, or the identification, removal, and analysis of the first nodes draining a cancer, may be performed to reduce complications of lymph node surgery while allowing for lymph node assessments.

Chemotherapy, immunotherapy, and radiation therapy may be indicated in addition to surgery. Therapies for metastatic melanoma include biologic immunotherapy drugs, such as drugs targeting *BRAF*- or *KIT*-mutated disease, though there is no consensus on the optimal approach for treatment in late-stage cancer.

Measure Findings

Available measures for melanoma treatment are focused on coordination and timing of skin examinations and surveillance, as well as surgical-focused measures of lymph node dissection. We note that the surveillance measures, in addition to other measures around coordination of biopsy and pathology result review, are aligned with structural priorities rather than patient-centered treatment priorities.

Measures Available

Measure Opportunity	Evidence[32]	Available Measure(s)	Program Use
Use of Annual Skin Examination and Surveillance for Patients with Melanoma	MS-23	■ NQF 0650	■ MIPS ■ PQRS
Use of Complete Lymph Node Dissection Following Positive SLN	MS-12	■ CoC M05lgLN ■ CoC M10AxLN ■ CoC MCLND	N/A

Though guidelines noted a lack of standardization in selection and use of targeted therapies for late-stage melanoma, possible measure opportunities exist for appropriate testing to direct treatment and for monitoring safety issues associated with use of therapy. Further, while surgery is a preliminary approach for melanoma, there is a lack of outcome measures associated with achievement of clear margins during excision.

Measure Gaps

Measure Opportunity	Evidence[32]
Genetic Mutation Testing and Molecular Screening During Workup for Metastatic Disease	MS-17 MS-18
Appropriate Monitoring for Adverse Outcomes During Use of Targeted Therapy or Immunotherapy	MS-20
Confirm Metastatic Disease with Appropriate Biopsy	MS-7
Use of *BRAF* Inhibition or Combined *BRAF/MEK* Inhibition for Patients with V600 *BRAF* Mutations	MS-20
Achieving Appropriate Surgical Margins for Primary Melanoma Excision	MS-9

Diffuse Large B-Cell (DLBCL) Non-Hodgkin Lymphoma (NHL)

Overview

Non-Hodgkin lymphoma (NHL) is a group of blood cancers that develop from lymphocytes, a type of white blood cell. Diffuse large B-cell lymphoma (DLBCL) is the most common type of NHL among adults, and is a cancer of B cells, lymphocytes responsible for producing antibodies. Generally, NHL cancers can be grouped into the following stages:

- Stage I, where the cancer is in one lymph node region or has invaded one extralymphatic organ or site;
- Stage II, where the cancer is in two or more lymph node regions on the same side of the diaphragm or is involved in a single organ and its regional lymph nodes;
- Stage III, where the cancer is on both sides of the diaphragm; and
- Stage IV, where the cancer has spread throughout the body beyond the lymph nodes.

NHL Statistics[33]

- Estimated New Cases (2016): **72,580**
- % of New Cancer Cases: **4.3%**
- Estimated Deaths (2016): **20,150**
- % of All Cancer Deaths: **3.4%**
- % Diagnosed During Lifetime: **2.1%**
- Living with NHL (U.S.): **569,536**

Number of Available Measures

- Direct Oncology VBP: **None**
- Other Available: **Low**
- Outcome: **None**
- Remaining Gaps: **Moderate**

Treatment for DLBCL most commonly involves chemotherapy plus immunotherapy, with the most common combination regimen being the monoclonal antibody rituximab + cyclophosphamide, doxorubicin, vincristine, and prednisone (R-CHOP). Timing and cycle length of delivery depends on whether the disease is advanced or localized, and on the patient's ability to tolerate therapy. Complications of therapy should be considered, and certain immunizations should be provided in advance of immunotherapy. In some cases, radiation therapy may also be used to treat DLBCL.

Measure Findings

Some measures, focused on biopsy timing and technique, hepatitis B testing prior to immunotherapy use, and use of monoclonal antibody therapy for NHL generally, have been developed but are not in use in accountable care measure sets.

Measures Available

Measure Opportunity	Evidence[34]	Available Measure(s)	Program Use
Use of Ancillary Techniques in Combination with Incisional or Excisional Biopsy	MS-8	■ NQMC 010678	N/A
Use of Hepatitis B Testing and Follow-Up Treatment in Initial Workup	MS-9 MS-11	■ NQMC 010680 ■ QOPI 78a	N/A
Use of Bone Marrow Biopsy Prior to Initiating Treatment	MS-9 MS-10	■ NQMC 010679	N/A
Use of R-CHOP in Stage I-II DLBCL Patients	MS-106	■ QOPI 77a	N/A

While selection and timing of treatment regimens and cycles may be difficult to measure, notable measure gaps include appropriate imaging prior to treatment to potentially direct appropriate chemotherapy selection and monitoring the effects of treatment. Assessing remission of disease through imaging may be an opportunity for outcome measurement, but its use in accountable care should be weighed carefully when considering the lack of control physicians may have over achieving this result.

Measure Gaps

Measure Opportunity	Evidence[34]
Use and Timing of PET or PET-CT Scans in DLBCL	MS-102
Use of MUGA Scan or Echocardiograms for Patients Receiving Anthracyclines and Anthracenedione-Containing Regimens	MS-9
Achievement of Complete Remission Established by Negative PET Scans	MS-107

Non-Small Cell Lung Cancer (NSCLC)

Overview

Non-small cell lung cancer (NSCLC) is a type of epithelial lung cancer that accounts for the majority of lung cancers. Common types of NSCLC are squamous cell carcinoma, large cell carcinoma, and adenocarcinoma. NSCLC is grouped into the following stages:

- Stage 0, where the cancer is in situ;
- Stage IA and IB, where the cancer may be found in the underlying lung tissues but not in the lymph nodes;
- Stage IIA and IIB, where the cancer is localized and has begun to spread to nearby lymph nodes or other nearby structures;
- Stage IIIA and IIIB, where the cancer has spread to the lymph nodes in the center of the chest or other structures outside the lung; and
- Stage IV, where the cancer has spread to the other lung, is found in the fluid around the lung or heart, or has spread to distant lymph nodes or other organs.

Lung Cancer Statistics[35]

- Estimated New Cases (2016): **224,390**
- % of New Cancer Cases: **13.3%**
- Estimated Deaths (2016): **158,080**
- % of All Cancer Deaths: **26.5%**
- % Diagnosed During Lifetime: **6.5%**
- Living with NSCLC (U.S.): **415,707**

Number of Available Measures

- Direct Oncology VBP: **None**
- Other Available: **Moderate**
- Outcome: **None**
- Remaining Gaps: **Moderate**

Surgery is the primary treatment modality for early-stage non-metastatic NSCLC. Highly targeted methods of definitive radiation therapy, including stereotactic body radiation therapy (SBRT), may be appropriate in some stages of lung cancer. Though NSCLC is not very sensitive to chemotherapy, platinum-based chemotherapy drugs, including cisplatin, may be indicated. Genetic markers commonly assessed for NSCLC include EGFR and anaplastic lymphoma kinase (ALK), which, when present, may introduce the need for targeted therapies, including TKIs and ALK inhibitors, such as crizotinib.

Measure Findings

Numerous measures have been developed around initiation of surgery, chemotherapy, and first-line targeted therapies for patients with NSCLC, though no accountable care measure sets currently include these measures in their sets.

Measures Available

Measure Opportunity	Evidence[36]	Available Measure(s)	Program Use
Use of First-Line EGFR Targeted Therapies for Patients with Sensitizing EGFR Mutations	MS-11 MS-12	■ QOPI 85 ■ QOPI 88 ■ QOPI 89 ■ NCQA Lung	N/A
Use of Crizotinib for ALK-Positive NSCLC Patients as First-Line or Subsequent Therapy (If Progressing on First-Line Chemotherapy)	MS-13	■ QOPI 85 ■ NCQA Lung	N/A
Initiation of Appropriate Surgical Resection for Stage I and II Patients	MS-36 MS-37	■ CoC LNoSurg	N/A
Initiation of Adjuvant Chemotherapy for Stage II and III Patients	MS-40	■ QOPI 79 ■ QOPI 80 ■ QOPI 81 ■ QOPI 82 ■ CoC LCT	N/A
Use of Doublet Chemotherapy Regimens in Stage IV Patients Who Are Negative for ALK Rearrangements or Sensitizing EGFR Mutations	MS-45	■ QOPI 85 ■ NCQA Lung	N/A

There is a lack of measures assessing appropriate use of definitive radiation therapy, recommended for some early-stage patients who are medically inoperable or refuse surgery. Other measure gaps identified relate to mediastinoscopy for biopsies, and genetic marker and mutational testing for patients with metastatic disease to guide selection of targeted therapies. Additionally, measure opportunities exist for use of immunotherapy checkpoint inhibitors in late-stage disease.

Measure Gaps

Measure Opportunity	Evidence[36]
Use of Mediastinoscopy to Assess Mediastinal Nodes	MS-34
Use of Definitive Radiation Therapy for Stage I-IIIA Patients Who Are Medically Inoperable or Refuse Therapy	MS-36
Use of EGFR and ALK Mutational Testing for Metastatic Patients	MS-10 – MS-14
Use of Immune Checkpoint Inhibitors as Subsequent Therapy in Patients with Metastatic Disease	MS-48 – MS-50

Ovarian Cancer

Overview

Ovarian cancer, though low prevalence, accounts for more deaths than any other cancer of the female reproductive system. Ovarian cancer is grouped into the following stages:

- Stage I, where the cancer is completely limited to the ovary;
- Stage II, where the cancer extends to the pelvis, involving one or both ovaries;
- Stage III, where the cancer is found outside the pelvis or in the retroperitoneal lymph nodes, involving one or both ovaries; and
- Stage IV, where the cancer has spread to distant parts of the body.

Ovarian Cancer Statistics[37]

- **Estimated New Cases (2016): 22,280**
- **% of New Cancer Cases: 1.3%**
- **Estimated Deaths (2016): 14,240**
- **% of All Cancer Deaths: 2.4%**
- **% Diagnosed During Lifetime: 1.3%**
- **Living with Ovarian Cancer (U.S.): 195,767**

Number of Available Measures

- **Direct Oncology VBP: None**
- **Other Available: Low**
- **Outcome: None**
- **Remaining Gaps: Moderate**

Treatment for ovarian cancer involves chemotherapy and surgery, and potentially radiotherapy. Surgical procedures may include removal of the ovaries (unilateral or bilateral oophorectomy), Fallopian tubes (salpingectomy), uterus (hysterectomy), or omentum (omentectomy). Platinum-based chemotherapy may be used for treatment and may be delivered in the peritoneal cavity (intraperitoneal, or IP, chemotherapy). Immunotherapy, including anti-angiogenesis agents such as bevacizumab, may be used for patients with late-stage cancer, along with chemotherapy. Other targeted therapies, such as olaparib, may be appropriate for patients with certain mutations present.

Measure Findings

The few measures developed for assessing quality in ovarian cancer treatment are focused on appropriate imaging during diagnosis, conducting appropriate early- to late-stage surgery, and initiating appropriate IP chemotherapy regimens. No accountable care measure sets currently include ovarian cancer measures.

Measures Available

Measure Opportunity	Evidence[38]	Available Measure(s)	Program Use
Appropriate Ultrasound and/or Abdominal/ Pelvic CT During Workup	MS-6	■ NQMC 010213	N/A
Use of Appropriate Surgical Staging/ Cytoreductive Surgery	MS-8	■ CoC OVSAL	N/A
Use of IP Chemotherapy Regimens for Appropriate Stage III Patients	MS-11 MS-12	■ QOPI 92 ■ QOPI 93	N/A

Possible priority gaps in ovarian cancer measurement include safety monitoring processes for patients receiving IP chemotherapy, which may lead to renal toxicity. Measurement for appropriate testing for BRCA germline mutations may be a priority, particularly where it helps direct selection of poly(ADP-ribose) polymerase inhibitors, including olaparib, which is a recommended recurrence therapy for certain late-stage patients.

Measure Gaps

Measure Opportunity	Evidence[38]
Monitoring and Prevention of Renal Toxicity for Patients Treated with IP Chemotherapy	MS-12
Use of Genetic Testing to Identify Patients with Germline BRCA Mutations	MS-20
Use of Olaparib as Recurrence Therapy for Advanced Ovarian Cancer with Germline BRCA and 3 or More Lines of Chemotherapy	MS-20

Overview

The most common types of pancreatic cancers are adenocarcinomas, which start within the part of the pancreas that produces digestive enzymes. Pancreatic cancer is the fourth most common cause of death from cancer in the U.S. Many doctors use a simple staging system to divide pancreatic tumors:

- Resectable, where the entire tumor can be removed surgically;
- Borderline resectable, where the cancer has reached nearby blood vessels but can still be removed completely with surgery;
- Locally advanced unresectable, where the cancer has not yet spread to distant organs but cannot be removed completely with surgery; and
- Metastatic unresectable, where the cancer has spread to distant organs.

Pancreatic Cancer Statistics[39]

- Estimated New Cases (2016): **53,070**
- % of New Cancer Cases: **3.1%**
- Estimated Deaths (2016): **41,780**
- % of All Cancer Deaths: **7%**
- % Diagnosed During Lifetime: **1.5%**
- Living with Pancreatic Cancer (U.S.): **49,620**

Number of Available Measures

- Direct Oncology VBP: **None**
- Other Available: **Moderate**
- Outcome: **None**
- Remaining Gaps: **Moderate**

Surgery is a primary focus of pancreatic cancer treatment as it is the only cure, though surgery with the intention of a cure is only possible in 20% of new cases. The location, how much the cancer has spread, and the general health of the patient may all be factors in determining the feasibility of surgery. Multiple methods of surgery are in place, including Whipple procedures and distal pancreatectomy. Other surgery may be performed for palliative care reasons (i.e., to reduce complications of cancer without curative intent). Chemotherapy or radiotherapy may be used in a neoadjuvant or adjuvant setting with surgery, or in a palliative setting.

Measure Findings

There are a number of available structural and process-oriented quality measures for pancreatic cancer care developed by the ACS, though none of the developed measures are in use in accountable care measure sets. For the prioritized measure opportunities identified through guideline review, there are numerous applicable measures, including measures focused on appropriate use of imaging to guide surgical assessments in the workup stage of treatment (referred to as the "pancreatic protocol"), selection of surgical candidates, and initiation of adjuvant or systemic therapy in certain patients.

Measures Available

Measure Opportunity	Evidence[40]	Available Measure(s)	Program Use
Use of CT Imaging Performed According to a Dedicated Pancreas Protocol	MS-7	■ NQMC 006373	N/A
Initiation of Systemic Therapy in Patients with Metastatic Disease or Locally Advanced Disease	MS-25 MS-26	■ NQMC 006389 ■ NQMC 006390	N/A
Selection of Surgical Candidates and Initiation of Resection with Curative Intent for Resectable and Borderline Resectable Cancers	MS-27	■ NQMC 006386 ■ NQMC 006388 ■ NQMC 006390 ■ NQMC 006399	N/A
Initiation and Timing of Adjuvant Therapy Following Resection	MS-36 MS-37	■ NQMC 006380 ■ NQMC 006383 ■ NQMC 006387	N/A

Of the remaining prioritized opportunities, gaps exist around appropriate use of biopsy to guide use and selection of neoadjuvant therapy, or for staging late-stage tumors; measuring CA 19-9 levels, which reflect the scope of pancreatic tumor cells in the blood and can be used to judge effectiveness of treatment; and use of appropriate biliary decompression in certain patients with jaundice who are receiving neoadjuvant therapy.

Measure Gaps

Measure Opportunity	Evidence[40]
Use of Biopsy Prior to Administration of Neoadjuvant Therapy or for Staging of Locally Advanced Unresectable Cancer or Metastatic Disease	MS-10
Use and Timing of Serum CA 19-9 Level Measurement	MS-12 MS-13 MS-40
Use of Biliary Decompression for Patients with Jaundice Undergoing Neoadjuvant Induction Therapy Before Resection	MS-32

Overview

Prostate cancer is a cancer of a gland in the male reproductive system. Prostate cancers can be grouped into the following stages:

- Stage I, where the cancer is still within the prostate and has not spread to nearby lymph nodes or elsewhere in the body, and prostate-specific antigen (PSA) levels are less than 10;
- Stage IIA and IIB, where the cancer has not spread to nearby lymph nodes or elsewhere in the body, and PSA levels or Gleason scores, which are based on microscopic features of the prostate tissue, may be higher;
- Stage III, where the cancer has grown outside the prostate and may have spread to the seminal vesicles, but has not spread to nearby lymph nodes or elsewhere in the body; and
- Stage IV, where the cancer has grown into tissues near the prostate and may have spread to nearby lymph nodes or more distant sites in the body.

Prostate Cancer Statistics[41]

- Estimated New Cases (2016): **180,890**
- % of New Cancer Cases: **10.7%**
- Estimated Deaths (2016): **26,120**
- % of All Cancer Deaths: **4.4%**
- % Diagnosed During Lifetime: **12.9%**
- Living with Prostate Cancer (U.S.): **2,850,139**

Number of Available Measures

- Direct Oncology VBP: **Moderate**
- Other Available: **Low**
- Outcome: **None**
- Remaining Gaps: **Moderate**

Management of prostate cancer may include surgery, radiation therapy–which includes brachytherapy, in which radioactive particles are implanted into the tumor site, and external beam therapy–hormonal therapy, chemotherapy, and other modalities. Androgen deprivation therapy (ADT), a method of hormonal therapy, blocks prostate cancer cells from accessing hormones that allow them to grow. Some prostate cancers may become castrate-resistant when the cancer spreads to other parts of the body, and ADT may no longer be effective. Nomograms may help predict the probability that more aggressive prostate cancer will spread, and inform treatment selection.

Though cancer screening was outside the scope of our review, we note that prostate cancer screening, including PSA testing, is controversial, as prostate cancer often grows slowly and testing may lead to over-diagnosis and over-treatment for patients who otherwise would not experience symptoms of the cancer. For this reason, active surveillance, or watchful waiting, may be a viable alternative to treatment.

Measure Findings

Prostate cancer measures in use in accountable care sets focus on appropriate imaging associated with low-risk prostate cancer (avoiding overuse) and initiation of appropriate ADT in late-stage cancer. There are also measures available, but not in use, for risk-scoring for patients with prostate cancer. While relatively few measures are available, they are well represented in accountable care sets, appearing in the physician and hospital reporting programs (MIPS, PQRS, and PCHQR) and the final OCM measure set.

Measures Available

Measure Opportunity	Evidence[42]	Available Measure(s)	Program Use
Appropriate Risk Scoring/Life Expectancy Estimate/Nomogram Use During Workup	MS-2 – MS-4	■ NQMC 010099 ■ NQMC 010100	N/A
Overuse of PSA-Based Screening	MS-2	■ NQMC 010933	N/A
Use/Overuse of Bone Scan/Pelvic CT or MRI for Select Patients	MS-28	■ NQF 0389	■ MIPS ■ PQRS ■ PCHQR
Use of Androgen Deprivation Therapy (ADT) for Metastatic Disease	MS-19 MS-30	■ NQF 0390	■ MIPS ■ OCM ■ PQRS ■ PCHQR

Gaps in available measures for prostate cancer include measures that promote watchful waiting, or active surveillance, for low-risk tumors, as well as initiation of image-guided radiation therapy to treat tumors. Because castration-resistant prostate cancer (CRPC) may ultimately impact the effectiveness of selected treatment, it may be important to measure providers' assessment of these results. Finally, prostate cancer treatment may create complications that impact quality of life, such as interference with sexual function and continence, and there is a lack of measures assessing these outcomes.

Measure Gaps

Measure Opportunity	Evidence[42]
Use and Timing of Active Surveillance for Appropriate Patients	MS-8 MS-9 MS-28
Use of Image-Guided Radiation Therapy for 3D-CRT or IMRT	MS-13
Monitoring Progression to CRPC During ADT	MS-35
Rate of Adverse Morbidity Following Radical Prostatectomy	MS-12

Cross-Cutting Oncology Measures

Overview

Care for patients with cancer is complex, as individual needs and preferences for treatment vary within individual types of cancer. For example, care for a patient with breast cancer depends on not only the stage of the cancer but also the specific characteristics of the tumor, the patient's tolerance of certain treatment approaches, and the patient's goals and preferences for care. An increasing number of treatment-specific variables introduce challenges into defining quality measure cohorts that can be assessed meaningfully. For example, the number of patients attributable to a given provider that have individual characteristics warranting a standardized and measureable treatment may be too small to determine how well the clinician performed. Further, as the number of innovative therapies developed to treat specific tumor types expands, opportunities for process-related condition-specific measures increase. Pursuing measure development for all possible opportunities would result in potentially burdensome data collection and reporting requirements for providers.

While condition-specific appropriate care is an essential part of treatment, the heterogeneity of cancer and cancer care points toward reduced reliance on condition-specific measures in accountable care models and inclusion of cross-cutting measures that more broadly assess performance across cancer populations. Cross-cutting measures, as defined by CMS, are "broadly applicable across multiple clinical settings and providers within a variety of specialties."[43] In the context of this white paper, condition-specific measures include patients who all have the same type of cancer, while cross-cutting measures include patients who have different types of cancer, or both patients who have cancer and patients who have other conditions.

Priorities for Cross-Cutting Measure Use and Development

Under Step 6 of our logic model (see *Methods*), we assessed measurement opportunities for cancer care that apply to two or more of the condition-specific guidelines reviewed. Further, we identified and assessed clinical guidelines that apply generally to oncology care (e.g., cancer pain, antiemesis, cancer-related fatigue) to identify treatment priorities that indicate measurement opportunities. See *Appendix I: Oncology-Specific Clinical Guidelines* for a full list of cross-cutting guidelines. Based on these assessments, we generated a list of measurement opportunities organized by important domains (e.g., care coordination, safety, palliative care). See *Appendix L: Initial Cross-Cutting Measure Opportunity Findings* for a high-level summary of the opportunities identified.

After the initial cross-cutting opportunities were identified, we shared the results with the members of the multi-stakeholder Roundtable and requested feedback on the findings. The group discussed priorities for enhancing existing measures and developing new measures for use in accountable care. Prioritization was based primarily on importance from patient, provider, payer, and purchaser perspectives, and feasibility in terms of data collection and analysis.

The following section provides a review of the cross-cutting measurement opportunities that the Roundtable identified as priorities. The discussion is organized by type of measure (e.g., outcome, process, structural). Within each category of priority cross-cutting measurement opportunity, we also identify available measures that align with that opportunity. Further, we note important measure gaps, such as where existing measures are or are not currently in use in accountable care programs, and where no available measures were identified.

Patient-Reported Outcome Measures

Roundtable participants emphasized the need for PROs that reflect patients' individualized needs or preferences, understanding, and experience of care. These PROs should be collected before, during, and after treatment. These measures include data collection via PROMs and assessment of change in outcomes via PRO-PMs. Three priority areas within PRO measurement were identified:

- **Care Planning and Assessment of Treatment Goal Attainment**–Patients with cancer are a heterogeneous population with unique needs, depending on diagnosis, tumor type, mutational status, and preferences for treatment alternatives that may negatively affect function or quality of life (e.g., pain, nausea and vomiting, breathlessness, fatigue, psychosocial health, financial toxicity). Patient-reported measures of the adequacy of care planning should assess: (1) whether shared decision-making, or discussion about patient preferences for treatment goals, occurred; and (2) whether treatment goals are met over time.

- **Provider Communication and Patient Understanding**–Communication and patient understanding of their diagnosis and effects of treatment at pivot points should be focus areas for PRO development. These pivot points include: (1) the point of diagnosis, (2) the point of cancer recurrence, and (3) the point when current treatment is no longer effective. Miscommunication from providers (e.g., whether the patient understood the implications of curative versus non-curative treatment) could result in long-term quality-of-life consequences. Patient-reported measures should be developed to evaluate whether patients understand their diagnosis and the goals of care based on effective provider communication.

- **Patient Functional Status and Symptom Management***–Patient functional status has been a focus of PRO measurement among non-cancer conditions. The Roundtable participants emphasized key issues of cancer symptom management related to disease and treatment that should be measured: pain, nausea and vomiting, breathlessness, and fatigue. The group noted that monitoring and treatment of these symptoms may vary depending on the patient's preference. For example, a patient may understand based on discussions with his or her physician that a selected chemotherapy treatment will likely cause nausea or vomiting. The patient may decide that the benefits of treatment, such as longer survival, outweigh these negative short-term effects. In this scenario, it would not be reasonable to measure a provider's performance against avoiding nausea and vomiting, as that would not align with the patient's understanding and treatment goals unless survival was weighted more heavily. Additionally, PROs must effectively assess the impact of treatment on non-clinical lifestyle issues. This may include patients' ability to return to work after treatment and how effectively they are able to do their job, which is also of particular interest to employers and health care purchasers. The Roundtable suggested that a suite of measures applicable to specific elements of symptom management could be defined and applied at the provider level, based on and weighted against the individual patient's preferences. An aggregate PRO measure of patient response to symptom management could be assessed for the provider's patient panel.

Our measure scan identified limited available measures that aligned with patient-reported data collection and outcome reporting for oncology, beyond the identified pain quantification and depression assessment and remission measures described earlier in this white paper (see Table 4). Of particular note, we identified measures developed by the Oncology Nursing Society (ONS) that promote symptom assessment, improvement, and goal setting. Further, NCQA, with support from the Center for American Progress

* Of note, the original OCM Request for Applications included a quality measure assessing the percentage of beneficiaries assessed by an approved PRO data collection tool, including data for anxiety, depression, fatigue, pain interference, and physical function. The proposed measure was not included in the final OCM measure set.

and the California Health Care Foundation, developed a measure to assess patient-reported symptoms during chemotherapy treatment.[44] This is a process-oriented measure, and it does not assess change in the degree of symptom control over time. Finally, the OCM includes a variation of the recently developed Cancer Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey measure for patient-reported experience of care. This patient experience of care measure includes five components: Overall Rating, Affective Communication Composite, Enabling Self-Management Composite, Exchanging Information Composite, and Access Composite. A sixth component, Shared Decision-Making, is reported but not scored for OCM practices.[45]

Table 4. Identified Patient-Reported Outcome Measures

Measure ID	Title	Steward	Program Use
ONSQIR 1	Symptom Assessment	ONS	N/A*
ONSQIR 2	Intervention for Psychosocial Distress	ONS	N/A*
ONSQIR 3	Intervention for Fatigue	ONS	N/A*
ONSQIR 4	Intervention for Sleep-Wake Disturbance	ONS	N/A*
ONSQIR 5	Assessment for Chemotherapy-Induced Nausea and Vomiting	ONS	N/A*
ONSQIR 7	Post-Treatment Symptom Assessment (Breast Cancer Only)	ONS	N/A*
ONSQIR 8	Post-Treatment Symptom Intervention (Breast Cancer Only)	ONS	N/A*
ONSQIR 10	Post-Treatment Goal Setting (Breast Cancer Only)	ONS	N/A*
ONSQIR 11	Post-Treatment Goal Attainment (Breast Cancer Only)	ONS	N/A*
ONSQIR 13	Fatigue Improvement (Breast Cancer Only)	ONS	N/A*
ONSQIR 14	Psychosocial Distress Improvement (Breast Cancer Only)	ONS	N/A*
NCQA PRO	Assessment of Patient-Reported Symptoms During Chemotherapy Treatment	NCQA	N/A†
OCM-6	Patient-Reported Experience of Care	CMS	OCM

* Non-PQRS Qualified Clinical Data Registry (QCDR) reporting measure

† Intended for use in oncology bundled payment delivery system models

Clinical Outcome Measures

The Roundtable prioritized outcome measures that assess effectiveness of important clinical processes, noting that these measures move past "checking the box." The Roundtable raised disease-free and progression-free survival measures as potentially applicable in accountable care, with the caveat that any clinical outcome measure would likely require a relatively long time horizon and robust risk stratification or adjustment methodology to ensure fairness. Roundtable participants also discussed that rate of recurrence, including rates of minimal residual disease in leukemia and other hematologic cancers, is a potentially meaningful measure of successful treatment. While we note the UHC episode payment model for chemotherapy episodes (see *Appendix H: Representative Accountable Care Measure Sets*) includes quality measures for assessing survival and cancer progression, our scan did not identify other available measures for these outcomes (see Table 5).

Roundtable participants cited the International Consortium for Health Outcomes Measurement (ICHOM) standard sets,[46] with their defined priority outcomes for measurement of cancer care, as a potential driver of outcome measure prioritization and action. Specifically, the ICHOM sets include survival and disease control concepts, quality-of-life and end-of-life concepts, and disutility of care concepts (e.g., reoperation, complications of treatment). While these concepts are important for guiding future measurement, the ICHOM sets do not typically include fully specified measures, so are not yet practicable for use in accountability models. Other utilization-based proxies of outcomes measurement currently in use in accountable care measure sets, including rates of hospital admissions and readmissions, ER visits, and appropriate hospice care admissions, are valuable measures that should continue to be used (see Table 5).

Table 5. Identified Clinical Outcome Measures

Measure ID	Title	Steward	Program Use
N/A	Time to First Progression for Relapsed Patients (collected in aggregate)	UHC	UHC
N/A	Survival from Date of Condition Enrollment (Relapsed Patients Only) (collected in aggregate)	UHC	UHC
N/A	ER and Hospitalization Rates	UHC	UHC
N/A	Admissions and ER Visits for Patients Receiving Outpatient Chemotherapy (All Cancer Types Except Leukemia)	CMS	PCHQR
NQF 0211*	Proportion of Patients Who Died from Cancer with More Than One ER Visit in the Last 30 Days of Life	ASCO	MIPS
OCM-1	Risk-Adjusted Proportion of Patients with All-Cause Hospital Admissions Within the 6-Month Episode	CMS	OCM
OCM-2	Risk-Adjusted Proportion of Patients with All-Cause ER Visits That Did Not Result in a Hospital Admission Within the 6-Month Episode (All Cancer Types Except Leukemia)	CMS	OCM
N/A	Admissions for Cancer Symptoms (collected in aggregate)	UHC	UHC
N/A	Admissions for Treatment-Related Symptoms (collected in aggregate)	UHC	UHC
N/A	Hospice Days for Patients Who Died (collected in aggregate)	UHC	UHC
NQF 0213*	Proportion Admitted to the ICU in the Last 30 Days of Life	ASCO	MIPS

Measure ID	Title	Steward	Program Use
NQF 0215*	Proportion Not Admitted to Hospice	ASCO	MIPS
NQF 0216*	Proportion Admitted to Hospice for Less Than 3 Days	ASCO	MIPS
OCM-3	Proportion of Patients Who Died Who Were Admitted to Hospice for 3 Days or More	CMS	OCM

* CQMC Medical Oncology Core Measure

Clinical Treatment Measures

While cancer treatment generally depends on diagnosis, staging, and biomarkers, other important aspects of care may be appropriate for aggregated groups of patients with cancer. The Roundtable prioritized clinical treatment process measures that are closely tied to improved cancer outcomes, including appropriate evidence-based use and timing of chemotherapy delivery. Because drug therapy for late-stage, tumor-specific cancer is shifting toward personalized medicine and use of targeted therapies, hormonal therapies, and immunotherapies, there is limited opportunity for cross-cutting cancer treatment measures. Yet, it is not feasible to measure every care process and outcome because of administrative burden and small numbers of patients.

Roundtable participants identified appropriate chemotherapy use in the final days of life, an available measure, as an appropriate core measure for inclusion in accountable care model measure sets (see Table 6). The group also saw utility in measuring adherence to regimens defined in clinical guidelines or clinical pathways, which define treatment courses for stage-specific cancer diagnoses, as an alternative to measuring numerous condition-specific process measures of appropriate care. Pathways adherence measures could be collected in aggregate across a range of cancer types within a practice. Our measure scan identified two draft measures, recently developed by NCQA, that assess use and adherence to evidence-based recommended regimens defined under the NCCN Guidelines for colon cancer and NSCLC. These measures are intended for use in oncology bundled payment models (see Table 6).

The Roundtable noted adherence to treatment as an important issue for patients with cancer who are receiving oral therapies. Non-adherence to therapy may result in poor therapeutic outcomes and an increase in health care costs where the result is treatment failure. Providers may have limited control over patient adherence, so a measure assessing performance should be carefully considered in the context of accountable care models.

Table 6. Identified Clinical Treatment Measures

Measure ID	Title	Steward	Program Use
NQF 0210*	Proportion Receiving Chemotherapy in the Last 14 Days of Life	ASCO	MIPS
N/A	Days from Last Chemotherapy to Death (collected in aggregate)	UHC	UHC
NCQA Col	Use of Evidence-Based Adjuvant Chemotherapy Regimens for Patients with Stage IIIA through IIIC Colon Cancer	NCQA	N/A†
NCQA Lung	Use of Evidence-Based Systemic Therapy for Patients with Metastatic NSCLC	NCQA	N/A†

* CQMC Medical Oncology Core Measure

† Intended for use in oncology bundled payment delivery system models

Safety Measures

Safety measures are indicators that provide information about potential adverse events, including complications or medical errors, following initiation of therapy or certain procedures. The Roundtable prioritized exploration of oncology safety measures that alert providers and other stakeholders to problems stemming from treatment. These problems may include unexpected treatment toxicity, radiation burns, or other issues of morbidity or mortality. "Never event" measures assess medical errors that should never occur, including events that are unambiguous (clearly identifiable and measurable), serious (resulting in death or significant disability), or usually preventable. In the oncology space, never event measures would be appropriate to assess incorrectly calculated or delivered chemotherapy or radiation, or the absence of pretreatment patient counseling on treatment-related loss of bodily function (e.g., fertility). The use of never event measures, which are counts of events against an absolute threshold of zero, could address small-numbers problems related to the size of measure denominators. Existing measures that assess avoidable utilization of high-cost services (e.g., hospital admissions and ER visits; see Table 5) can be useful early warning signals for monitoring whether safety issues have occurred, but may not detect rare safety issues discussed as possible never events.

Structural Measures

While the Roundtable emphasized the importance of clinically oriented outcome, process, and safety measures, the participants also indicated that structural measures, or measures that assess implementation of organization or practice features related to the capacity to provide high-quality care, play an important role in accountable care models. Oncology providers should be transforming their practices to incorporate essential elements of patient-centered care that allow for more effective care coordination and management. These elements include 24/7 live-voice access; HIT functions, such as interoperability and data sharing with patients and other providers; ability to meet standards for delivery of palliative care services; integration of PRO data collection during care planning; and adherence to clinical pathways.

The Roundtable also discussed scenarios in which rates of patient or treatment volume in care delivery could serve as a proxy indicator of quality. For example, the volume of patients undergoing reoperations could be useful information for patients and health care purchasers searching for efficient, high-quality provider networks. Based on our measure scan, currently available structural measures related to cancer care are limited to the OCM practice requirements, defined in the model's Request for Applications (see Table 7).[47]

Table 7. Identified Structural Measures

Measure ID	Title	Steward	Program Use
N/A	Attestation and Use of Office of the National Coordinator (ONC)-Certified EHRs	CMS	OCM
N/A	Provide and Attest to 24/7 Patient Access to Appropriate Clinicians with Real-Time Access to Medical Records	CMS	OCM
N/A	Treat Patients with Therapies Consistent with Nationally Recognized Clinical Guidelines	CMS	OCM

High-Priority Measure Opportunities

Based on the Roundtable discussion and priorities, we defined a set of high-priority cross-cutting measures and concepts. This set includes: (1) available measures identified and prioritized by the Roundtable, (2) available measures that fit within measure domains prioritized by the Roundtable, and (3) measure concepts that address gaps in priority measurement opportunities identified by the Roundtable. Table 8 provides an overview of these priorities, lists available measures where applicable, and indicates where measures are currently in use in accountable care models.

Table 8. High-Priority Cross-Cutting Measures

Domain	Cross-Cutting Measurement Opportunities and Measures	Program Use
Patient-Reported Outcome (PRO)	Patient-reported health status (pain, symptoms, psychosocial health) ■ NCQA Cancer Symptom PRO ■ Pain Intensity Quantified (NQF #0383) ■ Screening for Clinical Depression (NQF #0418)	✓
	Patient-reported symptom control (nausea, dyspnea, fatigue)	
	Patient-reported participation in defining treatment goals	
	Patient-reported assessment of meeting shared treatment goals	
	Patient-reported change in psychosocial distress/financial toxicity ■ Depression Remission at 12 Months (NQF #0710)	✓
Clinical Outcome	Disease-free/progression-free survival rate	
	Management of residual disease findings (hematologic cancer)	
	Cancer recurrence rate	
	Use of chemotherapy at end of life ■ Proportion Receiving Chemotherapy in Last 14 Days of Life (NQF #0210)	✓
Clinical Treatment	Stage, tumor status, genetic information collected	
	Appropriate chemotherapy dosing (aggregated)	
	Adherence to prescribed oral drug therapy (aggregated)	
	Pre-treatment symptom and fertility preservation counseling	
Safety	Unexpected hospitalization or ER visit rate ■ Admissions and ER Visits for Patients Receiving Outpatient Chemotherapy (PCHQR Measure)	✓
	"Never event" radiation or chemotherapy dosing errors	
	"Never event" failure to provide timely notification of potential treatment-related loss of bodily function or fertility	
Structural	24/7 access to care ■ OCM Requirement	✓
	Adherence to national guidelines or clinical pathways ■ OCM Requirement	✓
	Ability to meet palliative care standards	

Implications

Our findings indicate that, among accountable care measure sets currently in use, there are significant condition-specific gaps in measurement among high-impact cancer types, as well as a lack of meaningful clinical and patient-reported outcome cross-cutting measures. Specifically:

- Measures in use in accountable care sets focus primarily on high-prevalence cancer types (including breast, colorectal, and prostate). None of the representative accountable care sets included any measures assessing quality for CML, kidney, NHL, ovarian, or pancreatic cancers.

- Despite a significant number of cancer-related process measures available in the landscape, numerous gaps remain. Patterns for gaps across cancer types include:
  - Appropriate mutational and biomarker testing,
  - Appropriate imaging utilization in the diagnosis and monitoring of treatment effectiveness and post-treatment surveillance,
  - Initiating and monitoring adherence to appropriate stage-specific targeted or hormonal therapies, and
  - Initiating appropriate stage-specific radiation therapy.

- Accountable care measure sets include several important cross-cutting measures:
  - Pain quantification and treatment planning (MIPS, OCM, and PCHQR);
  - Rates of hospital visits (OCM, PCHQR, and UHC) and ER visits (OCM and UHC);
  - Depression screening (OCM and CMS ACO) and remission (CMS ACO);
  - Radiation dose limits and use of radiotherapy for bone metastases (MIPS and PCHQR); and
  - Survival, disease progression, and remission (UHC).

- Other high-priority cross-cutting gaps remain. Notably, there is a lack of PRO-PMs in use in accountable care sets beyond the requirements to collect data on pain or screen for depression. Further, Medicare measure sets do not currently: (1) require stage- or tumor-specific data collection or (2) include measures of survival or disease recurrence. While pathway use is a structural requirement of OCM, adherence to cancer-specific pathways is not a defined "measure" in any accountable care set.

These findings indicate that there are opportunities to make oncology accountable care measure sets more meaningful by improving: (1) the consistency with which models assess quality for individual cancer types, and (2) the efficiency with which models incorporate a carefully selected set of cross-cutting measures that assess important outcomes for patients and providers.

Based on these opportunities, this white paper offers a set of recommendations for high-level strategies and near-term action steps to improve oncology measurement in accountable care.

Recommendations

Based on the gap analysis and the Roundtable's conclusions about oncology measurement issues and priority measures, we defined the following strategies and near-term action steps to improve oncology quality measurement.

Develop parsimonious sets of oncology measures for various purposes, supplemented by cross-cutting measure development and use

CMS, AHIP, and other stakeholders collaborated through the CQMC to identify a core set of quality measures for cancer care. Payers should continue to seek the input of measure developers on the best use of oncology quality measures for inclusion in core sets, and ensure that core sets are applied consistently in accountable care models to promote measure alignment across programs. As noted by the CQMC, more advanced measures are needed to enhance the initial Medical Oncology Measure Set.[48]

Near-Term Action Steps

- **Payers should refine the CQMC-identified Core Measure Set for Medical Oncology with existing and new cross-cutting measures.**
- **Measure developers should prioritize cross-cutting measurement opportunities identified for development and testing.**

Measure developers, such as ASCO, ASTRO, and NCQA, have done important work to drive oncology measurement forward. To guide their future work, measure developers should focus on the prioritized cross-cutting measure concepts identified by the Roundtable (see Table 8), and seek opportunities to expand and improve these ideas. Stakeholders with a vested interest in improving measures for assessing cancer care quality, including payers, providers, and industry, should prioritize funding for measure development toward cross-cutting patient-reported and clinical outcome measures, and then put the measures into use.

Further understanding of oncology PROM tools and PRO-PMs for use in accountable care

The Roundtable discussed objectives for PRO measurement and recognized that these measures can provide valuable patient-centered information about how treatment goals are understood and whether care reflects patient preferences, which have significant downstream impact on quality of life. However, the participants noted that research is needed to understand the types of PROs that best reflect patient perspectives and the most effective methodology for constructing meaningful and consistent PROMs and PRO-PMs.

Near-Term Action Steps

- **Funders, including government, payers, and industry, should sponsor research about PROMs and data collection tools.**
- **Funders should sponsor measure development of PRO-PMs.**

Specifically, the Roundtable prioritized funding of implementation science for PROs in the context of payment models and standard data collection. This work can build on the efforts of organizations like ICHOM, which has identified key outcomes for select cancer conditions. Funding opportunities for PRO measurement science should be prioritized through agencies such as AHRQ and the Patient-Centered Outcomes Research Institute. Further, industry stakeholders, including pharmaceutical and medical technology manufacturers, should explore opportunities to fund research for best practices in developing PROMs and PRO-PMs for use in performance improvement and accountability. Adopting or piloting innovative, patient-controlled data collection tools could drive faster data collection that could inform research priorities in oncology.

Funders and measure developers should explore opportunities to create and test PRO-PMs through the NQF Measure Incubator™.[49] This collaborative effort seeks to facilitate efficient development and testing of measures for important aspects of care for which PROs are underdeveloped or non-existent. Further, measure developers should identify opportunities to test PRO-PMs through pilot payment reform initiatives that are being implemented by private payers and CMMI. In addition, payers should seek opportunities to incentivize collection and use of PRO tools, particularly tools that support patients in engaging actively in their care management, as use of these tools will lead to improvement in PRO-PM measurement.

Use a layered measurement strategy for oncology accountable care models and dashboards for transparency

Quality measure alignment in accountable care is important for reducing the provider burden of reporting and increasing transparency and comparability of measure results for patients and other stakeholders. Program implementers should use a layered approach to measurement, whereby the measures for different levels of accountability are aligned. The layered approach to measurement was explored in depth by NPC and Discern Health in a previous report assessing specialty care measure gaps.[50]

Near-Term Action Steps

- **Payers should design and incentivize reporting under a layered measurement approach.**
- **Measure dashboards should be developed for reporting aggregate quality results.**

At the provider level, clinicians may report cancer-specific process measures to guide appropriate care and identify opportunities for quality improvement; at the health system level, administrators may use a mix of process, outcome, and cross-cutting measures for a broader view of the system's performance; and at the external accountability level, cross-cutting measures can be used to aggregate outcomes, such as survival, recurrence, and PROs, for cancer populations. Measure dashboards should utilize and aggregate provider- and system-level results, so that accountable care model stakeholders, including health system administrators, payers, and the public, can drill down to compare quality across physicians and systems.

This layered measurement approach using fit-for-purpose oncology measures at various levels would create more efficient accountable care measure sets and significantly reduce the reporting burden for providers. It would also allow for flexibility to create meaningful measurement schemes for system-specific priorities.

Leverage best practices to address methodological issues in model design and measure development

The Health Care Payment Learning & Action Network (HCP-LAN) serves as a platform to advance the transition to VBP. Its efforts have focused on aligning best practices in APM development. Its members and committed partners include a diverse range of providers, payers, and patient advocates. HCP-LAN work groups have developed reports on best practices in patient attribution,[51] financial benchmarking,[52] performance measurement,[53] and data sharing,[54] and the lessons from this work can be applied to oncology measurement.

Near-Term Action Steps

- **Measure developers should leverage best practices from groups such as the HCP-LAN, NQF, and AHRQ to facilitate oncology outcome measure development.**

NQF, a leader in initiatives for enhancing quality measurement in health care, has also worked to develop best practices for key measurement issues, including principles and approaches to attribution[55] and risk adjustment for sociodemographic factors.[56] Payers and measure developers in the oncology space should use these best practices when developing measures and payment incentives to ensure that accountability among potentially fragmented provider silos is not misattributed and that outcomes for cancer populations that may include frail or socioeconomically disadvantaged patients are not misinterpreted.

To address small-numbers issues, developers and implementers should look to strategies explored by AHRQ, including leveraging composite measures, group reporting, potential for combining multiple years of data, and/or combining multi-payer data.[57]

Improve standardization of clinical pathways

Significant effort has been invested in developing and interpreting the effectiveness of oncology treatments to ensure that high-quality care is being delivered. Various organizations, including ASCO,[58,59] ASTRO,[60] and NCCN,[61,62] have developed clinical practice guidelines and value frameworks for the provision of quality cancer care. Because the interpretation of value relies on the collection and review of robust evidence demonstrating effectiveness, these organizations should work toward a collaborative repository of the most up-to-date evidence to facilitate access to and consistent interpretation of the most current data on the effectiveness of treatments.

In addition to these efforts, stakeholders, including payers, have created evidence-based clinical pathways. The Roundtable discussed the potential use of pathway adherence as a quality

Near-Term Action Steps

- **Organizations assessing value in oncology treatment should collaborate to create an accessible repository for timely, high-quality clinical evidence.**
- **Organizations should promote development of a single independent entity to review, standardize, and endorse clinical pathways, based on evidence.**

measure in accountable care. However, the group also noted that there is no single entity developing or reviewing pathways, and individual developers must rely on their own interpretation of the evidence. The Roundtable suggested that an entity independent of payers and provider groups could help to standardize and endorse developed pathways to ensure that pathways are based on the best available evidence and that the methodology is transparent to all stakeholders, including patients.

Pathway adherence measures should be validated by linking their use with real-time quality improvement and data collection tools for oncology, such as ASCO's CancerLinQ,[63] and to data on patient outcomes and other aspects of organizational performance. The tools will offer insights about the effectiveness of pathways and measurement in promoting high-quality cancer care over time.

Accelerate interoperability and functionality of data platforms for quality reporting

Current systems for collecting quality measurement data do not adequately capture the information needed for meaningful PRO or clinical outcome measures. Cancer care providers and their professional societies should work with HIT vendors to drive inclusion of structured inputs in EHRs and other data collection tools by collaborating with one another and with EHR developers and vendors to define a core set of data elements for quality measurement. Government agencies, such as the Office of the National Coordinator for HIT (ONC), should work with the oncology community to create such "use cases" to ensure that the certifications or incentives for health IT vendors focus on the capacity to exchange and use essential data elements.

Near-Term Action Steps

- **Oncology providers and their professional societies should define a core set of essential data elements for quality reporting in EHRs.**
- **ONC and EHR vendors should incorporate standardized data elements in Certified Electronic Health Record Technology (CEHRT).**

Appendices

Appendix A: Accountable Care Measures for High-Cost Specialty Care and Innovative Treatment: 2014 White Paper Executive Summary

Measures and Incentives in Accountable Care Systems

In response to growing concern about the rising cost and lagging quality of health care in the United States, policymakers, payers, and providers have looked to innovative systemic improvements and payment models that emphasize accountability for value; that is, for cost and quality of care. New accountable care system payment models are designed to replace fee-for-service incentives that promote overuse, and that do not support innovative approaches like care coordination, team-based care, telemedicine, diagnostics for targeting care, and other aspects of more personalized and preventive medicine. Instead, by paying for higher-quality care at a lower cost, accountable care systems, such as clinically integrated networks or accountable care organizations (ACOs), are using payment models to implement higher-value approaches.

Measurement of quality and cost of care is an integral component of accountable care, as measures help payers to reward better care, providers to take action to improve care, and patients to make informed decisions about where to seek care. Better measures can help enable higher-quality care, facilitating the desired care reforms. Measurement also can serve as a related monitoring function to detect problems within an accountable care system, such as inappropriate use of services, whether through underuse or overuse of necessary care. In accountable care models that use financial incentives to reward providers for achieving savings, measures are one mechanism to help align financial incentives. Measures may be particularly important to gauge appropriate use of services for high-cost conditions and treatments that may be subject to pressures for short-term savings.

The Challenge of Measure Gaps

Gaps in measurement are missed opportunities for monitoring system performance, providing transparency to patients and purchasers, and improving quality. In an ideal world, accurate and costless measures of all-important dimensions of care would be available to support clinical decisions and payments, but measures are costly and imperfect, and many measurement gaps exist in health care. The focus of this paper is addressing measure gaps, which entails identifying, prioritizing, and filling key gaps.

Current accountable care measure sets prioritize conditions that are the traditional focus of population health (i.e., diabetes and heart disease); however, many prevalent and costly conditions are not represented in measure sets. The paper examines gaps in accountable care measure sets for 20 conditions by two mechanisms: an analysis of measure gaps for each condition, and a one-day Roundtable discussion to gather feedback from national thought leaders on the findings. The analytical process consisted of selecting conditions of high prevalence and/or cost as the research focus; comparing measures in current representative accountable care sets to the care processes prescribed in clinical guidelines to identify measure gaps; cataloging available measures to fill those gaps; determining remaining gaps for measure development; and examining results across the conditions to identify patterns.

Key Findings

Gaps in accountable care measure sets were evident across most of the reviewed conditions, with varying availability of existing measures to address key components of care. In the Centers for Medicare & Medicaid Services' (CMS) Medicare Shared Savings Program (MSSP) ACO measure set, measures directly applied to only eight of the 20 conditions examined, with the highest numbers of applicable measures pertaining to ischemic heart disease and diabetes.

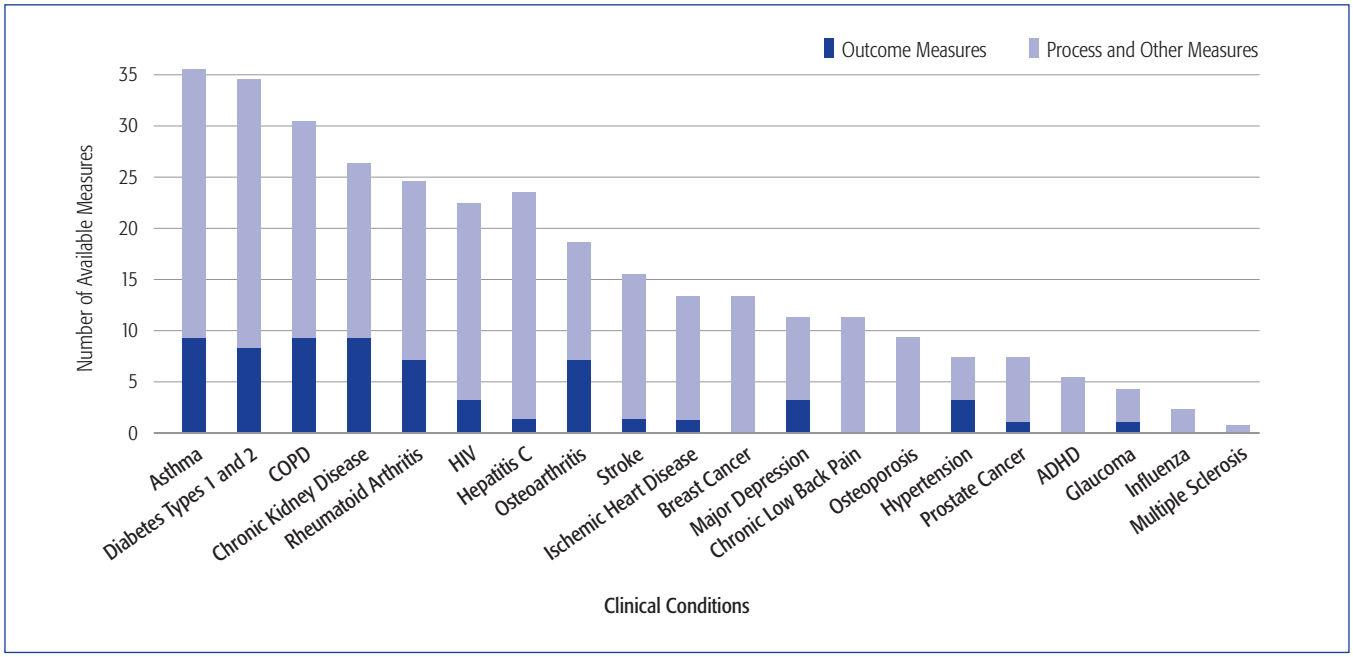
The graphic below shows the number of available measures, including outcome measures that could be used to fill gaps for specific conditions. It illustrates that the number of available measures identified in this project varies greatly by condition. Some conditions, such as asthma and diabetes, have many measures, while others, such as multiple sclerosis, have few. The majority of the available measures are process measures. A number of conditions do not have any outcome measures.

While there is variance in the number of outcome measures available for each condition, a lower number does not necessarily indicate a need for further development. A single measure may be sufficient for assessing outcomes for one condition, though other conditions may require multiple measures.

In addition, there were many aspects of care for the conditions studied for which there were no measures in the MSSP set nor in the universe of available measures. This finding points to the importance of investing in measure development to help assess the impact of accountable care and other health system reforms.

Solutions for Filling Gaps in Accountable Care Measure Sets

To address the identified measure gaps, accountable care program implementers would benefit from innovative ways of enhancing accountable care measure sets to support the goal of better results for the broad populations covered by their programs, including



patients who require specialty care and innovative treatment. Such patient-focused measures applied to existing health care systems could also help assess whether accountable care or other reforms are achieving the desired improvements in care. This paper offers program implementers workable solutions for improving accountable care measure sets.

Rely on Monitoring Indicators and Operating Programs

Before adding measures to accountable care measure sets, program implementers can apply utilization statistics and analytics from disease management programs as early warning indicators. Monitoring indicators can help identify problems in access to care and the need for measures to promote appropriate care, particularly as payment models are transitioning.

Fill Priority Gaps with Existing or New Measures

While it is not feasible to measure every aspect of care for every condition, program implementers should review their data to identify improvement opportunities and whether they need to add measures to their sets. Measures, including condition-specific outcomes and cross-cutting measures, are available for many of the conditions that are currently unaddressed in accountable care measure sets. Where measures are not available, measure development may be warranted.

Alternatives to Measuring Every Condition

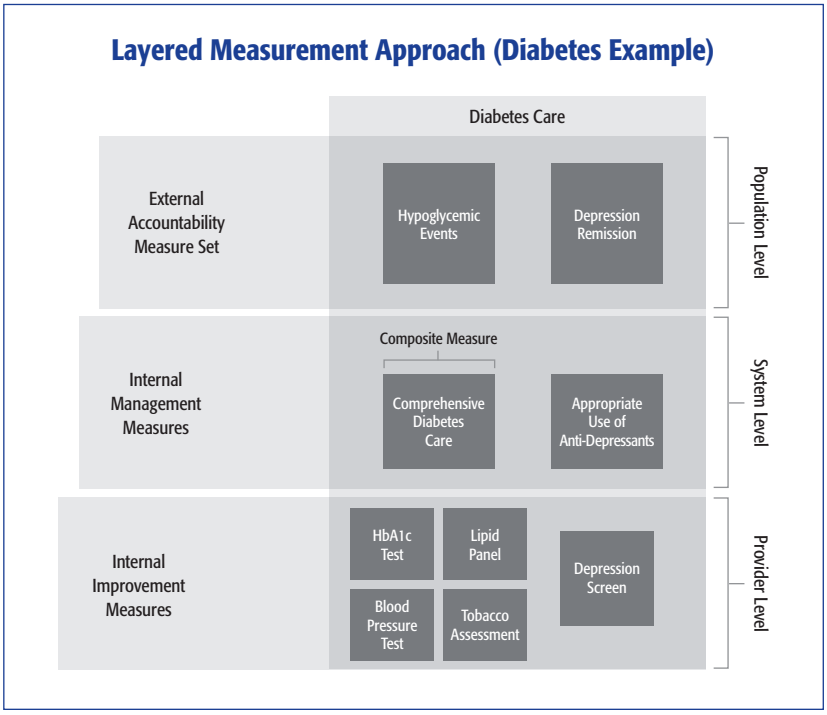
We have developed several potential solutions for balancing the burden of data collection and measurement overload with the benefit of meaningful quality measurement information for accountability and improvement.

Use Cross-Cutting Measures

Cross-cutting measures offer an efficient assessment of how care is being delivered across multiple conditions. While current accountable care sets use cross-cutting measures to an extent, use of cross-cutting measures should be expanded to increase focus on patient-centered care, care coordination, population health, and the complex needs of patients with multiple chronic conditions.

Apply Layered Measurement

Measures should be fit for purpose: measures that are suitable for external accountability may not generate the best information for internal management or improvement. The layered approach to measurement calls for using different, but related, measures at different levels to provide for the diversity of needs. Measure sets for external accountability should focus on outcome and experience measures that are meaningful to patients. A broader set of measures would be useful internally to support management and assessment of patient care at the system level. Still more measures are needed at the provider level to support internal process improvement and assess individual treatment effects.

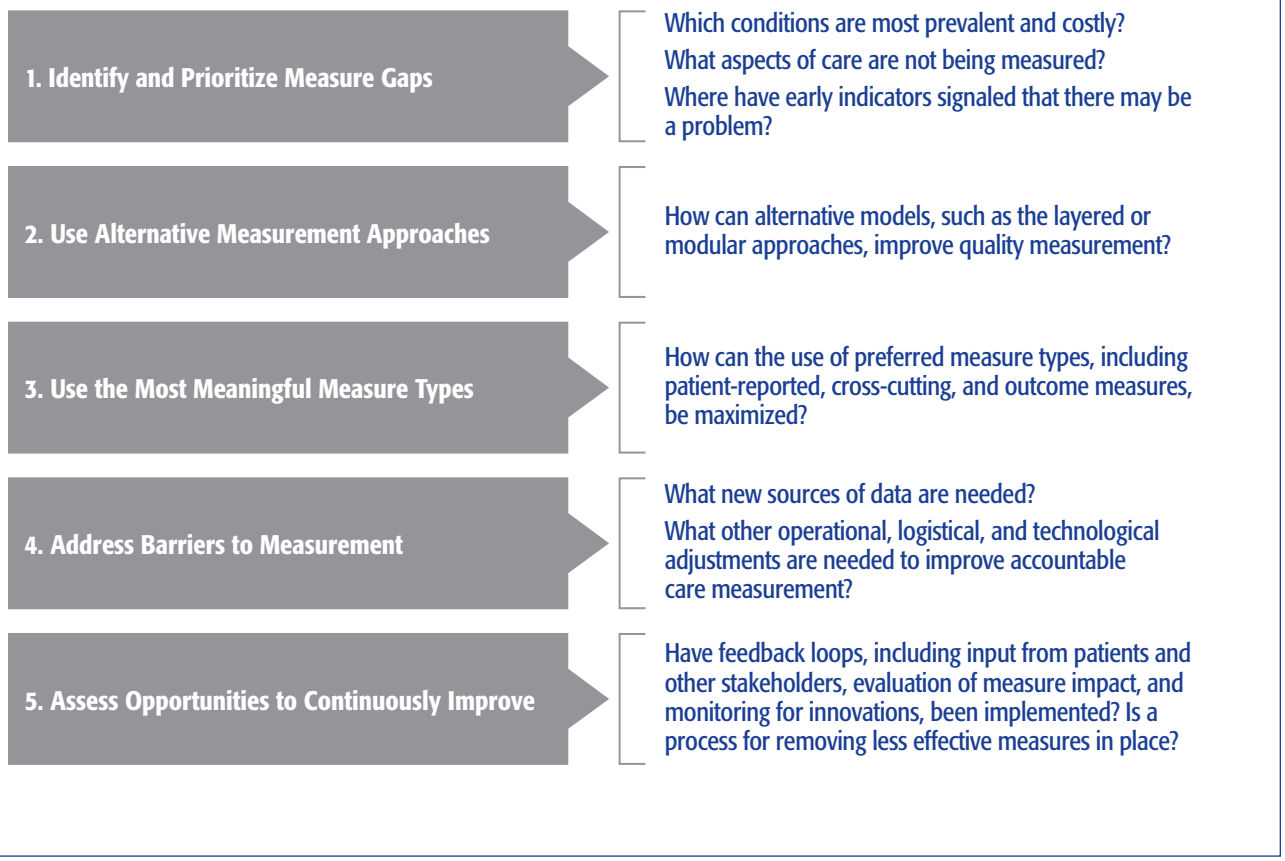


Adopt Modular Measurement

In some cases, it may not be feasible to assess quality for a specific patient population within the scope of a general accountable care measure set. A modular approach, applying a set of measures and incentives distinct to a certain subpopulation, such as cancer patients, would allow a more granular view of quality and costs for a segment of the accountable care population. The modular measure set could be used in addition to the broader measure set.

Recommendations for Improving Accountable Care Measurement

Accountable care program implementers should review the measures in their sets to determine gaps and consider the range of solutions presented in this paper to improve accountable care measurement. This paper makes five recommendations to program implementers:



Accountable care systems are becoming more sophisticated, and accountable care measures should do so as well. Accountable care program implementers, in partnership with patients, providers, and other stakeholders, must continue the conversation and work together to determine the best way to fill gaps in measure sets. Accountable care offers great potential for improving health and health care delivery while lowering costs; however, the transformation to higher-value care must be balanced by measures to ensure the provision of appropriate care.

Appendix B: Federal Value-Based Payment Models

The models described below reflect federal value-based payment (VBP) models that may generally encompass populations that include patients with cancer, or are specifically intended to improve payment for value delivered to cancer populations.

Type	Model Name	Type of Model	Overview
General	Quality Payment Program (QPP)	Pay-for-Reporting and Pay-for-Performance	The Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) repealed the Medicare Sustainable Growth Rate (SGR) methodology for updates to the Physician Fee Schedule (PFS) and replaced it with a new approach to payment called the Quality Payment Program (QPP) that rewards the delivery of high-quality patient care through two avenues: Advanced Alternative Payment Models (APMs) and the Merit-based Incentive Payment System (MIPS) for eligible clinicians or groups under the PFS.[64]
	Home Health Quality Reporting Program		The Home Health Quality Reporting Program requires that each home health agency shall submit data appropriate for the measurement of health care quality. Home health agencies are required to submit Outcome and Assessment Information Set (OASIS) assessments and Home Health Care Consumer Assessment of Healthcare Providers and Systems (CAHPS) to meet reporting requirements. Agencies that do not submit data in accordance with the program will have their scheduled payment percentage increase for a defined mix of goods and services reduced by 2 percentage points.[65]
	Hospice Quality Reporting Program		The Hospice Quality Reporting Program requires hospice programs to report quality data to the Centers for Medicare & Medicaid Services (CMS). Failure to submit required quality data results in a 2 percentage point reduction to the percentage increase for a defined mix of goods and services for that fiscal year.[66]
	Hospital-Acquired Condition (HAC) Reduction Program		The Hospital-Acquired Condition (HAC) Reduction Program provides an incentive for hospitals to reduce HACs, and requires the Secretary of the Department of Health and Human Services (HHS) to adjust payments to applicable hospitals that rank in the worst-performing quartile with respect to risk-adjusted HAC quality measures. These hospitals will have payments reduced to 99% of what would otherwise have been paid for such discharges.[67]

Type	Model Name	Type of Model	Overview
General	Hospital Inpatient Quality Reporting Program (Hospital IQR)	Pay-for-Reporting and Pay-for-Performance	The Hospital Inpatient Quality Reporting Program (Hospital IQR) was originally mandated by Section 501(b) of the Medicare Prescription Drug, Improvement, and Modernization Act (MMA) of 2003. This section of the MMA authorized CMS to pay hospitals that successfully report designated quality measures a higher annual update to their payment rates. Initially, the MMA provided for a 0.4 percentage point reduction in the annual market basket (the measure of inflation in costs of goods and services used by hospitals in treating Medicare patients) update for hospitals that did not successfully report. The Deficit Reduction Act of 2005 increased that reduction to 2 percentage points. In addition to giving hospitals a financial incentive to report the quality of their services, the hospital reporting program provides CMS with data to help consumers make more informed decisions about their health care. Some of the hospital quality-of-care information gathered through the program is available to consumers on the Hospital Compare website.[68]
	Hospital Outpatient Quality Reporting Program (Hospital OQR)		The Hospital Outpatient Quality Reporting Program (Hospital OQR) is a pay-for-quality data reporting program implemented by CMS for outpatient hospital services. The Hospital OQR Program was mandated by the Tax Relief and Health Care Act of 2006, which requires subsection (d) hospitals to submit data on measures on the quality of care furnished by hospitals in outpatient settings. Measures of quality may be of various types, including those of process, structure, outcome, and efficiency. Under the Hospital OQR Program, hospitals must meet administrative, data collection and submission, validation, and publication requirements or receive a 2 percentage point reduction in their annual payment update under the Outpatient Prospective Payment System. In addition to providing hospitals with a financial incentive to report their quality-of-care measure data, the Hospital OQR program provides CMS with data to help Medicare beneficiaries make more informed decisions about their health care. Hospital quality-of-care information gathered through the Hospital OQR program is available on the Hospital Compare website.[69]

Type	Model Name	Type of Model	Overview
General	Hospital Readmissions Reduction Program	Pay-for-Reporting and Pay-for-Performance	The Hospital Readmissions Reduction Program requires CMS to reduce payments to Inpatient Prospective Payment System hospitals with excess readmissions, based on a defined set of readmission measures established by CMS.[70]
	Hospital VBP		Hospital VBP is part of CMS' long-standing effort to link Medicare's payment system to a value-based system to improve health care quality, including the quality of care provided in the inpatient hospital setting. The program attaches VBP to the payment system that accounts for the largest share of Medicare spending, affecting payment for inpatient stays in over 3,500 hospitals across the country. Participating hospitals are paid for inpatient acute care services based on the quality of care, not just the quantity of the services they provide. Congress authorized Inpatient Hospital VBP in Section 3001(a) of the Patient Protection and Affordable Care Act of 2010 (ACA). The program uses the hospital quality data reporting infrastructure developed for the Hospital Inpatient Quality Reporting (IQR) Program, which was authorized by Section 501(b) of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003.[71]
	Ambulatory Surgical Center (ASC) Quality Reporting Program		The Ambulatory Surgical Center (ASC) Quality Reporting Program is a pay-for-reporting, quality data program finalized by CMS. Under this program, ASCs report quality-of-care data for standardized measures to receive the full annual update to their ASC annual payment rate, beginning with calendar year 2014 payments.[72]
	Inpatient Rehabilitation Facilities (IRF) Quality Reporting Program		The Inpatient Rehabilitation Facilities (IRF) Quality Reporting Program creates IRF quality reporting requirements. CMS publishes the quality measures reported–if an IRF does not submit the required quality data, it will be subject to a 2 percentage point reduction in the annual payment update.[73]

Type	Model Name	Type of Model	Overview
General	Long-Term Care Hospital (LTCH) Quality Reporting Program	Pay-for-Reporting and Pay-for-Performance	The Long-Term Care Hospital (LTCH) Quality Reporting Program, mandated by Section 3004(a) of the ACA, creates LTCH quality reporting requirements. Every year, by October 1, the quality measures LTCHs must report are published. Section 3004(a) of the ACA amends Section 1886(m)(5) of the Social Security Act to direct the Secretary of HHS to establish quality reporting requirements for long-term care hospitals. For fiscal year 2014, and each year forward, if LTCHs fail to submit the required quality data, the result shall be a 2 percentage point reduction in their annual payment update.[74]
	Accountable Care Organization (ACO) Programs and Models	Shared Savings	Accountable Care Organizations (ACOs) are groups of doctors, hospitals, and other health care providers who come together voluntarily to give coordinated high-quality care to their Medicare patients. The goal of coordinated care is to ensure that patients, especially the chronically ill, get the right care at the right time, while avoiding unnecessary duplication of services and preventing medical errors. When an ACO succeeds both in delivering high-quality care and spending health care dollars more wisely, it will share in the savings it achieves for the Medicare program. Medicare offers several ACO programs[75]: ■ Medicare Shared Savings Program—a program that helps Medicare fee-for-service program providers become an ACO. ■ Advance Payment ACO Model—a supplementary incentive program for selected participants in the Shared Savings Program. ■ Pioneer ACO Model—a program designed for early adopters of coordinated care. It is no longer accepting applications.

Type	Model Name	Type of Model	Overview
General	Medicare Advantage star rating program	Star Ratings	Medicare uses a star rating system to measure how well Medicare Advantage (Part C) and prescription drug (Part D) plans perform. Medicare scores how well plans did in several categories, including quality of care and customer service. Ratings range from 1 to 5 stars, with 5 being the highest score. Medicare assigns plans a single overall star rating to summarize the plan's performance as a whole. Plans also get separate star ratings in each individual category reviewed. The overall star rating score provides a way to compare performance among several plans. To learn more about differences among plans, look at plans' ratings in each category.[76]
Oncology-Specific	Prospective Payment System (PPS)-Exempt Cancer Hospital Quality Reporting (PCHQR) program	Pay-for-Performance	The Prospective Payment System (PPS)-Exempt Cancer Hospital Quality Reporting (PCHQR) program was developed as mandated by Section 3005 of the ACA. The PCHQR program is intended to equip consumers with quality-of-care information to make more informed decisions about health care options. It is also intended to encourage hospitals and clinicians to improve the quality of inpatient care provided to Medicare beneficiaries by ensuring that providers are aware of and reporting on best practices for their respective facilities and type of care. To meet the PCHQR program requirements, PPS-Exempt Cancer Hospitals are required to submit all quality measures to CMS, beginning with the fiscal year 2014 payment determination year. Participating facilities must comply with the program requirements set forth, including public reporting of the measure rates.[77]

Type	Model Name	Type of Model	Overview
Oncology-Specific	Oncology Care Model (OCM)	Bundled Payment	The goal of the Oncology Care Model (OCM) is to utilize appropriately aligned financial incentives to enable improved care coordination, appropriateness of care, and access to care for beneficiaries undergoing chemotherapy. OCM encourages participating practices to improve care and lower costs through an episode-based payment model that financially incentivizes high-quality, coordinated care. OCM incorporates a two-part payment system for participating practices, creating incentives to improve the quality of care and furnish enhanced services for beneficiaries who undergo chemotherapy treatment for a cancer diagnosis. The two forms of payment include a per-beneficiary Monthly Enhanced Oncology Services (MEOS) payment for the duration of the episode and the potential for a performance-based payment for episodes of chemotherapy care. The $160 MEOS payment assists participating practices in effectively managing and coordinating care for oncology patients during episodes of care, while the potential for performance-based payment incentivizes practices to lower the total cost of care and improve care for beneficiaries during treatment episodes.[78]

Appendix C: Commercial Value-Based Payment Oncology Care Models

Setting and Population	Payment Type and Incentive Structure	Performance Measures	Model Objectives and Outcomes
United Healthcare Episode Payment Model[79]: Rewards oncologists for providing high-quality treatment that ensures better patient outcomes rather than the quantity of care. This model has been tested across five group practices and 810 patients. This model removes incentives to prescribe high-cost drugs and allows medical practices to select a single chemotherapy regimen for each adjuvant therapy episode. It also replaces drug margins and fee-for-service (FFS) payments for physician hospital care, hospice care, hospice management, and case management.			
Setting: Oncology care practices **Population:** Breast, colon, and lung cancer patients **Scale:** Tested in 5 group practices **Episode Duration:** 4-12 months	**Payment Type:** Episode-based payment, FFS, bundled payment **Payment/Incentive Structure:** ■ Calculated monthly national average for chemotherapy costs per condition to determine episode-based payment – Drug margin for each adjuvant regimen – Case management fee for physician/hospital care per episode ■ Physician services reimbursed through FFS	■ 60 measures of cost/quality – Per episode (19 episodes) • Total cost of care • Emergency room (ER) and hospitalization rates • Parenteral drug costs per episode – Aggregate • Average drug cost per episode • Admissions for cancer symptoms • Admissions for treatment-related symptoms • Time to first progression for relapsed patients • Number of lines of therapy for relapsed patients • Hospice days for patients who died • Days from last chemotherapy to death • Costs in the last 30 days of life • Survival from date of condition enrollment (relapsed patients only) • Cost per admission and length of stay • Diagnostic radiology use • Laboratory service use	**Objectives:** ■ Decrease total medical cost by using aligned financial incentives supported by actionable use and quality information ■ Remove link between drug selection and medical oncology income **Outcomes:** ■ 34% reduction of predicted medical costs – Net savings of $33,361,272 (predicted cost of $98,121,388 vs. actual cost of $64,760,116) ■ 179% more chemotherapy drug cost than predicted when compared with controls – Predicted chemotherapy drug cost of $7,519,504 vs. actual chemotherapy drug cost of $13,459,913

Setting and Population	Payment Type and Incentive Structure	Performance Measures	Model Objectives and Outcomes
		• Durable medical equipment use • Surgical services, use, and cost • Febrile neutropenia occurrence rate • Granulocyte colony-stimulating factor usage rate • Erythropoietin use	■ 10% change in total medical costs for the aggregate group ■ Decreases in hospitalization and usage of therapeutic radiology (statistically not tied to quantifiable savings)
MD Anderson and United Healthcare[80]: This model tests the feasibility of bundled reimbursement for multidisciplinary cancer care. It is designed as a single payment for one year of care for patients with newly diagnosed head and neck cancers. This facility was selected for the pilot due to efficient processes, strong care coordination, participation in prior cost studies, and the insurer's preference. Newly diagnosed head and neck cancer patients are eligible to participate in this model. The success of this model is measured upon three outcome sets including health status achieved or retained, process of recovery, and sustainability of health. Providers are incentivized to improve quality, deliver appropriate care, and reduce costs.			
Setting: MD Anderson Cancer Center **Population:** ■ Head and neck cancer patients ■ 150 patients in 3-year pilot study **Scale:** 1 Group Practice **Episode Duration:** 1 year of care for newly diagnosed head/neck cancers	**Payment Type:** Bundled payment ■ 8 bundled payment models have been developed for the program **Payment/Incentive Structure:** ■ Reimburses care providers/hospitals for a defined episode of care under a single fee ■ Incentive to focus on the essential elements of care and to avoid unnecessary treatments	■ Outcome measure set: – Tier 1 – Health status achieved or retained: • Overall survival • Return to work/daily activities, speaking, swallowing – Tier 2 – Process of recovery: • Timely access, treatment start/completion • Reoperation • Unplanned admission • Emergency visit • Length of stay • Mortality – Tier 3 – Sustainability of health • Disease-free/disease-specific survival • Recurrence • Existence of symptoms like dry mouth • Use of feeding or breathing tube • Cosmetic satisfaction	**Objectives:** ■ Improve patient outcomes ■ Lower costs ■ Enhance patient quality of life ■ Transition to value-based care vs. FFS ■ Contribute to research of how a conceptual payment model works in a clinical setting with a defined control group of patients

Setting and Population	Payment Type and Incentive Structure	Performance Measures	Model Objectives and Outcomes
Anthem Cancer Care Quality Program[81]: This model incentivizes oncology care practices to align care delivery with defined cancer treatment pathways by providing enhanced reimbursement. Pathways are selected from therapies recommended by national guidelines on the basis of clinical benefit (efficacy), side effects (toxicity), strength of recommendations, and cost.			
Setting: Practices **Population:** Multiple cancer types: ■ Bladder ■ Breast ■ Central nervous system ■ Chronic Myelogenous Leukemia ■ Colorectal ■ Gastric/esophageal ■ Head and neck ■ Hodgkin Lymphoma ■ Kidney ■ Lung ■ Melanoma ■ Myeloma ■ Non-Hodgkin Lymphoma ■ Ovarian ■ Pancreatic ■ Prostate ■ Testicular ■ Uterine **Scale:** 616 practices (as of December 2014) with 5,538 registered patients	**Payment Type:** Enhanced reimbursement **Payment/Incentive Structure:** ■ Provider orders cancer treatment regimen ■ Practice staff enters regimen and clinical details in provider portal ■ Order requests assessed in real time ■ Program presents information on available pathway regimens ■ Enhanced reimbursement provided when pathway selected ($350 once at onset of treatment; $350 no more than monthly while managing care for established patients)	■ Quarterly reports on: – Pathway adherence – ER and hospitalizations – National Quality Forum (NQF) end-of-life care measures	**Objectives:** Support affordable cancer care through enhanced reimbursement for treatment planning and care coordination when treatment adheres to a cancer treatment pathway **Outcomes:** Pathway adherence was 63% to 72%, depending on cancer type

Setting and Population	Payment Type and Incentive Structure	Performance Measures	Model Objectives and Outcomes
Mobile Surgery International and Blue Cross and Blue Shield of Florida[82]: This model incentivizes surgeons to provide effective surgical care to their patients diagnosed with prostate cancer. The purpose of the model is to ensure effective patient operations, reduce costs, improve patient outcomes, and simplify the billing process. This model has also been launched overseas due to the lower costs in medical and surgical care.			
Setting: Hospitals **Population:** Prostate cancer patients **Scale:** Five hospitals (plans to expand to other markets) **Episode Duration:** Surgery for pancreatic cancer; duration not specified	**Payment Type:** Bundled payment **Payment/Incentive Structure:** ■ Upfront fee from Jacksonville-based insurer ■ Payments to caregivers, hospitals, and anesthesiologists from upfront fees ■ Leftover funds considered profit ■ Similar financial model to accountable care organization (ACO) structure	■ No measures available	**Objectives:** ■ Effective patient operations ■ Eliminate unnecessary costs ■ Work cooperatively to prevent complications ■ Simplify billing process and cut administrative costs for insurer
Horizon Blue Cross Blue Shield of New Jersey and Regional Cancer Care Associates[83]: This is a value-based model that incentivizes oncologists to provide high-quality cancer care to breast cancer patients across New Jersey. The objectives of this model are to improve quality and control costs through episode-based payment and opportunities for shared savings. In addition, this model utilizes customized technology to develop an individualized treatment plan using real-time data by molecular subtype.			
Setting: Oncologist physician group practice **Population:** Breast cancer patients **Scale:** 100 specialists; 700 employees; 24 NJ locations	**Payment Type:** Episode-of-care-based payment/bundled payment **Payment/Incentive Structure:** ■ Value-based payment (VBP) incentive	■ Specified measures not available ■ Quality and efficiency goals – Care coordination – Patient satisfaction – Cost and resource use	**Objectives:** ■ Provide individualized care for the patient ■ Efficient care ■ Improve patient satisfaction ■ Improve coordination, communication, and collaboration across care continuum

Setting and Population	Payment Type and Incentive Structure	Performance Measures	Model Objectives and Outcomes
Episode Duration: Not specified	■ Shared savings for meeting quality and efficiency goals		**Outcomes:** Over 50,000 Horizon BCBSNJ members received treatment
Miami-Dade Accountable Care Program[84]: This model was developed in response to Florida Blue's high prevalence of members with cancer, with 80% of medical spending in this disease category. This is an episode-of-care-based payment model geared toward cancer patients with specific diagnoses. The purpose of this model is to improve the quality of care by providing appropriate levels of care, reducing hospitalizations, and increasing adherence to medication. This model also focuses on care coordination and person-centeredness. Providers are incentivized with shared savings for meeting quality and efficiency goals, as well as meeting the objectives of the program.			
Setting: Hospital **Population:** Cancer patients with breast, digestive system and peritoneum, female reproductive organ, lymphatic and hematopoietic tissue, male reproductive organ, and respiratory and intrathoracic organ conditions **Scale:** Multi-specialty physician group focused on cancer care **Episode Duration:** Not specified	**Payment Type:** ■ Episode-of-care-based payment/ bundled payment ■ ACO structure **Payment/Incentive Structure:** ■ VBP incentive ■ Shared savings for meeting quality and efficiency goals	■ Specified measures not available	**Objectives:** ■ Decrease readmissions ■ Decrease ER visits ■ Increase medication adherence ■ Improve quality of care ■ Target a large population **Outcomes:** ■ Increased connectivity among the partners ■ Implemented total cost of care using value-based model **Lessons Learned:** ■ Select committed and aligned partners with common goals ■ Streamline data exchange early in the process ■ A smaller population of patients can result in large variations in data from one reporting period to another

Setting and Population	Payment Type and Incentive Structure	Performance Measures	Model Objectives and Outcomes
Florida Physician Group Bundled Radiation Services (Humana/21st Century Oncology)[85]: Health insurer Humana has contracted with 21st Century Oncology, a large Florida-based physician group, in a novel effort to bundle payments for radiation therapy services used to treat several common cancers. The goal of the program is to shift radiation therapy costs from FFS to evidence-based treatment. Feedback from physicians and payers has been positive, indicating that the model can help stabilize revenue streams and payment structures.			
Setting: Physician group practices providing radiation services **Population:** ■ Cancer patients receiving radiation therapy; several cancers (over 13 frequent diagnoses including breast, lung, GI, and GYN cancers). ■ Regionally advanced non-metastatic ■ Covers about 80% of all the diagnoses treated with radiation therapy **Scale:** ■ Fort Myers-based 21st Century includes over 250 facilities in 16 states and 7 countries; 500 physicians ■ Over 130 radiation oncologists in 16 states under Humana contract	**Payment Type:** ■ Episode-of-care-based payment/ bundled payment ■ Fixed price **Payment/Incentive Structure:** ■ Evidence-based treatment ■ Stabilize revenue streams and payment structures ■ Bundles based on ICD-9 codes ■ Payment includes a defined set of services ■ Multiple active bundled payment agreements for radiotherapy since 2012 ■ Simplified payment processing through alerts	■ Tracking outcomes related to following the clinical care paths developed as part of the bundles ■ Measuring: – Improved clinical outcomes • Timeliness • Reduced hospitalizations – Frequency of treatment interruptions related to toxicity of radiation therapy	**Objectives:** ■ Reduce administrative costs ■ Decouple clinical decision-making from reimbursement ■ Permit latitude for physician to exercise full clinical judgement on prescribing a course of care ■ Improve patient satisfaction with insurance **Outcomes:** ■ Challenges with meeting payer expectations for reporting and transparency ■ Working with the Centers for Medicare & Medicaid Services helped the company improve use of specific measures and reach outcomes payers require ■ Payer is looking for economic relevance

Setting and Population	Payment Type and Incentive Structure	Performance Measures	Model Objectives and Outcomes
■ 21st Century's book of business involves over 1 million patients **Episode Duration:** ■ Radiation therapy; duration not specified ■ Challenge in defining beginning and end of episode			
Oncology Case Rate (OCR) (Hill Physicians Medical Group)[86]: This oncology model was developed to improve the quality of care, manage costs, and ensure patient satisfaction for Hill Physicians Medical Group oncology patients. The goal was to develop a program that integrates quality with clinically appropriate care including quality measures, patient and physician satisfaction, and adherence to regimens accepted by professional organizations. This model is deemed a stepping stone toward an accountable care model and has larger initiatives to reorient from procedure-based to disease-based bundled compensation.			
Setting: Hill Physicians Medical Group **Population:** Cancer patients ■ Colon and rectum ■ Lung ■ Breast (female) ■ Ovary and other uterine adnexa ■ Prostate ■ Malignant neoplasm of other unspecified sites ■ Malignant neoplasm of lymphema tissue ■ Other malignant neoplasm ■ Diseases of blood and blood-forming origin	**Payment Type:** Case rate payments, FFS **Payment/Incentive Structure:** ■ Dual payment structure ■ Case rate payments – Calculated to be equivalent to 100% of FFS – Cancer diagnoses are grouped – Paid monthly – Providers bear some risk – Stop-loss program protects providers	■ Quality management program – Clinical quality • Subset (25-30) of American Society of Clinical Oncology Quality Oncology Practice Initiative (QOPI®) care measures – Patient experience • Clinician and Group Consumer Assessment of Healthcare Providers and Systems (CAHPS) • Internally developed referring to primary care physician satisfaction survey – Utilization • Inpatient bed days • Emergency department (ED) visits • Infusion center use • Chemo initiation	**Objectives:** ■ Respond to financial pressures to moderate cancer care cost trend ■ Improve quality of care ■ Align oncologists' incentives with organization's initiatives **Outcomes:** ■ The outpatient oncology per-member-per-month trend has decreased in the OCR practice since the implementation of the program ■ OCR practice shows a declining per-member-per-month trend, while the FFS practices show an increasing trend

Setting and Population	Payment Type and Incentive Structure	Performance Measures	Model Objectives and Outcomes
Scale: ■ 3,800 providers/ consultants (980 primary care, 2,260 specialists [170 oncologists]) ■ 300,000 members, 5 regions in Northern California (9 counties) **Episode Duration:** Prospective, once case begins	■ Quality management program – Opportunity for additional 10% incentive for clinical quality, patient experience, and utilization goals • These are new dollars that previously were not available to the oncologists	■ Example QOPI clinical quality measures: – Current stage of patient's cancer – Anti-emetics prescribed appropriately with moderate/ high emetic risk chemotherapy – Hospice enrollment and enrolled more than seven days before death – Chemotherapy administered within the last two weeks of life – Documented plan for chemotherapy, including doses, route, and time intervals – Test for HER2/neu overexpression or gene amplification – Carcinoembryonic Antigen (CEA) within four months of curative resection for colorectal cancer – *KRAS* testing for patients with metastatic colorectal cancer who received anti-epidermal growth factor receptor (EGFR) monoclonal antibody (MoAb) therapy – Performance status documented for patients with initial American Joint Committee on Cancer (AJCC) Stage IV or distant metastatic non-small cell lung cancer (NSCLC) – Advance directive documentation within first three visits after diagnosis with advanced/metastatic cancer	■ 96% pathway adherence to National Comprehensive Cancer Network (NCCN) Guidelines® based on cancer state observed in treatment of colon cancer patients ■ Patient Satisfaction Questionnaire (PSQ)-18 survey finds high patient satisfaction ■ Significant improvement in referring patient satisfaction ■ 14% decrease in inpatient bed days (vs. 13% for non-OCR FFS practices) **Program Results:** ■ Bent the cost curve ■ Measured improvements in quality of care ■ Demonstrated improvements in patient and referring provider satisfaction ■ Measured improvement in utilization patterns ■ Measured and compared overall survival

Appendix D: Other Oncology Care Delivery Models

Model Type	Model	Description
Oncology Accountable Care Organizations	Multiple	Oncology accountable care organizations (ACOs) may operate in a similar manner to general population ACOs, though they include hospitals or treatment centers specifically focused on cancer treatment. Models may include episode-based payments and gainsharing (shared savings) opportunities for participants, contingent upon meeting oncology quality measure benchmarks.[84]
Oncology Medical Homes	Community Oncology Alliance Oncology Medical Home (OMH)	The OMH is a patient-focused system intended to deliver quality cancer care. Key aspects of the model are to deliver cancer care that is: (1) coordinated with the central focus on the patient and their entire medical condition; (2) optimized based on evidence-based medicine to produce quality outcomes; (3) accessible and efficient, with treatment provided in the highest-quality, lowest-cost setting for the patient; (4) delivered in a patient-centric, caring environment that optimizes patient satisfaction; and (5) continuously improved by measuring and benchmarking results against other facilities providing care so that best practices "raise the bar" in delivering care.[87]
	Community Oncology Medical Home (COME HOME)	The COME HOME model builds on the concept of a patient-centered medical home by including seven important components: (1) an ongoing relationship with a personal physician to provide first contact, continuous and comprehensive care; (2) a physician-directed care team; (3) whole person orientation; (4) integrated/coordinated care; (5) evidence-based medicine and performance measurement to ensure quality and safety; (6) enhanced access; and (7) payment to recognize the value added by a medical home.[88]

Model Type	Model	Description
Oncology Bundled Payment Models	Radiation Therapy Alliance (RTA)	RTA has developed a bundled payment initiative for prostate cancer, covering external beam radiation therapy, image guided radiation therapy, intensity modulated radiation therapy, 3-D conformal radiation therapy, and 2-D conformal radiation therapy.[89]
	American Society for Radiation Oncology (ASTRO) Radiation Oncology Palliative Care Alternative Payment Model	ASTRO developed an episode payment model for the palliation of bone metastases. The model establishes a value-based payment methodology that features two diagnosis categories and bundled payments for care management, treatment, and follow-up care, as well as initiatives for adherence to quality measures.[90]
Enhanced Oncology Payments	American Society of Clinical Oncology (ASCO) Patient-Centered Oncology Payment (PCOP)	The PCOP is designed to change payment for oncology practices in two key ways to enable oncology practices to deliver higher-quality care at a lower cost: (1) oncology practices would receive larger payments than today in order to provide sufficient resources to deliver high-quality services that cancer patients and their families need, and payments would be made in a way that give practices more flexibility than they have today to tailor services to the unique needs of individual patients; and (2) oncology practices would take accountability for delivering high-quality care to patients and families, including following evidence-based appropriate use criteria for drugs, lab tests, and imaging; helping patients avoid and manage complications; and providing support at end of life.[91]

Appendix E: Oncology Measure Developers and Measure Sets

Developer	Measure Set
American Academy of Dermatology (AAD)	The AAD has developed 22 Board-approved dermatology measures, including seven measures relevant to care coordination processes for biopsies, three measures relevant to melanoma care, and eight measures relevant to basal cell carcinoma and squamous cell carcinoma.[92] DataDerm is a clinical data registry that allows dermatologists to report clinical quality data for federal programs.[93]
American College of Radiology (ACR)	The ACR National Radiology Data Registry (NRDR®) is a Centers for Medicare & Medicaid Services-approved Qualified Clinical Data Registry (QCDR) that allows registry participants to report a combination of non-Physician Quality Reporting System (PQRS) and PQRS measures from across other registries.[94,95,96] ACR provides a list of quality measures relevant to diagnostic radiology, interventional radiology, and radiation oncology practices.[97]
American College of Surgeons–Commission on Cancer (CoC)	CoC Measures for Quality of Cancer Care were developed by the CoC with the expectation that cancer registries would be used to collect the necessary data to assess and monitor concordance with the measures. Extensive assessment and validation of the measures were performed using cancer registry data reported to the National Cancer Database. All measures are designed to assess performance at the hospital or system level, and are not intended for application to individual physician performance.[98]
American Gastroenterological Association (AGA)	The AGA has developed measures for several digestive health conditions and clinical topics, including colorectal cancer screening and surveillance.[99] The Digestive Health Recognition Program™ is a clinical data registry that allows clinicians to demonstrate quality of care in the management of patients with digestive health issues.[100]

Developer	Measure Set
American Society of Clinical Oncology (ASCO)	The Quality Oncology Practice Initiative (QOPI®) is an oncologist-led, practice-based quality assessment program designed to promote excellence in cancer care by helping practices create a culture of self-examination and improvement.[101] At the core of the QOPI program is a robust library of quality measures developed by oncologists and quality experts, founded on ASCO and nationally recognized practice guidelines and expert consensus. The more than 180 measures reflect the team-based care provided to the patient with cancer in the outpatient oncology setting.[102]
American Society for Radiation Oncology (ASTRO)	The ASTRO measures inventory includes 15 measures developed collaboratively with ASCO, the National Comprehensive Cancer Network, and the Physician Consortium for PCPI®. ASTRO has also developed a National Quality Forum-endorsed quality measure on external beam radiotherapy for bone metastases.[103]
American Urological Association (AUA)	The AUA has developed five quality measures for prostate cancer.[104] The AUA Quality Registry (AQUA) is a national urologic disease registry designed to measure and report health care quality and patient outcomes.[105]
National Committee for Quality Assurance (NCQA)	NCQA has developed the Healthcare Effectiveness Data and Information Set (HEDIS®), a tool used by health plans to measure performance on important dimensions of care and service. HEDIS 2017 consists of 91 measures across seven domains of care, and includes screening measures for cancer. NCQA also develops measures for physician measurement, accountable care organization (ACO) measurement, and other system levels.[106] With support from the Center for American Progress and the California Health Care Foundation, NCQA developed three measures for potential use in oncology bundled payment delivery system models or other quality reporting programs, applying to patients administered or prescribed chemotherapy treatment in an outpatient oncology clinic: ■ Assessment of Patient-Reported Symptoms During Chemotherapy Treatment[107]; ■ Use of Evidence-Based Adjuvant Chemotherapy Regimens for Patients with Stage IIIA through IIIC Colon Cancer[108]; and ■ Use of Evidence-Based Systemic Therapy for Patients with Metastatic Non-Small Cell Lung Cancer.[109] NCQA submitted the three measures for public comment in November 2016, and will be refining the concepts for future use.

Developer	Measure Set
Oncology Nursing Society (ONS)	The ONS Quality Improvement Registry is a QCDR that can be used to benchmark and improve patient outcomes. ONS quality measures, developed and tested through a contract with the Joint Commission, are included in the registry.[110]
PCPI®	PCPI-stewarded measures include measures developed and maintained by PCPI that support federal programs, and which are stewarded for several conditions or topic areas, including oncology.[111] Measures stewarded externally include PCPI-developed measures that are stewarded and maintained by PCPI's partners in measure development for several conditions and topic areas.[112]
Society for Gynecologic Oncology (SGO)	The SGO Policy, Quality and Outcomes Taskforce identified ovarian, endometrial, and cervical cancer quality measures for prioritization.[113]

Appendix F: Key Identified Oncology Measure Gaps

Measure Type	Gap	Prioritized by:		
		National Quality Forum (NQF)[18]	Centers for Medicare & Medicaid Services (CMS)/MITRE Corporation[114]	Core Quality Measure Collaborative (CQMC)[48]
Structural Measures	Availability, timeliness, and coordination of care	✓	✓	
	Access to hospice care	✓		
	Enrollment in clinical trials	✓		
	Electronic Health Record-linked structural measures	✓		
Process Measures	Appropriate use of chemotherapy			✓
	Outcome-linked process measures	✓		
	Process measures accounting for patient preference	✓		✓
	Reporting cancer stage			✓
	Correct diagnosis and staging	✓		
Utilization Measures	Emergency room admissions			✓
	Inpatient admissions			✓
	Hospital readmissions	✓		
Value/Efficiency/ Cost Measures	Total cost			✓
	Appropriate care (underuse and overuse)	✓		✓
Outcome Measures	Survival	✓		✓
	Overall survival	✓		
	Disease-free survival	✓		✓
	Stage-specific survival	✓		
	Five-year cure rate	✓		✓

Measure Type	Gap	Prioritized by:		
		National Quality Forum (NQF)[18]	Centers for Medicare & Medicaid Services (CMS)/MITRE Corporation[114]	Core Quality Measure Collaborative (CQMC)[48]
Outcome Measures	Medication adherence	✓		
	Rates of local recurrence	✓		
	Quality of life	✓	✓	✓
	Pain control		✓	✓
	Functional status		✓	✓
Patient-Centered/ Experience Measures	Personalized medicine	✓		
	Patient- and family-focused engagement	✓	✓	✓
	Patient-reported outcome standards	✓	✓	✓
	Level of pain			✓
	Shared decision-making		✓	✓
	Symptoms and complications of therapy	✓		
	Whole patient care	✓		
Cross-Cutting Measures	Issues across disease trajectory	✓		
	Communication and care transitions	✓		
Population-Specific Measures	Pediatric cancers and transitions to adult care	✓		
	Hematologic cancers	✓		
	Kidney cancer	✓		
	Lung cancer	✓		✓
	End-of-life and palliative care	✓	✓	
	Survivorship	✓		
	Psychosocial needs	✓		

Appendix G: Condition Selection Summary

Cancer Type	Incidence[115]	Prevalence[116,117]	Deaths[118]	Cost[119]	Treatment Episode Length[120]	Treatment Modalities[120]	Disparities[121]
Breast	✓	✓	✓	✓	Short-Term	CT, HT, RT, S, TT	✓
Chronic Myelogenous Leukemia		✓		✓	Long-Term	CT, IT, RT, S, TT	
Colon	✓	✓	✓	✓	Short-Term	CT, RT, S, TT	✓
Kidney	✓	✓	✓	✓	Short-Term	AS, CT, IT, RT, S, TT	✓
Lung	✓	✓	✓	✓	Long-Term	CT, IT, RT, S, TT	✓
Melanoma		✓			Short-Term	CT, IT, RT, S, TT	
Non-Hodgkin Lymphoma	✓	✓	✓	✓	Long-Term	CT, IT, RT, TT	
Ovarian					Long-Term	CT, HT, RT, S, TT	✓
Pancreatic			✓		Short-Term	CT, RT, S	✓
Prostate	✓	✓	✓	✓	Long-Term	AS, CT, HT, RT, S	✓

AS Active Surveillance
CT Chemotherapy
HT Hormonal Therapy
IT Immunotherapy
RT Radiation Therapy
S Surgery
TT Targeted Therapy

Appendix H: Representative Accountable Care Measure Sets

Merit-Based Incentive Payment System (MIPS)/Physician Quality Reporting System (Oncology Measures Only)[122]

ID #	NQF #	Steward	Measure Title
67	0377	American Society of Hematology (ASH)	Hematology: Myelodysplastic Syndrome (MDS) and Acute Leukemias: Baseline Cytogenetic Testing Performed on Bone Marrow
68	0378	ASH	Hematology: MDS: Documentation of Iron Stores in Patients Receiving Erythropoietin Therapy
69	0380	ASH	Hematology: Multiple Myeloma: Treatment with Bisphosphonates
70	0379	PCPI®	Hematology: Chronic Lymphocytic Leukemia: Baseline Flow Cytometry
99	0391	College of American Pathologists (CAP)	Breast Cancer Resection Pathology Reporting: pT Category (Primary Tumor) and pN Category (Regional Lymph Nodes) with Histologic Grade
100	0392	CAP	Colorectal Cancer Resection Pathology Reporting: pT Category (Primary Tumor) and pN Category (Regional Lymph Nodes) with Histologic Grade
102	0389	PCPI	Prostate Cancer: Avoidance of Overuse of Bone Scan for Staging Low-Risk Prostate Cancer Patients
104	0390	American Urological Association Education and Research (AUA)	Prostate Cancer: Adjuvant Hormonal Therapy for High-Risk or Very High-Risk Prostate Cancer
112	2372	National Committee for Quality Assurance (NCQA)	Breast Cancer Screening
113	0034	NCQA	Colorectal Cancer Screening

ID #	NQF #	Steward	Measure Title
137	0650	American Academy of Dermatology (AAD)	Melanoma: Continuity of Care–Recall System
138	N/A	AAD	Melanoma: Coordination of Care
143	0384	PCPI	Oncology: Medical and Radiation–Pain Intensity Quantified
144	0383	American Society of Clinical Oncology (ASCO)	Oncology: Medical and Radiation–Plan of Care for Pain
146	0508	American College of Radiology (ACR)	Radiology: Inappropriate Use of "Probably Benign" Assessment Category in Screening Mammograms
156	0382	American Society for Radiation Oncology (ASTRO)	Oncology: Radiation Dose Limits to Normal Tissues
185	0659	American Gastroenterological Association (AGA)	Colonoscopy Interval for Patients with a History of Adenomatous Polyps–Avoidance of Inappropriate Use
224	0562	AAD	Melanoma: Overutilization of Imaging Studies in Melanoma
225	0509	ACR	Radiology: Reminder System for Screening Mammograms
249	1854	CAP	Barrett's Esophagus
250	1853	CAP	Radical Prostatectomy Pathology Reporting
251	1855	CAP	Quantitative Immunohistochemical Evaluation of Human Epidermal Growth Factor Receptor 2 Testing (HER2) for Breast Cancer Patients
262	N/A	American Society of Breast Surgeons (ASBS)	Image Confirmation of Successful Excision of Image-Localized Breast Lesion
263	N/A	ASBS	Preoperative Diagnosis of Breast Cancer
264	N/A	ASBS	Sentinel Lymph Node Biopsy for Invasive Breast Cancer
309	0032	NCQA	Cervical Cancer Screening

ID #	NQF #	Steward	Measure Title
320	0658	AGA	Appropriate Follow-Up Interval for Normal Colonoscopy in Average Risk Patients
343	N/A	American Society for Gastrointestinal Endoscopy	Screening Colonoscopy Adenoma Detection Rate
361	N/A	ACR	Optimizing Patient Exposure to Ionizing Radiation: Reporting to a Radiation Dose Index Registry
364	N/A	ACR	Optimizing Patient Exposure to Ionizing Radiation: Appropriateness: Follow-Up CT Imaging for Incidentally Detected Pulmonary Nodules According to Recommended Guidelines
395	N/A	CAP	Lung Cancer Reporting (Biopsy/Cytology Specimens)
396	N/A	CAP	Lung Cancer Reporting (Resection Specimens)
397	N/A	CAP	Melanoma Reporting
406	N/A	ACR	Appropriate Follow-Up Imaging for Incidental Thyroid Nodules in Patients
429	N/A	American Urogynecologic Society	Pelvic Organ Prolapse: Preoperative Screening for Uterine Malignancy
439	N/A	AGA	Age Appropriate Screening Colonoscopy
440	N/A	AAD	Basal Cell Carcinoma /Squamous Cell Carcinoma: Biopsy Reporting Time—Pathologist to Clinician
443	N/A	NCQA	Non-Recommended Cervical Cancer Screening in Adolescent Females
448	0567	Centers for Medicare & Medicaid Services (CMS)	Appropriate Workup Prior to Endometrial Ablation
449	1857	ASCO	HER2 Negative or Undocumented Breast Cancer Patients Spared Treatment with HER2-Targeted Therapies

ID #	NQF #	Steward	Measure Title
450	1858	ASCO	Trastuzumab Received by Patients with AJCC Stage I (T1c) – III and HER2 Positive Breast Cancer Receiving Adjuvant Chemotherapy
451	1859	ASCO	*KRAS* Gene Mutation Testing Performed for Patients with Metastatic Colorectal Cancer Who Receive Anti-Epidermal Growth Factor Receptor Monoclonal Antibody Therapy
452	1860	ASCO	Patients with Metastatic Colorectal Cancer and *KRAS* Gene Mutation Spared Treatment with Anti-EGFR Monoclonal Antibodies
453	0210	ASCO	Proportion Receiving Chemotherapy in the Last 14 Days of Life
454	0211	ASCO	Proportion of Patients Who Died from Cancer with More Than One Emergency Department (ED) Visit in the Last 30 Days of Life
456	0215	ASCO	Proportion Not Admitted to Hospice
457	0216	ASCO	Proportion Admitted to Hospice for Less Than 3 Days

Medicare Shared Savings Program (MSSP) Accountable Care Organizations Measures[123]

ID #	NQF #	Steward	Title
ACO-1	0005	Agency for Healthcare Research and Quality (AHRQ)	Consumer Assessment of Healthcare Providers and Systems (CAHPS): Getting Timely Care, Appointments, and Information
ACO-2	0005	AHRQ	CAHPS: How Well Your Providers Communicate
ACO-3	0005	AHRQ	CAHPS: Patients' Rating of Provider
ACO-4	N/A	CMS	CAHPS: Access to Specialists
ACO-5	N/A	CMS	CAHPS: Health Promotion and Education
ACO-6	N/A	CMS	CAHPS: Shared Decision-Making
ACO-7	N/A	CMS	CAHPS: Health Status/Functional Status

ID #	NQF #	Steward	Title
ACO-34	N/A	CMS	CAHPS: Stewardship of Patient Resources
ACO-8	1789	CMS	Risk-Standardized, All-Condition Readmission
ACO-35	2510	CMS	Skilled Nursing Facility 30-Day All-Cause Readmission Measure
ACO-36	N/A	CMS	All-Cause Unplanned Admissions for Patients with Diabetes
ACO-37	N/A	CMS	All-Cause Unplanned Admissions for Patients with Heart Failure
ACO-38	N/A	CMS	All-Cause Unplanned Admissions for Patients with Multiple Chronic Conditions
ACO-43	N/A	AHRQ	Ambulatory Sensitive Condition Acute Composite (AHRQ Prevention Quality Indicator [PQI] #91)
ACO-11	N/A	CMS	Use of Certified Electronic Health Record Technology (CEHRT)
ACO-12	0097	CMS	Medication Reconciliation Post Discharge
ACO-13	0101	NCQA	Falls: Screening for Future Fall Risk
ACO-44	0052	NCQA	Use of Imaging Studies for Low Back Pain
ACO-14	0041	PCPI	Preventive Care and Screening: Influenza Immunization
ACO-15	0043	NCQA	Pneumonia Vaccination Status for Older Adults
ACO-16	0421	CMS	Preventive Care and Screening: Body Mass Index Screening and Follow-Up
ACO-17	0028	PCPI	Preventive Care and Screening: Tobacco Use: Screening and Cessation Intervention
ACO-18	0418	CMS	Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan
ACO-19	0034	NCQA	Colorectal Cancer Screening
ACO-20	2372	NCQA	Breast Cancer Screening
ACO-42	N/A	CMS	Statin Therapy for the Prevention and Treatment of Cardiovascular Disease

ID #	NQF #	Steward	Title
ACO-40	0710	Minnesota Community Measurement	Depression Remission at Twelve Months
ACO-27	0059	NCQA	Diabetes Mellitus: Hemoglobin A1c Poor Control
ACO-41	0055	NCQA	Diabetes: Eye Exam
ACO-28	0018	NCQA	Hypertension: Controlling High Blood Pressure
ACO-30	0068	NCQA	Ischemic Vascular Disease: Use of Aspirin or Another Antithrombotic

Oncology Care Model (OCM) Measures[45]

ID #	NQF #	Steward	Title
OCM-1	N/A	CMS	Risk-Adjusted Proportion of Patients with All-Cause Hospital Admissions Within the Six-Month Episode
OCM-2	N/A	CMS	Risk-Adjusted Proportion of Patients with All-Cause ED Visits That Did Not Result in a Hospital Admission Within the Six-Month Episode
OCM-3	N/A	CMS	Proportion of Patients Who Died Who Were Admitted to Hospice for Three Days or More
OCM-4	0383 0384	ASCO PCPI	Pain Assessment and Management
OCM-5	0418	CMS	Preventive Care and Screening: Screening for Clinical Depression and Follow-Up Plan
OCM-6	N/A	CMS	Patient-Reported Experience of Care
OCM-7	0390	AUA	Prostate Cancer: Adjuvant Hormonal Therapy for High-Risk Beneficiaries
OCM-8	0223	American College of Surgeons (ACS)	Timeliness of Adjuvant Chemotherapy for Colon Cancer

ID #	NQF #	Steward	Title
OCM-9	0559	ACS	Timeliness of Combination Chemotherapy for Hormone Receptor Negative Breast Cancer
OCM-10	1858	ASCO	Trastuzumab Received by Patients with AJCC Stage I (T1c) – III HER2/neu Positive Breast Cancer
OCM-11	0387	PCPI	Hormonal Therapy for Stage IC – IIIC Estrogen Receptor/ Progesterone Receptor (ER/PR) Positive Breast Cancer
OCM-12	N/A	CMS	Documentation of Current Medication

Prospective Payment System (PPS)-Exempt Cancer Hospital Quality Reporting (PCHQR) Program Measures[124]

ID #	NQF #	Steward	Title
CLABSI	0139	Centers for Disease Control and Prevention (CDC)	National Healthcare Safety Network (NHSN) Central Line-Associated Bloodstream Infection Outcome Measure
CAUTI	0138	CDC	NHSN Catheter-Associated Urinary Tract Infections Outcome Measure
SSI	0753	CDC	American College of Surgeons–Centers for Disease Control and Prevention (ACS–CDC) Harmonized Procedure Specific Surgical Site Infection Outcome Measure
CDI	1717	CDC	NHSN Facility-wide Inpatient Hospital-onset *Clostridium difficile* Infection Outcome Measure
MRSA	1716	CDC	NHSN Facility-wide Inpatient Hospital-onset Methicillin-resistant *Staphylococcus aureus* Bacteremia Outcome Measure
HCP	0431	CDC	Influenza Vaccination Coverage Among Healthcare Personnel
N/A	0223	ACS	Adjuvant Chemotherapy Is Considered or Administered Within 4 Months (120 Days) of Diagnosis to Patients Under the Age of 80 with AJCC III (Lymph Node Positive) Colon Cancer

ID #	NQF #	Steward	Title
N/A	0559	ACS	Combination Chemotherapy is Considered or Administered Within 4 Months (120 Days) of Diagnosis for Women Under 70 with AJCC T1cN0M0, or Stage IB – III Hormone Receptor Negative Breast Cancer
N/A	0220	ACS	Adjuvant Hormonal Therapy
N/A	0382	ASTRO	Oncology: Radiation Dose Limits to Normal Tissues
N/A	0383	ASCO	Oncology: Plan of Care for Pain–Medical Oncology and Radiation Oncology
N/A	0384	PCPI	Oncology: Medical and Radiation–Pain Intensity Quantified
N/A	0390	AUA	Prostate Cancer: Adjuvant Hormonal Therapy for High Risk Prostate Cancer Patients
N/A	0389	PCPI	Prostate Cancer: Avoidance of Overuse of Bone Scan for Staging Low-Risk Prostate Cancer Patients
HCAHPS	0166	CMS	Hospital Consumer Assessment of Healthcare Providers and Systems
EBRT	1822	ASTRO	External Beam Radiotherapy (EBRT) for Bone Metastases
N/A	N/A	CMS	Admissions and ED Visits for Patients Receiving Outpatient Chemotherapy

United Healthcare (UHC) Chemotherapy Episode-Based Payment Initiative[125]

ID #	NQF #	Steward	Title
N/A	N/S	UHC	Total Cost of Care
N/A	N/S	UHC	Emergency Room and Hospitalization Rates
N/A	N/S	UHC	Parenteral Drug Costs per Episode
N/A	N/S	UHC	Aggregate
N/A	N/S	UHC	Average Drug Cost per Episode
N/A	N/S	UHC	Admissions for Cancer Symptoms
N/A	N/S	UHC	Admissions for Treatment-Related Symptoms
N/A	N/S	UHC	Time to First Progression for Relapsed Patients
N/A	N/S	UHC	Number of Lines of Therapy for Relapsed Patients
N/A	N/S	UHC	Hospice Days for Patients Who Died
N/A	N/S	UHC	Days from Last Chemotherapy to Death
N/A	N/S	UHC	Costs in the Last 30 Days of Life
N/A	N/S	UHC	Survival from Date of Condition Enrollment (Relapsed Patients Only)
N/A	N/S	UHC	Cost per Admission and Length of Stay
N/A	N/S	UHC	Diagnostic Radiology Use
N/A	N/S	UHC	Laboratory Service Use
N/A	N/S	UHC	Durable Medical Equipment Use
N/A	N/S	UHC	Surgical Services, Use, and Cost
N/A	N/S	UHC	Febrile Neutropenia Occurrence Rate
N/A	N/S	UHC	Granulocyte Colony-Stimulating Factor Usage Rate
N/A	N/S	UHC	Erythropoietin Use

Appendix I: Oncology-Specific Clinical Guidelines

Condition	Guideline Title	Developer	Year
Breast Cancer	National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Breast Cancer	NCCN	November 2015
	Selection of Optimal Adjuvant Chemotherapy Regimens for Human Epidermal Growth Factor Receptor 2 (HER2)–Negative and Adjuvant Targeted Therapy for HER2-Positive Breast Cancers	American Society of Clinical Oncology (ASCO)	April 2016
	Role of Patient and Disease Factors in Adjuvant Systemic Therapy Decision-Making for Early-Stage, Operable Breast Cancer		March 2016
	Adjuvant Endocrine Therapy for Women with Hormone Receptor–Positive Breast Cancer Update on Ovarian Suppression		February 2016
	Use of Biomarkers to Guide Decisions on Adjuvant Systemic Therapy for Women with Early-Stage Invasive Breast Cancer		February 2016
	Use of Biomarkers to Guide Decisions on Systemic Therapy for Women with Metastatic Breast Cancer		July 2015
	Chemo- and Targeted Therapy for Women with HER2–Negative (or unknown) Advanced Breast Cancer		September 2014
	Systemic Therapy for Patients with Advanced Human Epidermal Growth Factor Receptor 2–Positive Breast Cancer		May 2014
	Recommendations on Disease Management for Patients with Advanced Human Epidermal Growth Factor Receptor 2–Positive Breast Cancer and Brain Metastases		May 2014
	Margins for Breast-Conserving Surgery with Whole-Breast Irradiation in Stage I and II Invasive Breast Cancer Endorsement		April 2014
	Sentinel Lymph Node Biopsy for Patients with Early-Stage Breast Cancer Update		March 2014
	Recommendations for Human Epidermal Growth Factor Receptor 2 Testing in Breast Cancer Update		November 2013
	Immunohistochemical Testing of Estrogen and Progesterone Receptors in Breast Cancer		June 2010

Condition	Guideline Title	Developer	Year
Breast Cancer	Accelerated Partial Breast Irradiation	American Society for Radiation Oncology (ASTRO)	February 2009
	Fractionation for Whole Breast Irradiation		April 2010
	Guideline on Margins for Breast-Conserving Surgery with Whole-Breast Irradiation in Stages I and II Invasive Breast Cancer		November 2013
Chronic Myelogenous Leukemia	NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Chronic Myelogenous Leukemia	NCCN	September 2015
Colon Cancer	NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Colon Cancer	NCCN	November 2015
	Extended *RAS* Gene Mutation Testing in Metastatic Colorectal Carcinoma to Predict Response to Anti–Epidermal Growth Factor Receptor Monoclonal Antibody Therapy Provisional Clinical Opinion Update	ASCO	October 2015
	Hereditary Colorectal Cancer Syndromes Endorsement of the Familial Risk–Colorectal Cancer European Society for Medical Oncology Guideline		December 2014
	Recommendations for the Use of Tumor Markers in Gastrointestinal Cancer Update		October 2006
	Recommendations on Adjuvant Chemotherapy for Stage II Colon Cancer		August 2004
Kidney Cancer	NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Kidney Cancer	NCCN	November 2015
Malignant Melanoma	NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Melanoma	NCCN	November 2015
	Sentinel Lymph Node Biopsy for Melanoma	ASCO	August 2012
Non-Hodgkin Lymphoma (Diffuse Large B-Cell)	NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Non-Hodgkin Lymphomas	NCCN	August 2014

Condition	Guideline Title	Developer	Year
Non-Small Cell Lung Cancer (NSCLC)	NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Non-Small Cell Lung Cancer	NCCN	January 2016
	Systemic Therapy for Stage IV Non-Small Cell Lung Cancer Update	ASCO	August 2015
	Definitive and Adjuvant Radiotherapy in Locally Advanced Non-Small Cell Lung Cancer Guideline Endorsement		May 2015
	Molecular Testing for Selection of Lung Cancer Patients for Epidermal Growth Factor Receptor (EGFR) and ALK Tyrosine Kinase Inhibitors (TKI) Guideline Endorsement		October 2014
	EGFR Mutation Testing for Patients with Advanced Non-Small Cell Lung Cancer Considering First-Line EGFR TKI Therapy PCO		May 2011
	Adjuvant Chemotherapy and Adjuvant Radiation Therapy for Stages I – IIIA Resectable Non-Small Cell Lung Cancer		December 2007
Ovarian Cancer	NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Ovarian Cancer Including Fallopian Tube Cancer and Primary Peritoneal Cancer	NCCN	June 2015
Pancreatic Cancer	NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Pancreatic Adenocarcinoma	NCCN	March 2015
Prostate Cancer	NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) Prostate Cancer	NCCN	February 2016
	Active Surveillance for the Management of Localized Prostate Cancer Endorsement	ASCO	February 2016
	Adjuvant and Salvage Radiotherapy After Prostatectomy Endorsement		November 2014
	Systemic Therapy in Men with Metastatic Castration-Resistant Prostate Cancer		September 2014
	Screening for Prostate Cancer with Prostate-Specific Antigen Testing PCO		February 2012

Condition	Guideline Title	Developer	Year
Prostate Cancer	Use of 5-alpha Reductase Inhibitors for Prostate Cancer Chemoprevention	ASCO	March 2009
	Non-Hormonal Therapy for Men With Metastatic Hormone-Refractory (Castration-Resistant) Prostate Cancer Endorsement		November 2007
	Initial Hormonal Management of Androgen-Sensitive Metastatic, Recurrent, or Progressive Prostate Cancer Update		April 2007
	Adjuvant and Salvage Radiotherapy After Prostatectomy	ASTRO	May 2013
Cross-Cutting	Adult Cancer Pain	NCCN	March 2016
	Antiemesis		April 2016
	Cancer- and Chemotherapy-Induced Anemia		November 2016
	Cancer-Associated Venous Thromboembolic Disease		July 2016
	Cancer-Related Fatigue		December 2015
	Distress Management		July 2016
	Palliative Care		November 2015
	Prevention and Treatment of Cancer-Related Infections		May 2016
	Smoking Cessation		September 2016
	Survivorship		September 2016

Appendix J: Improving Oncology Measurement: Roundtable Participants

Name	Title	Affiliation	Role
Mark McClellan, MD, PhD	Director	Duke-Margolis Center for Health Policy	Co-Chairs
Robert S. Miller, MD, FACP, FASCO	Vice President, Quality and Guidelines	American Society of Clinical Oncology	
Kimberly Westrich, MA	Vice President, Health Services Research	National Pharmaceutical Council	Facilitators
Tom Valuck, MD, JD	Partner	Discern Health	
Joseph Alvarnas, MD	Director of Medical Quality	City of Hope	Participants
Alan Balch, PhD	Chief Executive Officer	Patient Advocate Foundation	
Helen Burstin, MD, MPH, FACP	Chief Scientific Officer	National Quality Forum	
Woody Eisenberg, MD, FACP	Senior Vice President, Performance Measurement and Strategic Alliances	Pharmacy Quality Alliance	
Karen Fields, MD	Medical Director, Strategic Alliances	Moffitt Cancer Center	
Stephen Flaherty, MPH, BSc	Program Manager Quality Measures	Dana-Farber Cancer Institute	
	Chair	Comprehensive Cancer Center Consortium for Quality Improvement	
Shelley Fuld Nasso	Chief Executive Officer	National Coalition for Cancer Survivorship (NCCS)	
William Golden, MD, MACP	Medical Director	Arkansas Medicaid	
Linda House, RN, BSN, MSM	President	Cancer Support Community	

Name	Title	Affiliation	Role
Carol Jones	Program Analyst	Centers for Medicare & Medicaid Services Center for Clinical Standards and Quality	Participants
J. Leonard Lichtenfeld, MD, MACP	Deputy Chief Medical Officer	American Cancer Society	
Jennifer Malin, MD, PhD	Staff Vice President for Clinical Strategy	Anthem	
R. Sean Morrison, MD	Director	National Palliative Care Research Center	
Jeremy Nobel, MD, MPH	Medical Director	Northeast Business Group on Health	
Sarah Scarpace Peters, PharmD, MPH, BCOP	President	Hematology/Oncology Pharmacy Association	
Gamini Soori, MD, MBA, FACP, FRCP, CPE	CEO & Medical Director	Nebraska Cancer Specialists / Midwest Health Coalition	
Manasi Tirodkar, PhD, MS	Research Scientist	National Committee for Quality Assurance	
Cristie Travis	Chief Executive Officer	Memphis Business Group on Health	
Emily Wilson	Executive Vice President	American Society for Radiation Oncology	
Andrew York, PharmD, JD	Health Insurance Specialist	Center for Medicare & Medicaid Innovation, Patient Care Models Group	

Appendix K: Available Condition-Specific Quality Measures Aligned with Measure Opportunities

Condition(s)	Measure ID	Measure Title	Steward
Breast Cancer	NQF 0219 CoC BCSRT	Post-breast conservation surgery irradiation	American College of Surgeons (ACS)
Breast Cancer	NQF 0222	Patients with early-stage breast cancer who have evaluation of the axilla	Intermountain Healthcare
Colon Cancer	NQF 0225 CoC 12RLN QOPI 70	At least 12 regional lymph nodes are removed and pathologically examined for resected colon cancer	ACS
Colon Cancer	NQF 0385 QOPI 67 QOPI 68	Oncology: chemotherapy for American Joint Committee on Cancer (AJCC) Stage III colon cancer patients	PCPI®
Colon Cancer	NQF 0572 QOPI 72	Follow-up after initial diagnosis and treatment of colorectal cancer: colonoscopy	Health Benchmarks-IMS Health
Breast Cancer	NQF 0623	Breast cancer: cancer surveillance	ActiveHealth Management
Breast Cancer	NQF 1878 QOPI 54	HER2 testing for overexpression or gene amplification in patients with breast cancer	American Society of Clinical Oncology (ASCO)
Non-Small Cell Lung Cancer (NSCLC)	CoC LCT	Systemic chemotherapy is administered within 4 months to day preoperatively or day of surgery to 6 months postoperatively, or it is recommended for surgically resected cases with pathologic, lymph node-positive (pN1) and (pN2) NSCLC	ACS
NSCLC	CoC LNoSurg	Surgery is not the first course of treatment for cN2, M0 lung cases	ACS
Melanoma	CoC M05IgLN	At least 5 regional lymph nodes are removed and examined in inguinal lymph node dissection	ACS
Melanoma	CoC M10AxLN	At least 10 regional lymph nodes are removed and examined in axillary lymph node dissection	ACS

Condition(s)	Measure ID	Measure Title	Steward
Breast Cancer	CoC MASTRT	Radiation therapy is recommended or administered following any mastectomy within one year of diagnosis of breast cancer for women with ≥ four positive regional lymph nodes	ACS
Melanoma	CoC MCLND	Completion lymph node dissection use after positive sentinel lymph nodes biopsy	ACS
Ovarian Cancer	CoC OVSAL	Salpingo-oophorectomy with omentectomy, debulking, cytoreductive surgery, or pelvic exenteration in stages I – IIIC ovarian cancer	ACS
Colon Cancer	CoC RECRTCT	Preoperative chemo and radiation are administered for clinical AJCC T3N0, T4N0, or Stage III; postoperative chemo and radiation are administered within 180 days of diagnosis for clinical AJCC T1-2N0 with pathologic AJCC T3N0, T4N0, or Stage III; or treatment is recommended for patients under the age of 80 receiving resection for rectal cancer	ACS
Pancreatic Cancer	NQMC 006373	Pancreatic cancer: percentage of patients being considered for resection for whom a triple-phase, multi-slice CT, or MRI scan is obtained	ACS
Pancreatic Cancer	NQMC 006380	Pancreatic cancer: percentage of patients undergoing cancer-directed resection for whom the number of lymph nodes positive is recorded	ACS
Pancreatic Cancer	NQMC 006383	Pancreatic cancer: percentage of patients undergoing adjuvant therapy for whom the timing relative to resection (before, after, both) is recorded	ACS
Pancreatic Cancer	NQMC 006386	Pancreatic cancer: percentage of patients with clinical Stage I or II disease who undergo resection or have a valid reason documented for not undergoing resection	ACS

Condition(s)	Measure ID	Measure Title	Steward
Pancreatic Cancer	NQMC 006387	Pancreatic cancer: percentage of patients undergoing cancer-directed resection for whom adjuvant chemotherapy with or without radiation is considered or administered, or a valid reason is documented for not receiving adjuvant therapy	ACS
Pancreatic Cancer	NQMC 006388	Pancreatic cancer: percentage of patients with clinical Stage IV disease for whom cancer-directed surgery is not done	ACS
Pancreatic Cancer	NQMC 006389	Pancreatic cancer: percentage of patients not undergoing resection for whom chemotherapy or chemoradiation is considered or administered, or a valid reason is documented for not receiving non-surgical therapy	ACS
Pancreatic Cancer	NQMC 006390	Pancreatic cancer: percentage of patients to receive treatment for whom the time from diagnosis to surgery or first treatment is less than two months	ACS
Pancreatic Cancer	NQMC 006399	Pancreatic cancer: percentage of patients to undergo resection for resectable pancreatic cancer for whom, on the basis of CT or MRI scan, there is (1) no metastatic disease; (2) no tumor contact with the superior mesenteric vein (SMV) or portal vein (PV) or less than or equal to 180° contact without vein contour irregularity; and (3) no arterial tumor contact (celiac axis [CA], superior mesenteric artery [SMA], or common hepatic artery [CHA])	ACS
Breast Cancer	NQMC 007407	Breast cancer: the proportion of patients with invasive cancer and axillary clearance performed who had at least 10 lymph nodes examined	European Society of Breast Cancer Specialists (ESBCS)
Breast Cancer	NQMC 007408	Breast cancer: the proportion of patients with invasive breast cancer (M0) who received post-operative radiotherapy after surgical resection of the primary tumor and appropriate axillary staging/ surgery in the framework of BCT	ESBCS
Breast Cancer	NQMC 007411	Breast cancer: the proportion of patients with DCIS who do not undergo axillary clearance	ESBCS

Condition(s)	Measure ID	Measure Title	Steward
Breast Cancer	NQMC 007412	Breast cancer: the proportion of patients with invasive breast cancer with pN0 who do not undergo axillary clearance	ESBCS
Breast Cancer	NQMC 007413	Breast cancer: the proportion of patients with endocrine-sensitive invasive carcinoma who received hormonotherapy	ESBCS
Breast Cancer	NQMC 007415	Breast cancer: the proportion of patients with N+ or N- T > 1 cm HER2+ (IHC 3+ or FISH+) invasive carcinoma treated with chemotherapy and who had adjuvant trastuzumab	ESBCS
Breast Cancer	NQMC 009623	Breast cancer: percentage of patients who had documentation of follow-up care (recommendations) during the 12-month period after completing the final component of the treatment plan for breast imaging, coordination of care, LVEF assessment, and pelvic exam	Oncology Nursing Society
Prostate Cancer	NQMC 010099	Prostate cancer: percentage of patients, regardless of age, with a diagnosis of prostate cancer receiving interstitial prostate brachytherapy, OR external beam radiotherapy to the prostate, OR radical prostatectomy, OR cryotherapy with documented evaluation of prostate-specific antigen (PSA), AND primary tumor (T) stage, AND Gleason score prior to initiation of treatment	American Urological Association (AUA)
Prostate Cancer	NQMC 010100	Prostate cancer: percentage of patients, regardless of age, with a new diagnosis of prostate cancer with documented evaluation of PSA, AND primary tumor (T) stage, AND Gleason score	AUA
Ovarian Cancer	NQMC 010213	Diagnostic imaging: percentage of final reports for ultrasound studies of the pelvis for pre-menopausal women aged 18 and older with no known ovarian disease with a simple ovarian cyst less than 5 cm noted incidentally with follow-up imaging recommended	American College of Radiology

Condition(s)	Measure ID	Measure Title	Steward
Non-Hodgkin Lymphoma (NHL)	NQMC 010678	Non-Hodgkin lymphoma: percent of patients with lymphoma whose initial lymphoma diagnosis was established by one of the following: incisional or excisional biopsy AND immunohistochemical characterization, OR core needle biopsy AND appropriate ancillary techniques employed	American Society of Hematology (ASH)
NHL	NQMC 010679	Non-Hodgkin lymphoma: percent of lymphoma patients assigned a specific stage using Ann Arbor system including presence/absence of B symptoms AND having bone marrow biopsy or documentation why bone marrow biopsy was unnecessary or contraindicated	ASH
NHL	NQMC 010680	Non-Hodgkin lymphoma: percent of lymphoma patients treated with anti-CD20 monoclonal antibody-containing regimens and tested for hepatitis B prior to medication administration	ASH
Breast Cancer	QOPI 55	Trastuzumab recommended for patients with AJCC Stage I (T1c) – III HER2/neu positive breast cancer	ASCO
Breast Cancer	QOPI 56a	Trastuzumab not received when HER2/neu is negative or undocumented	ASCO
Breast Cancer	QOPI 57	Trastuzumab received by patients with AJCC IA (T1c) and IB – III HER2/neu positive breast cancer	ASCO
Breast Cancer	QOPI 58	Tamoxifen or AI recommended within 1 year of diagnosis for patients with AJCC Stage IA (T1c) and IB – III Estrogen Receptor (ER)- or Progesterone Receptor (PR)-positive breast cancer	ASCO
Breast Cancer	QOPI 59	Tamoxifen or AI received within one year of diagnosis by patients with AJCC Stage IA(T1c) and IB – III ER- or PR-positive breast cancer	ASCO
Breast Cancer	QOPI 60	Tamoxifen or AI received when ER/PR status is negative or undocumented	ASCO
Colon Cancer	QOPI 65(a-c)	Genetic testing addressed appropriately for patients with invasive colorectal cancer	ASCO

Condition(s)	Measure ID	Measure Title	Steward
Colon Cancer	QOPI 66	Carcinoembryonic antigen (CEA) within four months of curative resection for colorectal cancer	ASCO
Colon Cancer	QOPI 74	*RAS* (*KRAS* and *NRAS*) testing for patients with metastatic colorectal cancer who received anti-epidermal growth factor receptor (EGFR) Monoclonal antibody (MoAb) therapy	ASCO
Colon Cancer	QOPI 75a	Anti-EGFR MoAb therapy not received by patients with *KRAS* and *NRAS* mutation	ASCO
NHL	QOPI 77	Obinutuzumab, ofatumumab, or rituximab not administered when cluster differentiation (CD)-antigen expression is negative or undocumented	ASCO
NHL	QOPI 77a	Obinutuzumab, ofatumumab, or rituximab not administered when CD-antigen expression is negative or undocumented	ASCO
NHL	QOPI 78	Hepatitis B virus infection test (HBsAg) and Hepatitis B core antibody (Anti-HBc) test within 3 months prior to initiation of obinutuzumab, ofatumumab, or rituximab for patients with NHL	ASCO
NSCLC	QOPI 79	Adjuvant chemotherapy recommended for patients with AJCC Stage II or IIIA NSCLC	ASCO
NSCLC	QOPI 80	Adjuvant chemotherapy received by patients with AJCC Stage II or IIIA NSCLC	ASCO
NSCLC	QOPI 81	Adjuvant cisplatin-based chemotherapy received within 60 days after curative resection by patients with AJCC Stage II or IIIA NSCLC	ASCO
NSCLC	QOPI 82	Adjuvant chemotherapy recommended for patients with AJCC Stage IA NSCLC	ASCO

Condition(s)	Measure ID	Measure Title	Steward
NSCLC	QOPI 85	Platinum doublet first-line chemotherapy or EGFR-TKI (or other targeted therapy with documented DNA mutation) received by patients with initial AJCC Stage IV or distant metastatic NSCLC with performance status of 0-1 without prior history of chemotherapy	ASCO
NSCLC	QOPI 88	Positive mutation for patients with Stage IV NSCLC who received first-line EGFR tyrosine kinase inhibitor or other targeted therapy	ASCO
NSCLC	QOPI 89	First-line EGFR tyrosine kinase inhibitor or other targeted therapy received by patients with Stage IV NSCLC in the absence of positive mutation	ASCO
Ovarian Cancer	QOPI 92	Intraperitoneal chemotherapy offered within 42 days of optimal cytoreduction to women with invasive Stage III ovarian, fallopian tube, or peritoneal cancer	ASCO
Ovarian Cancer	QOPI 93	Intraperitoneal chemotherapy administered within 42 days of optimal cytoreduction to women with invasive Stage III ovarian, fallopian tube, or peritoneal cancer	ASCO
Colon Cancer	NCQA Col	Use of evidence-based adjuvant chemotherapy regimens for patients with Stage IIIA – IIIC colon cancer	NCQA
NSCLC	NCQA Lung	Use of evidence-based systemic therapy for patients with metastatic NSCLC	NCQA

Appendix L: Initial Cross-Cutting Measure Opportunity Findings

Category	Measure Opportunity
Care Coordination	Coordinating treatment information with other care providers
	Delivering appropriate treatment at high-volume facilities
	Referring patients to clinical trials
	Referring patients to multidisciplinary care team providers
Clinical Outcome	Rate of hospital readmissions following treatment
	Rate of hospitalization and emergency department use following treatment
	Rate of mortality following treatment
	Rate of overall survival following treatment
	Rate of stage-specific survival following treatment
	Rate of patients progressing to advanced-stage disease
	Rate of cancer recurrence/remission or secondary cancer following treatment
	Rate of therapy line failure among treated patients
Cost and Utilization of Care	Appropriate chemotherapy utilization at end of life
	Appropriate imaging utilization
	Adherence to treatment pathways
	Appropriate laboratory testing utilization
	Appropriate radiation therapy utilization
	Cost of care (per episode)
	Drug therapy costs (per episode)
	Inpatient medical costs (per episode)
	Post-acute care costs (per episode)
	Other medical technology costs (per episode)

Category	Measure Opportunity
Palliative and End-of-Life Care	Discussing and developing advance care directives
	Managing and treating bone metastases
	Managing and treating dyspnea in cancer
	Managing and treating general cancer pain
	Referring appropriately for hospice care
Diagnosis and Staging	Assessing genetic status and counseling patients
	Assessing patient performance status to guide treatment
	Collecting and recording lymph node samples
	Coordinating pathology findings among care providers
	Reporting adequate pathology or staging information
	Reporting operative information and surgical margins
	Using standardized pathology reporting tools
Patient-Centered Process	Monitoring patient functionality
	Counseling patients on fertility prior to treatment
	Counseling patients on nutritional well-being
	Counseling patients on therapy selection and treatment options
	Developing a stage-specific treatment plan
	Educating patients on appropriate use of therapy
	Monitoring adherence to therapy
	Monitoring and treating psychosocial distress or emotional well-being
	Providing timely clinical information to patients

Category	Measure Opportunity
Patient-Reported Outcome	Assessing caregiver satisfaction with care delivery
	Assessing change in patient pain
	Assessing change in patient psychosocial health
	Assessing patient satisfaction with care delivery
	Assessing change in patient functionality
Safety	Monitoring appropriate chemotherapy dosing
	Monitoring appropriate radiation dosing
	Monitoring effects of chemotherapy
	Monitoring and treating neutropenia for certain chemotherapy use
	Monitoring and treating tumor lysis syndrome
	Rate of complications following treatment
Screening and Prevention	Administering appropriate immunizations and vaccinations
	Monitoring and treating bone health
	Screening for secondary cancer following remission
Survivorship	Addressing smoking, alcohol, and/or drug use
	Developing a survivorship plan
Symptom Management	Managing and treating general fatigue or distress
	Monitoring and treating anemia for certain chemotherapy use
	Monitoring and treating emetic symptoms for chemotherapy use
	Monitoring general symptoms of chemotherapy use

Endnotes

1. McClellan M, Penso J, Valuck T, Dugan D, Dubois RW, Westrich K. *Accountable Care Measures for High-Cost Specialty Care and Innovative Treatment.* Washington, DC: National Pharmaceutical Council; 2014.
2. The High Concentration of U.S. Health Care Expenditures: Research in Action, Issue 19. Agency for Healthcare Research and Quality website. http://archive.ahrq.gov/research/findings/factsheets/costs/expriach/index.html. Published June 2006. Accessed January 31, 2017.
3. Mariotto AB, Yabroff KR, Shao Y, Feuer EJ, Brown ML. Projections of the cost of cancer care in the United States: 2010-2020. *J Natl Cancer Inst.* 2011;103(2):117-128.
4. Targeted Therapy. National Cancer Institute website. https://www.cancer.gov/about-cancer/treatment/types/targeted-therapies. August 15, 2014. Accessed January 31, 2017.
5. *A Decade of Innovation in Cancer: 2006-2016.* Washington, DC: The Pharmaceutical Researchers and Manufacturers of America; 2016.
6. Zeng C, Wen W, Morgans AK, et al. Disparities by race, age, and sex in the improvement of survival for major cancers. *JAMA Oncol.* 2015;1(1):88-96.
7. *Cancer Treatment & Survivorship Facts & Figures 2016-2017.* Atlanta, GA: American Cancer Society; 2016.
8. HHS announces physician groups selected for an initiative promoting better cancer care [press release]. US Dept of Health and Human Services; June 29, 2016. https://www.hhs.gov/about/news/2016/06/29/hhs-announces-physician-groups-selected-initiative-promoting-better-cancer-care.html. Accessed January 31, 2017.
9. *Payment Methods for Certain Cancer Hospitals Should Be Revised to Promote Efficiency.* Washington, DC: US Government Accountability Office; February 2015.
10. PPS-Exempt Cancer Hospital Quality Reporting (PCHQR) Program. Quality Reporting Center website. http://www.qualityreportingcenter.com/inpatient/pch/. Accessed March 1, 2017.
11. Study: New cancer care payment model reduced health care costs, maintained outcomes [press release]. Minnetonka, MN: UnitedHealth Group; July 8, 2014. http://www.unitedhealthgroup.com/newsroom/articles/feed/unitedhealthcare/2014/0708cancercarepaymentstudy.aspx. Accessed January 31, 2017.
12. Oncology Care Model. Oncology Care Model [fact sheet]. Centers for Medicare & Medicaid Services website. https://www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-sheets/2016-Fact-sheets-items/2016-06-29.html. June 29, 2016. Accessed January 31, 2017.
13. Morris AM, Rhoads KF, Stain SC, Birkmeyer JD. Understanding racial disparities in cancer treatment and outcomes. *J Am Coll Surg.* 2010;211(1):105-113.
14. Toward a Comprehensive Cancer Measure Set: Value-Based Episodes of Care [workshop summary]. Washington, DC: National Quality Forum; May 2008.
15. ASCO Institute for Quality. American Society of Clinical Oncology website. http://www.instituteforquality.org. Accessed January 31, 2017.
16. Cancer Measure Set: Value-Based Episodes of Care. National Quality Forum website. http://www.qualityforum.org/Projects/c-d/Cancer_Measure_Set_Value-Based_Episodes_of_Care/Comprehensive_Cancer_Measure_Set__Value-Based_Episodes_of_Care.aspx. Accessed January 31, 2017.
17. Cancer Care Phase I-II. National Quality Forum website. http://www.qualityforum.org/Projects/c-d/Cancer_Care_Phase_II/Cancer_Care_Phase_I-II.aspx. Accessed January 31, 2017.
18. Cancer 2015-2017. National Quality Forum website. http://www.qualityforum.org/Cancer_Project_2015-2017.aspx. Accessed January 31, 2017.

19. McClellan M, Patel K, O'Shea J, Nadel J, Thoumi A, Tobin J. *Specialty Payment Model Opportunities Assessment and Design: Summary of the Technical Expert Panel for Oncology.* Washington, DC: The Brookings Institution; 2013.

20. Consensus Core Set: Medical Oncology Measures Version 1.0. Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/Downloads/Medical-Oncology-Measures.pdf. Updated November 2015. Accessed January 31, 2017.

21. Cancer Stat Facts: Female Breast Cancer. National Cancer Institute website. https://seer.cancer.gov/statfacts/html/breast.html. Updated April 2016. Accessed January 31, 2017.

22. Gradishar W, Salerno KE. NCCN Guidelines Update: Breast cancer. *J Natl Compr Canc Netw.* 2016;14:641-644.

23. Sandoval C, Rahal R, Forte T, Klein-Geltink J, He D, Bryant H. Indicator measures ER/PR and HER2 testing among women with invasive breast cancer. *Curr Oncol.* 2013;20(1):62-63.

24. Cancer Stat Facts: Chronic Myeloid Leukemia (CML). National Cancer Institute website. https://seer.cancer.gov/statfacts/html/cmyl.html. Updated April 2016. Accessed January 31, 2017.

25. What Are the Survival Rates for CML? The National CML Society website. http://www.nationalcmlsociety.org/faq/general-leukemia-questions/what-are-survival-rates-cml. Accessed January 31, 2017.

26. O'Brien S, Radich JP, Abboud CN, et al. Chronic Myelogenous Leukemia, Version 1.2015. *J Natl Compr Canc Netw.* 2014;12:1590-1610.

27. Cancer Stat Facts: Colon and Rectum Cancer. National Cancer Institute website. https://seer.cancer.gov/statfacts/html/colorect.html. Updated April 2016. Accessed January 31, 2017.

28. Benson III AB, Venook AP, Bekaii-Saab T, et al. Colon Cancer, Version 3.2014. *J Natl Compr Canc Netw.* 2014;12:1028-1059.

29. Cancer Stat Facts: Kidney and Renal Pelvis Cancer. National Cancer Institute website. https://seer.cancer.gov/statfacts/html/kidrp.html. Updated April 2016. Accessed January 31, 2017.

30. Motzer RJ, Jonasch E, Agarwal N, et al. Kidney Cancer, Version 3.2015. *J Natl Compr Canc Netw.* 2015;13:151-159.

31. Cancer Stat Facts: Melanoma of the Skin. National Cancer Institute website. https://seer.cancer.gov/statfacts/html/melan.html. Updated April 2016. Accessed January 31, 2017.

32. Coit DG, Thompson JA, Algazi A, et al. Melanoma, Version 2.2016, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw.* 2016;14:450-473.

33. Cancer Stat Facts: Non-Hodgkin Lymphoma. National Cancer Institute website. https://seer.cancer.gov/statfacts/html/nhl.html. Updated April 2016. Accessed January 31, 2017.

34. Zelenetz AD, Gordon LI, Wierda WG, et al. Diffuse Large B-cell Lymphoma, Version 1.2016. *J Natl Compr Canc Netw.* 2016;14:196-231.

35. Cancer Stat Facts: Lung and Bronchus Cancer. National Cancer Institute website. https://seer.cancer.gov/statfacts/html/lungb.html. Updated April 2016. Accessed January 31, 2017.

36. Ettinger DS, Wood DE, Akerley W, et al. Non–Small Cell Lung Cancer, Version 6.2015. *J Natl Compr Canc Netw.* 2015;13:515-524.

37. Cancer Stat Facts: Ovarian Cancer. National Cancer Institute website. https://seer.cancer.gov/statfacts/html/ovary.html. Updated April 2016. Accessed January 31, 2017.

38. Morgan RJ, Armstrong DK, Alvarez RD, et al. Ovarian Cancer, Version 1.2016, NCCN Clinical Practice Guidelines in Oncology. *J Natl Compr Canc Netw.* 2016;14:1134-1163.

39. Cancer Stat Facts: Pancreas Cancer. National Cancer Institute website. https://seer.cancer.gov/statfacts/html/pancreas.html. Updated April 2016. Accessed January 31, 2017.

40. Tempero MA, Arnoletti JP, Behrman S, et al. Pancreatic Adenocarcinoma. *J Natl Compr Canc Netw.* 2010;8:972-1017.

41. Cancer Stat Facts: Prostate Cancer. National Cancer Institute website. https://seer.cancer.gov/statfacts/html/prost.html. Updated April 2016. Accessed January 31, 2017.

42. Mohler JL, Armstrong AJ, Bahnson RR, et al. Prostate Cancer, Version 1.2016. *J Natl Compr Canc Netw.* 2016;14:19-30.

43. What are cross-cutting measures in Physician Quality Reporting System (PQRS) and how do face-to-face encounters trigger possible reporting of a cross-cutting measure? Centers for Medicare & Medicaid Services website. https://questions.cms.gov/faq.php?id=5005&faqId=12168. Accessed January 31, 2017.

44. Development of Quality Measures for Potential Use in Oncology Quality Reporting Programs. National Committee for Quality Assurance website. http://www.ncqa.org/homepage/ncqa-public-comments/development-of-quality-measures-for-potential-use-in-oncology-quality-reporting-programs. Accessed January 31, 2017.

45. *OCM Performance-Based Payment Methodology Version 1.1.* Research Triangle Park, NC: RTI International; 2016.

46. Our Standard Sets. International Consortium for Health Outcomes Measurement website. http://www.ichom.org/medical-conditions/. Accessed January 31, 2017.

47. Oncology Care Model (OCM) Request for Applications (RFA). Centers for Medicare & Medicaid Innovation website. https://innovation.cms.gov/files/x/ocmrfa.pdf. Updated June 2015. Accessed January 31, 2017.

48. Consensus Core Set: Medical Oncology Measures Version 1.0. Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/QualityMeasures/Downloads/Medical-Oncology-Measures.pdf. Updated November 2015. Accessed January 31, 2017.

49. NQF Measure Incubator™. National Quality Forum website. https://www.qualityforum.org/NQF_Measure_Incubator.aspx. Accessed January 31, 2017.

50. Valuck T, Dugan D, Dubois RW, Westrich K, Penso J, McClellan M. Solutions for filling gaps in accountable care measure sets. *Am J Manag Care.* 2015;21(10):723-728.

51. *Accelerating and Aligning Population-Based Payment: Patient Attribution.* McLean, VA: Health Care Payment Learning & Action Network; 2016.

52. *Accelerating and Aligning Population-Based Payment: Financial Benchmarking.* McLean, VA: Health Care Payment Learning & Action Network; 2016.

53. *Accelerating and Aligning Population-Based Payment: Performance Measurement.* McLean, VA: Health Care Payment Learning & Action Network; 2016.

54. *Accelerating and Aligning Population-Based Payment: Data Sharing.* McLean, VA; Health Care Payment Learning & Action Network; 2016.

55. *Attribution–Principles and Approaches.* Washington, DC: National Quality Forum; 2016.

56. *Risk Adjustment for Socioeconomic Status or Other Sociodemographic Factors.* Washington, DC: National Quality Forum; 2014.

57. Part II. Introduction to Measures of Quality. Agency for Healthcare Research and Quality website. https://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/perfmeasguide/perfmeaspt2.html. Updated October 2014. Accessed January 31, 2017.

58. Value in Cancer Care. American Society of Clinical Oncology website. https://www.asco.org/practice-guidelines/cancer-care-initiatives/value-cancer-care. Accessed January 31, 2017.

59. Practice & Guidelines. American Society of Clinical Oncology website. https://www.asco.org/practice-guidelines. Accessed January 31, 2017.

60. Clinical Practice Statements. American Society of Clinical Oncology website. https://www.astro.org/Clinical-Practice-Statements.aspx. Accessed January 31, 2017.

61. NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) with NCCN Evidence Blocks™. National Comprehensive Cancer Network website. https://www.nccn.org/evidenceblocks/. Accessed January 31, 2017.

62. NCCN Guidelines®. National Comprehensive Cancer Network website. https://www.nccn.org/professionals/physician_gls/f_guidelines.asp. Accessed January 31, 2017.

63. CancerLINQ. ASCO CancerLINQ website. https://cancerlinq.org/. Accessed January 31, 2017.

64. Quality Payment Program Educational Resources. Centers for Medicare & Medicaid Services website. https://qpp.cms.gov/resources/education. Accessed January 31, 2017.

65. Home Health Quality Reporting Requirements. Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HomeHealthQualityInits/Home-Health-Quality-Reporting-Requirements.html. Updated January 2017. Accessed January 31, 2017.

66. Hospice Quality Reporting. Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Hospice-Quality-Reporting. Updated November 2016. Accessed January 31, 2017.

67. Hospital-Acquired Condition Reduction Program (HACRP). Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/HAC-Reduction-Program.html. Updated December 2016. Accessed January 31, 2017.

68. Hospital Inpatient Quality Reporting Program. Centers for Medicare & Medicaid Services website. https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/hospitalqualityinits/hospitalrhqdapu.html. Updated September 2013. Accessed January 31, 2017.

69. Hospital Outpatient Quality Reporting Program. Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalOutpatientQualityReportingProgram.html. Updated November 2013. Accessed January 31, 2017.

70. Remissions Reduction Program (HRRP). Centers for Medicare & Medicaid Services website. https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/readmissions-reduction-program.html. Updated April 2016. Accessed January 31, 2017.

71. Hospital Value-Based Purchasing. Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/hospital-value-based-purchasing/index.html. Updated October 2015. Accessed January 31, 2017.

72. ASC Quality Reporting. Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/ASC-Quality-Reporting. Updated December 2016. Accessed January 31, 2017.

73. Inpatient Rehabilitation Facilities (IRF) Quality Reporting Program (QRP). Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/IRF-Quality-Reporting. Updated December 2016. Accessed January 31, 2017.

74. Long-Term Care Hospital (LTCH) Quality Reporting (QRP). Centers for Medicare & Medicaid Services website. https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/ltch-quality-reporting. Updated December 2016. Accessed January 31, 2017.

75. Accountable Care Organizations (ACO). Centers for Medicare & Medicaid Services website. https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ACO/index.html. Updated January 2015. Accessed January 31, 2017.

76. Star Ratings. Centers for Medicare & Medicaid Services website. https://www.medicare.gov/find-a-plan/staticpages/rating/planrating-help.aspx. Accessed January 31, 2017.

77. PPS-Exempt Cancer Hospital Quality Reporting (PCHQR) Program. Quality Reporting Center website. http://www.qualityreportingcenter.com/inpatient/pch. Accessed January 31, 2017.

78. Oncology Care Model. Centers for Medicare & Medicaid Innovation website. https://innovation.cms.gov/initiatives/oncology-care. Updated January 2017. Accessed January 31, 2017.

79. Newcomer LN. Innovative Payment Models and Measurement for Cancer Therapy. *Journal of Oncology Practice.* 2014;10(3);187-189.

80. MD Anderson, UnitedHealthcare launch new cancer care payment model [press release]. MD Anderson; December 16, 2014. https://www.mdanderson.org/newsroom/2014/12/md-anderson-unitedhealthcare-launch-new-cancer-care-payment-mode.html. Accessed January 31, 2017.

81. Cancer Care Quality Program. AIM Oncology website. https://anthem.aimoncology.com. Accessed January 31, 2017.

82. Bandell B. Blue Cross signs first bundled payment deal with Miami firm. *South Florida Business Journal.* April 8, 2011. http://www.bizjournals.com/southflorida/print-edition/2011/04/08/blue-cross-signs-first-bundled.html. Accessed January 31, 2017.

83. Horizon Blue Cross Blue Shield of New Jersey creates ground-breaking patient-centered program for cancer treatment [press release]. Horizon Blue Cross Blue Shield of New Jersey. October 21, 2014. https://www.horizonblue.com/about-us/news/newsroom/horizon-blue-cross-blue-shield-of-new-jersey-creates-ground-breaking-patient-centered-program-for. Updated March 2017. Accessed January 31, 2017.

84. Edlin M. Oncology ACOs offer innovation for high-cost populations. *Managed Healthcare Executive.* January 1, 2014. http://managedhealthcareexecutive.modernmedicine.com/managed-healthcare-executive/content/tags/aco/oncology-acos-offer-innovation-high-cost-populations. Accessed January 31, 2017.

85. Tocknell MD. Humana, FL physicians group bundle radiation services. *HealthLeaders Media.* August 15, 2012. http://www.healthleadersmedia.com/finance/humana-fl-physicians-group-bundle-radiation-services. Accessed January 31, 2017.

86. Barkley R, Krasna M, Mantz C, O'Hara J, Sobczak M, Strieff L. To bundle or not to bundle? Oral presentation at: 2016 Cancer Center Business Summit. http://cancerbusinesssummit.com/Presentations/PPT_Feb_24_Track_A_315PM_Bundle_or_Not.ppt. Accessed January 31, 2017.

87. About Us. Oncology Medical Home website. http://www.medicalhomeoncology.org/. Accessed January 31, 2017.

88. The COME HOME Model. COME HOME Program website. http://www.comehomeprogram.com/index.php/come-home-practices. Accessed January 31, 2017.

89. Radiation Oncology Providers Split on Bundled Pay. American Association of Physicists in Medicine website. http://www.aapm.org/pubs/enews/documents/RadiationOncology.pdf. Accessed January 31, 2017.

90. ASTRO invites public comment on its palliative care alternative payment model [press release]. The Society for Radiation Oncology Administrators; May 16, 2016. https://www.sroa.org/news/2016/news_051616.cfm. Accessed January 31, 2017.

91. ASCO releases payment reform proposal to support higher quality, more affordable cancer care [press release]. American Society of Clinical Oncology; May 21, 2015. http://www.asco.org/advocacy-policy/asco-in-action/asco-releases-payment-reform-proposal-support-higher-quality-more. Accessed January 31, 2017.

92. Quality Measures. American Academy of Dermatology Association website. https://www.aad.org/practicecenter/quality/quality-measures. Accessed February 28, 2017.

93. Dataderm. American Academy of Dermatology Association website. https://www.aad.org/practicecenter/quality/dataderm. Accessed February 28, 2017.

94. PQRS Qualified Clinical Data Registry. American College of Radiology website. https://www.acr.org/Quality-Safety/National-Radiology-Data-Registry/Qualified-Clinical-Data-Registry. Accessed February 28, 2017.

95. Qualified Clinical Data Registry (QCDR) Non-PQRS Measures Supported 2016. American College of Radiology website. https://www.acr.org/~/media/ACR/Documents/PDF/QualitySafety/NRDR/QCDR/ACR%20QCDR%20Measures%20Supported%202016_NonPQRS.pdf. Accessed February 28, 2017.

96. Qualified Clinical Data Registry (QCDR) PQRS Measures Supported 2016. American College of Radiology website. https://www.acr.org/~/media/ACR/Documents/PDF/QualitySafety/NRDR/QCDR/ACR%20QCDR%20Measures%20Supported%202016_PQRS.pdf. Accessed February 28, 2017.

97. Performance Measures. American College of Radiology website. https://www.acr.org/Quality-Safety/Quality-Measurement/Performance-Measures. Accessed February 28, 2017.

98. CoC Quality of Care Measures. American College of Surgeons website. https://www.facs.org/quality%20programs/cancer/ncdb/qualitymeasures. Accessed February 28, 2017.

99. Colorectal Cancer Screening and Surveillance. American Gastroenterological Association website. http://www.gastro.org/practice-management/measures/2016_AGA_Measures_-_2016_AGA_QCDR.pdf. Accessed February 28, 2017.

100. Digestive Health Recognition Program (DHRP). American Gastroenterological Association website. http://www.gastro.org/practice-management/quality/quality-reportng/digestive-health-recognition-program-dhrp. Accessed February 28, 2017.

101. Quality Oncology Practice Initiative. American Society of Clinical Oncology Institute for Quality website. http://www.instituteforquality.org/quality-oncology-practice-initiative-qopi. Accessed February 28, 2017.

102. Measures Overview. American Society of Clinical Oncology Institute for Quality website. http://www.instituteforquality.org/qopi/measures. Accessed February 28, 2017.

103. ASTRO Measures. American Society for Radiation Oncology website. https://www.astro.org/Inventory.aspx. Accessed February 28, 2017.

104. AUA Developed Measures. American Urological Association website. https://www.auanet.org/resources/aua-developed-measures.cfm. Accessed February 28, 2017.

105. AQUA AUA Quality Registry. American Urological Association website. https://www.auanet.org/resources/aqua.cfm. Accessed February 28, 2017.

106. HEDIS® and Quality Compass®. National Committee for Quality Assurance website. http://www.ncqa.org/hedis-quality-measurement/what-is-hedis. Accessed February 28, 2017.

107. Quality Measure Development for Assessment of Patient-Reported Symptoms During Chemotherapy Treatment Measure Information Form. National Committee for Quality Assurance website. http://www.ncqa.org/Portals/0/PublicComment/MIF_PRO_Public_Comment.pdf?ver=2016-10-04-144602-713. Accessed February 28, 2017.

108. Quality Measure Development for Guideline-Concordant Cancer Care Measure Information Form. National Committee for Quality Assurance website. http://www.ncqa.org/Portals/0/PublicComment/MIF_Colon_Public_Comment.pdf?ver=2016-10-04-150000-177. Accessed February 28, 2017.

109. Quality Measure Development for Guideline-Concordant Cancer Care Measure Information Form. National Committee for Quality Assurance website. http://www.ncqa.org/Portals/0/PublicComment/MIF_NSCLC_Public_Comment.pdf?ver=2016-10-04-151404-563. Accessed February 28, 2017.

110. The Oncology Quality Clinical Data Registry. Medconcert website. https://www.medconcert.com/content/medconcert/ONSQIR/. Accessed February 28, 2017.

111. PCPI-Stewarded Measures. PCPI website. https://www.thepcpi.org/programs-initiatives/measurement-science/measure-directory/pcpi-stewarded-measures/. Accessed February 28, 2017.

112. Measures Stewarded Externally. PCPI website. https://www.thepcpi.org/programs-initiatives/measurement-science/measure-directory/pcpi-measures-stewarded-by-external-organizations/. Accessed February 28, 2017.

113. Quality Indicators. Society for Gynecologic Oncology website. https://www.sgo.org/quality-outcomes-and-research/quality-indicators/. Accessed February 28, 2017.

114. McClellan M, Patel K, O'Shea J, Nadel J, Thoumi A, Tobin J. *Specialty Payment Model Opportunities Assessment and Design: Environmental Scan for Oncology (Task 2): Final Version.* Washington, DC: The Brookings Institution; 2013.

115. U.S. Cancer Statistics Working Group. *United States Cancer Statistics: 1999–2013 Incidence and Mortality Web-based Report.* Atlanta, GA: U.S. Dept of Health and Human Services, Centers for Disease Control and Prevention, and National Cancer Institute; 2016.

116. Cancer Prevalence: How Many People Have Cancer? American Cancer Society website. https://www.cancer.org/cancer/cancer-basics/cancer-prevalence.html. Updated May 20, 2014. Accessed January 31, 2017.

117. Cancers That Develop in Children. American Cancer Society website. https://www.cancer.org/cancer/cancer-in-children/types-of-childhood-cancers.html. Updated August 22, 2016. Accessed January 31, 2017.

118. *Cancer Facts & Figures 2015.* Atlanta, GA: American Cancer Society; 2015.

119. National Expenditures for Cancer Care. National Cancer Institute website. https://costprojections.cancer.gov/expenditures.html. Accessed January 31, 2017.

120. NCCN Guidelines for Treatment of Cancer by Site. National Comprehensive Cancer Network website. https://www.nccn.org/professionals/physician_gls/f_guidelines_nojava.asp#site. Accessed January 31, 2017.

121. Examples of Cancer Health Disparities. National Cancer Institute website. https://www.cancer.gov/about-nci/organization/crchd/about-health-disparities/examples. Accessed January 31, 2017.

122. Medicare program; Merit-based Incentive Payment System (MIPS) and Alternative Payment Model (APM) incentive under the physician fee schedule, and criteria for physician-focused payment model. *Fed Regist.* Washington, DC: US Dept of Health and Human Services; 2016.

123. Medicare program; revisions to payment policies under the physician fee schedule and other revisions to Part B for CY 2017; Medicare Advantage pricing data release; Medicare Advantage and Part D medical low ratio data release; Medicare Advantage provider network requirements; expansion of Medicare diabetes prevention program model. *Fed Regist.* Washington, DC: US Dept of Health and Human Services; 2016.

124. Medicare program; hospital inpatient prospective payment systems for acute care hospitals and the Long-Term Care Hospital Prospective Payment System and policy changes and fiscal year 2017 rates; quality reporting requirements for specific providers; graduate medical education; hospital notification procedures applicable to beneficiaries receiving observation services; technical changes relating to costs to organizations and Medicare cost reports; finalization of interim final rules with comment period on LTCH PPS payments for severe wounds, modifications of limitations on redesignation by the Medicare Geographic Classification Review Board, and extensions of payments to MDHs and low-volume hospitals; final rule. *Fed Regist.* Washington, DC: US Dept of Health and Human Services; 2016.

125. Newcomer LN, Gould B, Page RD, Donelan S, Perkins M. Changing physician incentives for affordable, quality cancer care: Results of an episode payment model. *Journal of Oncology Practice.* 2014;10(5);322-326.

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