Comparison of U.S. Oncology Value Frameworks and Integration with Performance-based Pricing

by

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A master’s paper submitted to the faculty of The University of North Carolina at Chapel Hill In partial fulfillment of the requirements For the degree of Masters of Healthcare Administration In the Department of Health Policy and Management, Gillings School of Global Public Health

Chapel Hill

May 3rd, 2017

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EXECUTIVE SUMMARY

Rising cancer drug costs within the United States have raised questions regarding the accessibility and affordability of these treatments to patients. To curb costs, several organizations created value frameworks for oncology drugs. These frameworks calculate value by measuring the clinical benefit of the drug and dividing it by the cost of the drug. Currently, four U.S. value frameworks exist: the American Society of Clinical Oncology (ASCO) Value Framework, the National Comprehensive Cancer Network (NCCN) Evidence Blocks, the Institute for Clinical and Economic Review (ICER), and the Memorial Sloan Kettering Cancer Center (MSKCC) Drugabacus. These frameworks are defined by their inclusion of three perspectives: the physician, the patient, and the payer. Each of the frameworks weighs clinical, cost, and value metrics differently based on the predominant perspective(s) associated with the framework. For example, the ASCO and NCCN frameworks are primarily used as a shared decision making tool due to their emphasis of the physician and patient perspectives while the ICER and MSKCC Drugabacus frameworks focus on the payer perspective and include population level data and health system ramifications. Due to these different interpretations of value, an integrated value frameworks approach does not exist. However, these frameworks can still be used to change the price of oncology drugs by combining them with performance-based pricing. The frameworks can drive alignment across stakeholders to define and measure clinical outcomes for performance-based pricing. More importantly, the frameworks can be used to create a new pricing process where the framework-generated value output can raise or lower the price of oncology drugs. This will facilitate purchase negotiations between manufacturers and payers based on the value of the drug to patients. While limitations like transparency concerns and regulatory barriers still exist, there is an opportunity to improve the overall value of oncology
drugs and match them to the best care pathways by providing patients with the appropriate drug at the right time.

**INTRODUCTION**

Cancer is a generic term used to describe a set of diseases that is defined by the rapid creation of abnormal cells that grow uncontrollably and invade other parts of the body. According to the World Health Organization (WHO), cancer is the leading cause of morbidity and mortality worldwide with approximately 14 million new cases in 2012 and 8.2 million cancer related deaths in 2015 (World Health Organization, 2017). Treatments for cancer typically consist of cancer type specific treatment regimens that can include surgery, radiotherapy, chemotherapy and/or various other oncology drugs. However, the cost of cancer treatment, specifically oral oncology drugs, is far outpacing cost of living adjustments and is becoming an increasing burden on cancer patients. This issue is especially pressing as the WHO predicts that annual cancer cases will rise to 22 million within the next two decades (National Cancer Institute, 2017).

Oncology drug prices within the United States (US) have skyrocketed over the last 15 years with the price of most patented cancer drugs increasing 5 to 10-fold (Kantarjian et al., 2014). In 2000, the price for one year of therapy was around $10,000 whereas in 2012, 12 of 13 new drugs approved for cancer indications were priced at above $100,000 (Kantarjian et al., 2014). Due to the expensive nature of these drugs, insurance companies often assign them to the specialty drug tier. Thus, even with insurance, the patient is responsible for 20% to 30% of the drug or a financial burden of $20,000 to $30,000 (Kantarjian et al., 2014). In 2013, the median household income in the US was $51,939 so paying for these drugs will use approximately half of a household’s income (DeNavas-Walt & Proctor, 2014). As a result, there is a growing
concern regarding the affordability and ultimately the public’s accessibility to these life-saving drugs. Drug companies are being pressured by regulators and patients to change the pricing structure of oncology drugs as immuno-oncology drugs, drugs aimed at boosting the patient’s immune system to fight cancer, are entering the market. These drugs are often priced at a premium within the US with prices running over $100,000 per year of treatment (Kantarjian et al., 2014). The impact of these prices on patients has been especially pronounced in recent years as the Affordable Care Act (ACA) and other legislation have shifted the total cost of care to patients through higher premiums and copays (Schnipper & Bastian, 2016).

One potential solution is the adoption of a value-based or pay for performance model for cancer drug pricing. However, before any changes to the pricing structure of cancer drugs can happen, the value of oncology drugs must be determined. Value is a very nebulous term and there are currently several conceptual frameworks that try to quantify the value of cancer treatment options (Schnipper & Bastian, 2016). This paper will analyze four existing US value frameworks and identify key limitations and gaps across the frameworks. The goal behind this analysis is to provide a foundation to create a performance-based payment system for oncology drugs within the US. While performance-based contracting in other therapeutic areas and other parts of the world exist, there are still questions about value specific to U.S. patients and the U.S. health system. This gap in understanding prevents the design of meaningful metrics to measure the performance and appropriateness of different oncology drugs.

While this paper will use cancer drug pricing to provide a context for the current political climate and push for value within the US healthcare system, it will not delve into the appropriateness of cancer drug prices. The focus paper of this paper is on the four US based value frameworks and the context in which they are used to evaluate and measure cancer drugs.
Each of the frameworks is designed with a different audience in mind and this paper will analyze the categories that comprise each of the frameworks and identify similarities and differences in the concept of value. With this information, one can begin to tie specific metrics and themes with a pay for performance reimbursement system for cancer drugs.

**VALUE FRAMEWORKS AND THE PATIENT JOURNEY**

When discussing value in the context of healthcare, there are several considerations that do not exist in other industries. For example, in addition to the financial considerations of paying for oncology drugs, there are also physical and emotional challenges that patients face when confronted with a diagnosis of cancer (Schnipper & Bastian, 2016). To achieve the best outcome, oncologists must balance all three domains when working with the patient to determine the best treatment option. Rising oncology drug prices are especially concerning as research has shown that patients are sensitive to cost and there is lower predicted benefit when there is lower willingness to tolerate higher copayments (Wong et al., 2010). Balancing financial pressures with standard of care is a relatively new theme in US healthcare but is becoming more popular as the industry shifts to value-based delivery. In fact, the American College of Physicians updated their statement of ethical principles to acknowledge that the physician owes his or her primary responsibility to the patient and emphasizes the importance of the physician serving as a steward of society’s resources in the context of caring for one’s patient (Snyder 2012).

Frameworks to help define the value of drugs that are used to treat cancer have increased in popularity in recent years. While there are similarities across the frameworks, each of them is different in terms of the stakeholders, the purpose and the means of assessment (Schnipper & Bastian, 2016). Additionally, the idea of value is a fluid concept for frameworks as any assessment that characterizes value at a given point in time, for a specific clinical indication, can
change for the better or worse as new indications or toxicities emerge (Schnipper & Bastian, 2016). Generally, value is defined as a drug’s clinical benefit over its cost as shown in Figure 1.

**Figure 1. Definition of Value**

Thus, value frameworks can be assessed based on their ability to process and integrate various clinical benefits and cost metrics to arrive at a drug’s value.

**CURRENT U.S. ONCOLOGY VALUE FRAMEWORKS**

Cancer care within the US is expected to account for $158 billion by 2020 (Mariotto et al., 2011). However, the rising costs do not account for the patient’s ability to pay for treatments. In a national survey of individuals with cancer, among those with insurance, 25% reported that they used all or most of their savings to pay for treatment and 33% of families had difficulties paying for cancer-related expenses (USA Today, 2006). The increasing inability for patients to pay due to the rising costs of treatment is becoming a central issue among patients, physicians and payers within the US. In fact, it has led to several strategies including the emergence of clinical pathways and value frameworks when evaluating treatment options. Within the US, there are several value frameworks that assist physicians and patients when discussing cancer treatment options. The following section examines four US oncology value frameworks with a focus on the history of the frameworks, the various stakeholders and how they are being used to reduce costs to patients and the US healthcare system.
The American Society of Clinical Oncology (ASCO) Value Framework was created in response to the rising costs of cancer care and their impact on patients (Schnipper & Bastian, 2016). ASCO deemed this issue a high priority because the top 10 drugs reimbursed by Medicare Part B were used for cancer treatment and many of the antineoplastic agents approved by the US Food and Drug Administration (FDA) only offered modest improvements in progression-free or overall survival when compared to prevailing, less costly standard of care (Schnipper & Bastian, 2016). By assessing the relative value of treatments, this framework serves as a tool to promote shared decision-making between physicians and patients. The primary emphasis of this framework is ensuring that both the physician and patient are fully informed regarding the clinical effects and toxicities of a regimen as well as the underlying costs of the agent and supportive medications. The framework calculates a net health benefit score and compares it to the cost of treatment to explain the tradeoffs of therapy for a given patient. Data to generate the score comes from prospective randomized trials in which a comparator is tested against a standard of care. Exceptions to this standard is when antineoplastic agents are approved based on promising activity seen in a single-arm trial where there is no comparator (Schnipper & Bastian, 2016). From this process, two types of ASCO frameworks have been developed: one for advanced disease and the other for potentially curative disease (adjuvant therapy).

The driving force behind the creation of the ASCO Value Framework was the acknowledgement that cancer care’s contribution to overall health care costs was increasing at a faster rate than other areas due to the aging population, the introduction of new drugs and therapies, and the adoption of more expensive diagnostic tests (Schnipper et al., 2015). In some cases, the adoption of new diagnostic or therapeutic interventions may not be well supported by
medical evidence with the effect of raising costs without improving patient outcomes.

Compounding this effect are sometimes unrealistic patient and family expectations that can prompt a clinician to recommend new interventions without supporting evidence of utility or benefit (Schnipper et al., 2015). From the patient’s perspective, growing out-of-pocket health care costs in this area is creating an environment of financial toxicity. Per Zafar et al. (2013), insured patients undergoing cancer treatment and seeking copayment assistance experience considerable subjective financial burden and may alter their care to defray out-of-pocket expenses. In many instances, patients have had to reduce spending on essentials or skip prescribed medications and procedures due to cost concerns. Studies have shown that patients desire financial information about alternative treatments in addition to information about medical effectiveness and treatment toxicity (Ubel, 2010). The ASCO Value Framework aims to reduce the knowledge gap between clinician and patient regarding the best and most cost-effective cancer treatment option.

In 2007, ASCO created the Task Force on the Cost of Cancer Care with the missions of educating oncologists on the importance of discussing costs associated with recommended treatments, enabling patients to ask questions about anticipated costs of treatment options and identifying the drivers of the rising costs of cancer care to move towards more equal access and the highest-quality care at the lowest cost (Schnipper et al., 2015). Over time, this task force evolved from understanding and defining the costs of cancer care to focusing on value. In 2013, the Task Force was renamed the Value in Cancer Care Task Force and charged with developing a framework for comparing the relative clinical benefit, toxicity and cost of treatment in the medical oncology area. At its core, the framework was meant to provide a standardized approach to assist physicians and patients in assessing the value of a new drug treatment in cancer care.
when compared to the prevailing standards of care (Schnipper et al., 2015). It empowers medical oncologists with the information and tools to assess the relative value of cancer therapies and share the decision-making process by presenting information to the patient on the expected cost of treatment and the benefit it may provide.

The ASCO Value Framework was created with the guidance of three core principles (Schnipper et al., 2015). Foremost among them is the concept that the physician-patient relationship is central to defining the management options for the patient. In ASCO’s view, the oncologist is the patient’s best advocate and resource for guidance in assessing the value of treatment options. Thus, the physician must have the tools and knowledge to differentiate the relative value of different therapies for specific clinical scenarios. The second principle is that patients need access to both the clinical and the cost data about their treatment options to make an informed decision. This scenario is only possible when patients have a clear understanding of the clinical benefits and harms associated with treatment options and an appreciation of the financial impact of each option. The final principle states that the physician has a responsibility to be a good steward of health care resources. To that end, the oncologist should make informed decisions regarding the value of care, understanding the most accurate and up-to-date information on the benefits and costs to patients and society. As a result, this framework was created with the input of four major stakeholder constituencies: oncologists, patients, payers and manufacturers (Schnipper et al., 2015). In its current form, the framework illustrates the challenges of developing a clinically useful tool in this area. While it can be used to influence policymakers and payers, the primary motivation is still on the physician-patient relationship.

When deciding on the metrics for the ASCO Value Framework, the Task Force decided to focus on the concept of value. As it is traditionally defined, value is measured as outcomes
achieved per monetary expenditure (Feeley et al., 2010). The Institute of Medicine (IOM) has outlined six elements of quality health care delivery including safety, effectiveness, patient centeredness, timeliness, efficiency and equity (Wolfe 2001). Through the Value in Cancer Care Task Force, ASCO has chosen to define value in cancer by emphasizing three of those elements: clinical benefit (efficacy), toxicity (safety) and cost (efficiency). These criteria were selected due to the ease and frequency of measurement in addition to being at the center of the mission of the clinical oncologist.

As previously mentioned, there are two versions of the ASCO Value Framework – one for advanced cancer and another for potentially curative therapy. In both framework, points are awarded and subtracted in the categories of clinical benefit and toxicity. For the advanced disease framework, bonus points can be earned if a regimen shows statistically significant improvement in palliation of symptoms and/or treatment-free interval compared with the control treatment in the clinical trial. Clinical benefit and toxicity (and bonus points for the advanced cancer framework) scores are combined to generate a net health benefit (NHB) score which is compared to the direct cost of the treatment for a summary assessment. Detailed explanations of the various components of the ASCO Value Framework are described below (Schnipper et al., 2015):

**Clinical benefit.** In both frameworks, clinical benefit is assigned a categorical score between 1 to 5 based on the fractional improvement to the patient as shown in Table 1.
Table 1. ASCO Value Framework – Clinical Benefit

<table>
<thead>
<tr>
<th>Step 1: Determine the regimen’s CLINICAL BENEFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.A. Is hazard ratio (HR) for death reported?</td>
</tr>
<tr>
<td>YES. Assign an HR Score for death by subtracting the HR from 1, and then multiplying the result by 100. Write this number in the box labeled “HR Score (death).” Proceed to 1.F.</td>
</tr>
<tr>
<td>HR Score (death)</td>
</tr>
<tr>
<td>No. Proceed to 1B.</td>
</tr>
<tr>
<td>1.B. If HR for death is not reported, is median overall survival (OS) reported?</td>
</tr>
<tr>
<td>YES. Assign an OS Score by calculating the percentage (ie, fractional) difference in median overall survival between the two regimens and multiply the result by 100. Write this number in the box labeled “OS Score.” Proceed to 1.F.</td>
</tr>
<tr>
<td>OS Score</td>
</tr>
<tr>
<td>NO. Proceed to 1C.</td>
</tr>
<tr>
<td>1.C. If OS data are not reported, is hazard ratio (HR) for disease progression reported?</td>
</tr>
<tr>
<td>YES. Assign an HR Score for disease progression by subtracting the HR from 1, multiplying the result by 100, and then multiplying this number by 0.8. Write this number in the box labeled “HR Score (progression).” Proceed to 1.F.</td>
</tr>
<tr>
<td>HR Score (progression)</td>
</tr>
<tr>
<td>NO. Proceed to 1D.</td>
</tr>
<tr>
<td>1.D. If HR for disease progression is not reported, is median progression-free survival (PFS) reported?</td>
</tr>
<tr>
<td>YES. Assign a PFS Score by calculating the percentage (ie, fractional) difference in median progression-free survival between the two regimens and multiply the result by 100. Multiply this number by 0.8. Write this number in the box labeled “PFS Score.” Proceed to 1.F.</td>
</tr>
<tr>
<td>PFS Score</td>
</tr>
<tr>
<td>NO. Proceed to 1E.</td>
</tr>
<tr>
<td>1.E. If median PFS is not reported, is response rate (RR) reported?</td>
</tr>
<tr>
<td>YES. Assign an RR Score by adding the complete response (CR) and partial response (PR) rates, multiply by 100, then multiply this number by 0.7. Write this number in the box labeled “RR Score.” Proceed to 1.F.</td>
</tr>
<tr>
<td>RR Score</td>
</tr>
<tr>
<td>NO. Proceed to 1.F.</td>
</tr>
<tr>
<td>1.F. Calculate the Clinical Benefit Score</td>
</tr>
<tr>
<td>Insert the score for HR death, HR PFS, median OS, or median PFS. Note: You should have a score for only 1 of the clinical benefit scales above. Write the total in the box labeled “Clinical Benefit Score.” Proceed to Step 2.</td>
</tr>
<tr>
<td>Clinical Benefit Score</td>
</tr>
</tbody>
</table>

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The benefit is measured by applying the categorical score to three weighted metrics: median overall survival (OS), median progression-free survival (PFS), and response rate (RR). OS is the length of time from the start of treatment for a disease that half the patients are still alive when comparing a new regimen to the standard-of-care. PFS is the length of time where half of the patients live with the disease but it does not get worse. RR is the percentage of patients whose cancer shrinks or disappears after treatment.
(Schnipper et al., 2015). In this scale, improvements in OS represent the greatest clinical benefit to the patient.

**Toxicity.** As shown in Table 2, toxicity examines the relative toxicity of the new agent against standard-of-care.

**Table 2. ASCO Value Framework – Toxicity**

<table>
<thead>
<tr>
<th>Does the new regimen represent an improvement in toxicity over the standard of care/comparator?</th>
<th>For each of the regimens being assessed, compare the number and frequency of clinically relevant toxicities, and assign a Toxicity Score as shown below. Each clinically meaningful toxicity (i.e., exclude laboratory results only) is assigned a score between 0.5 and 2.0 based on grade and frequency: For every grade 1 or 2 toxicity with a frequency &lt; 10%, record 0.5 points. For every grade 1 or 2 toxicity with a frequency ≥ 10%, record 1.0 points. For every grade 3 or 4 toxicity with a frequency &lt; 5%, record 1.5 points. For every grade 3 or 4 toxicity with a frequency ≥ 5%, record 2.0 points.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Calculate the total number of toxicity points for each regimen. Calculate the percentage difference in total toxicity points between the two regimens, then multiply by 20 to obtain a toxicity score. If the regimen being evaluated is more toxic than the comparator, subtract the toxicity score of the regimen from the clinical benefit score. If the regimen is less toxic than the comparator, add the toxicity score of the regimen to the clinical benefit score. If there are unresolved symptomatic treatment-related toxicities at 1 year after completion of treatment, subtract 5 additional points from the clinical benefit score. The maximum points that can be awarded is 20. Proceed to Step 3.</td>
</tr>
<tr>
<td>Toxicity Score</td>
<td></td>
</tr>
</tbody>
</table>

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Depending on the level of potential harm to the patient, the toxicity category can change the NHB score by 20 points.

**Bonus Points.** As shown in Table 3, new treatments can gain bonus points in two ways: palliation points and treatment-free interval points.
Table 3. ASCO Value Framework – Bonus Points

<table>
<thead>
<tr>
<th>Step 3: Determine Bonus Points</th>
<th>Tail of the Curve Bonus Points</th>
<th>Palliation Bonus</th>
<th>QoL Bonus</th>
<th>Treatment-Free Interval Bonus</th>
<th>Total Bonus Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.A. TAIL OF THE CURVE. Identify the time point on the survival curve that is 2X the median OS (or PFS) of the comparator regimen. Is there a 50% or greater improvement in proportion of patients alive with the test regimen at this time point (assuming ≥ 20% surviving with standard)?</td>
<td>YES. If yes, award 20 points if the improvement is in OS, and 15 points (0.8 x 20) if the improvement is in PFS, and place this number in the box labeled &quot;Tail of the Curve Bonus Points.&quot; Proceed to Step 3.B.</td>
<td>NO. No bonus points are awarded. Proceed to Step 3.B.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.B. PALLIATION BONUS. Is there an improvement in cancer-related symptoms reported?</td>
<td>YES. If a statistically significant improvement in cancer-related symptoms is reported for the regimen being evaluated, award 10 points, and place this number in the box labeled &quot;Palliation Bonus.&quot; Proceed to Step 3.C.</td>
<td>NO. No bonus points are awarded. Proceed to Step 3.C.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.C. QoL BONUS. Is there an improvement in QoL reported?</td>
<td>YES. If a statistically significant improvement in QoL is reported for the regimen being evaluated, award 10 points, and place this number in the box labeled &quot;QoL Bonus.&quot; Proceed to Step 3.D.</td>
<td>NO. No bonus points are awarded. Proceed to Step 3.D.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.D. TREATMENT-FREE INTERVAL BONUS. Are data related to treatment-free interval reported?</td>
<td>YES. If a statistically significant improvement in treatment-free interval is reported for the regimen being evaluated, multiply the percentage improvement by 20 and award points. Proceed to 3.E.</td>
<td>NO. No bonus points are awarded. Proceed to Step 3.E.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.E. Calculate Total Bonus Points</td>
<td>Add the Palliation Bonus Points (Step 3.A), the Treatment-Free Interval Bonus Points (Step 3.B), and the QoL Bonus Points (Step 3.C). Write this number in the box labeled &quot;Total Bonus Points.&quot; The maximum points available for Bonus Points is 60. Proceed to Step 4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Palliation points are awarded if there is a statistically significant improvement in cancer-related symptoms. Treatment-free interval points are earned when the patient’s disease is not progressing and they are spared treatment-related toxicities.

**NHB Score.** The clinical benefit and toxicity scores, as well as the bonus points in the advanced disease framework, are combined to yield an NHB score as shown in Table 4.
Table 4. ASCO Value Framework – Net Health Benefit

<table>
<thead>
<tr>
<th>Step 4: Determine the regimen’s NET HEALTH BENEFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculate the Net Health Benefit</td>
</tr>
</tbody>
</table>

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The maximum score is 130 for the advanced disease framework and 100 for the curative framework.

**Cost.** Under this component, two cost estimates are considered. The first is the drug acquisition cost (DAC) which is the price listed by the drug manufacturer. The second cost estimate is the patient cost which is highly dependent on the patient’s insurance. Also, included in these calculations are costs associated with supportive care drugs that are required to administer the treatment as shown in Table 5.

Table 5. ASCO Value Framework – Cost

<table>
<thead>
<tr>
<th>Step 5: Determine the regimen’s COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insert the drug acquisition cost (DAC) and patient co-pay based on how much the treatment regimen costs per month.</td>
</tr>
<tr>
<td>Cost (per month)</td>
</tr>
<tr>
<td>DAC: ___________</td>
</tr>
<tr>
<td>Patient Payment: ___________</td>
</tr>
</tbody>
</table>

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**Summary Assessment.** After calculating the NHB score and the cost information, the results are summarized in an assessment that examines the relationship between the NHB and the cost necessary to achieve that level of benefit as seen in Table 6.
After presenting the ASCO Value Framework in 2013, the organization asked for comments from interested parties to refine the methodology and utility of the tool. Based on the results of this process, ASCO envisions additional iterations of the framework to better serve the needs of the physicians and patients.

**NATIONAL COMPREHENSIVE CANCER NETWORK EVIDENCE BLOCKS**

The National Comprehensive Cancer Network (NCCN) is a not-for-profit alliance of 27 of the world’s leading cancer centers with the aim of improving the quality and effectiveness of care provided to individuals with cancer (National Comprehensive Cancer Network – About, 2017). Recently, the NCCN has incorporated evidence blocks into its guidelines for various clinical scenarios. This tool provides physicians and patients a graded assessment of the variables that go into implementing treatment regimens based on NCCN recommendations (National Comprehensive Cancer Network - Evidence Blocks, 2017). The domains measured in this tool include effectiveness, safety, quality of evidence, consistency of evidence and affordability (National Comprehensive Cancer Network - Evidence Blocks, 2017). Each domain is assigned a grade from 1 (least favorable) to 5 (most favorable).

Similar to the other U.S. oncology value frameworks, the NCCN Evidence Blocks framework is intended to educate providers and patients and be a starting point for shared

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**Table 6. ASCO Value Framework – Summary Assessment**

<table>
<thead>
<tr>
<th>Step 6: Summary Assessment: Advanced Disease Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Benefit</td>
</tr>
<tr>
<td>DAC: ___________</td>
</tr>
</tbody>
</table>

*Note: Reprinted from Updating the American Society of Clinical Oncology Value Framework: Revisions and Reflections in Response to Comments Received, by Schnipper et al., Copyright 2016.*
decision-making. Understanding the clinical and scientific rationale for treatments in addition to the economic impact enables individuals to make informed choices based on the patient’s needs and values. The NCCN Evidence Blocks are a visual representation of the NCCN Guidelines based on input from a multidisciplinary panel of experts on appropriate interventions for cancer care (National Comprehensive Cancer Network - Evidence Blocks, 2017). The panel of experts focus on sub-specialties and incorporate new disease-specific information into the existing framework. Due to the framework’s visual nature, it allows for a quick and transparent view of the panel’s assessment of the different domains.

The graphical representation of the NCCN Guidelines creates an efficient way to scan and compare multiple therapy options. Physicians can condense the information of different cancer treatments into an easy-to-understand format and work with patients to choose the best option. Discussing the benefits and drawbacks of each of the therapies can help patients identify the treatment that best matches their goals and preferences. Thus, the primary stakeholders for this tool include everyone involved in the treatment decision-making process from physicians to patients and their families.

Unlike the ASCO framework, the NCCN Evidence Blocks framework is relatively subjective as it is created and scored by a panel of experts and then disseminated to clinicians. There are currently over 48 individual panels consisting of 1,150 clinicians and oncology researchers from the 27 NCCN member institutions (National Comprehensive Cancer Network - Guidelines, 2017). Each NCCN Panel member assigns a standardized score of 1 to 5 to the domains based on the clinician’s understanding of the treatment. For example, the members score safety and efficacy based on their knowledge of published data and clinical experience from treating patients. Quality and consistency of clinical data is rated based on the panel’s
knowledge of the data supporting the treatment. Finally, affordability is graded using the members’ knowledge of the overall cost of treatment. Taken together, the final score for each domain is based on all responding panel members, rounding to the nearest whole number. The compiled results are used to build a 5 x 5 table that represents the NCCN Evidence Block for the treatment as shown in Figure 2.

**Figure 2. NCCN Evidence Blocks**

![NCCN Evidence Blocks](https://www.nccn.org/evidenceblocks/)


Each column corresponds to one of the domains of efficacy (E), safety (S), quality and quantity of evidence (Q), consistency of evidence (C), and affordability (A) (National Comprehensive Cancer Network - Evidence Blocks, 2017). The rows are shaded from bottom to top based on the compiled score for each measure. An in-depth look at each of the categories of the NCCN Evidence Blocks framework is shown below:

**Efficacy (E).** This measure examines the extent to which the intervention is useful in prolonging life, slowing disease progression, or reducing the symptoms of a medical condition. The scale ranges from 5 (highly effective) which provides long-term survival advantage or curative potential to 1 (palliative only) which consists of symptomatic benefit only.
Safety (S). This refers to the relative likelihood of side effects from an intervention. A score of 5 (usually no toxicity) indicates uncommon or minimal side effects with little interference with activities of daily life (ADL) while a score of 1 (highly toxic) refers to severe or life threatening toxicities and high interference with ADLs.

Quality and quantity of evidence (Q). This is the number and types of clinical trials that are relevant to an intervention. Panel members may weigh the depth of the evidence (the number and design of the clinical trials) to assign a score. A score of 5 (high quality) represents multiple well-designed randomized trials and/or meta-analyses while a score of 1 (poor quality) is little or no evidence.

Consistency (C). This is the degree to which the clinical trials for the intervention have consistent results. A 5 (highly consistent) represents multiple trials with similar outcomes while a score of 1 (anecdotal evidence) indicates that the evidence in humans is based on anecdotal evidence.

Affordability (A). This category is the overall cost of the intervention including the drug cost, required supportive care, infusions, toxicity monitoring management of toxicity, and inpatient stays with lower cost being assigned a higher score. For this scale, a 5 is very inexpensive while a 1 is very expensive.

The NCCN Evidence Blocks framework primarily serves as a shared decision-making tool between the physician and patient. The data is organized in a visual format to allow the easy interpretation of recommendations and comparisons. Unlike other frameworks, the NCCN Evidence Blocks framework incorporates input from a panel of experts to generate its results.
INSTITUTE FOR CLINICAL AND ECONOMIC REVIEW

Founded in 2006, the Institute for Clinical and Economic Review (ICER) is a non-profit organization that evaluates evidence on the value of medical tests, treatments and delivery system innovations (ICER – About, 2017). Per its website, ICER’s mission is to act as an independent source of analysis of evidence on effectiveness and value to better understand value in healthcare and improve the quality of care that patients receive (ICER – About, 2017).

Currently, the industry lacks an unbiased, trustworthy voice that can integrate all stakeholders to discuss transparency and value on the individual and system level. ICER aims to fill that gap with a systematic approach to evaluating the relationship between prices and drugs that improve patients’ lives. In doing so, the organization supports a broader dialogue regarding value that brings together stakeholders ranging from insurance companies, drug manufacturers, physicians and patients. Through ICER, the linking of innovation that improves patient outcomes with system-level cost data will generate more value to both the patients and the system.

ICER accomplishes its goal through a two-tiered approach that includes the following: (1) collaborations with patient groups, clinical experts and life science companies to generate reports comparing efficacy and cost of treatment options and (2) public meetings with regional independent panels of clinical, scientific and health policy experts to discuss the ICER reports (ICER – Myths, 2017). The focus of this paper with regards to ICER will be on the reports that analyze drug comparative effectiveness and the value of treatments to patients and the health care system. For new treatment options, ICER calculates “value-based price benchmarks” based on how much better they are at improving patients’ lives. Per the organization, the aim of these reports is to identify a “win-win-win” outcome: a price that will be recognized by insurers as
being aligned with value, will lead to broad and affordable coverage for patients, and will reward innovators for the additional value they provide to patients (ICER – Myths, 2017).

The ICER value framework stems from the organization’s principles of not only developing methods of evidence assessment but also providing mechanisms for engaging stakeholders and the public on best practices for using evidence as the foundation for a more effective and sustainable health care system (ICER - VAF Update, 2017). Thus, the purpose of the value framework is to form the backbone of rigorous evidence reports that will help the United States move towards providing sustainable access to high-value care for patients. Guiding these efforts are an emphasis on collaboration across all stakeholders and the understanding that many choices in health care are subject to trade-offs as societal resources are not unlimited. Through the framework, the process of thinking about value in the context of health care is transparent and evidence-based.

ICER’s value framework is different compared to the other value frameworks in that it focuses on the conceptual framework and the methods that drive the ICER evidence reports. The ICER framework is focused on the “population-level” perspective instead of being used as a shared decision-making tool for the physician and patient at the point of care. It seeks to analyze evidence in a way that supports population-level initiatives such as guidelines on appropriate care, pricing, insurance determinations and payment mechanisms (ICER - VAF Update, 2017). In addition to providing a different perspective to evaluate the strengths and weaknesses of the available evidence, the reports can also explore potential tension between population-level policies and the value to individual patients.

The development of the ICER value framework is an iterative process as the organization constantly seeks feedback from stakeholders and collaborators. In February of 2017, ICER
proposed a new structure of the framework that examines two general concepts: “long-term value for money” and “short-term affordability.” Figure 3 below shows the new conceptual structure as well as the different domains under short-term and long-term value.

**Figure 3. ICER Update – Proposed Conceptual Structure**


The following section will examine the concepts and the supporting domains in greater depth as well as the outputs of the ICER value framework.

Long-term value for money serves as the anchor for the ICER value framework and is comprised of 4 domains: 1) comparative clinical effectiveness, 2) incremental cost-effectiveness, 3) other benefits and advantages, and 4) contextual considerations. In addition to these domains, the long-term perspective in this framework promotes several ideas regarding value. First, this
concept acknowledges that while most clinical data is limited in duration, overall value in terms of outcomes for patients and costs should include a longer time horizon. Therefore, the ICER framework uses the full lifetime of the patient for its incremental cost-effectiveness analyses. Second, the evaluation of evidence on comparative clinical effectiveness of different treatment options forms the basis of the cost-effectiveness analysis. Third, the framework accepts multiple forms of evidence for determining value. In addition to randomized controlled trials (RCTs), ICER uses observational studies, patient reported data and long-term registries to measure long-term benefit. Finally, the framework acknowledges that “clinical outcomes” may not include items that are highly valued by patients. Thus, the framework also examines “other benefits and disadvantages” and “contextual considerations.” A closer look at the domains is shown below:

**Comparative clinical effectiveness.** This domain examines the body of evidence for the effectiveness of the new treatment including RCTs and other sources such as cohort studies and patient-reported data. This domain will include the magnitude and the level of certainty of the net health benefit. Additionally, ICER will attempt to include an evaluation of the heterogeneity of treatment effect for key clinical outcomes to address variations between individuals within treatment groups.

**Incremental cost-effective analysis.** ICER will compare different treatment options with the cost per quality-adjusted life year (QALY). The cost will be estimates of the price of the treatment net of discounts, rebates and other price concessions. The QALY is the established benchmark for determining the benefits to patients from lengthening/improving their quality of life. After obtaining a cost per QALY, the treatment is placed in a range of cost-effectiveness thresholds from $50,000 to $150,000 per QALY to guide long-term value for money.
Other Benefits and Disadvantages. This section of the framework explores benefits and disadvantages of the treatment to the patient, caregivers, delivery system or public that is not evident from comparative clinical effectiveness evidence. Benefits can include public health benefits, increased productivity, and treatment outcomes that reduce disparities across patient groups. Disadvantages can include increased burden on the family or caregiver and inability to return to work or other negative effects on productivity. There are several potential methods to implement this measure but the current process invites independent committees to consider the factors and submit votes on the impact.

Contextual Considerations. This domain examines ethical, legal and other issues that influence the relative priority of illnesses and interventions. Factors that are considered include the likelihood of similar treatments being introduced, societal values, and the severity of the illness. Similar to the “other benefits and disadvantages” domain, these factors are judged by an independent appraisal committee.

Short-term affordability is a complementary consideration to the “long-term value for money” concept when measuring value. The ICER value framework provides an explicit evaluation of the short-term affordability of new treatments by analyzing the potential budget impact of changes in health expenditures. The examination of the potential budget impact is the net impact across all elements of the health system. Additionally, ICER currently uses a “short-term” time frame of 5 years. Doing so allows for the incorporation of potential clinical benefits and cost offsets that may not happen immediately after the adoption of a new treatment. The importance of this concept cannot be underestimated as short-term budget impact is a key driver of policy changes and decisions on how to allocate resources to maximize the quality of care.
The ICER value framework is payer focused as it incorporates population level data and health system impact when determining the value of new oncology drugs. This information is used to generate evidence reports that are used by policymakers and payers to provide sustainable access to high-value care for patients.

MEMORIAL SLOAN KETTERING CANCER CENTER DRUGABACUS

The Memorial Sloan Kettering Cancer Center (MSKCC) DrugAbacus is a tool created by Dr. Peter B. Bach to calculate the theoretical price of cancer drugs based on user inputs. It was made available in 2015 and contains a convenience sample of 52 cancer drugs approved between 2001 and 2015 by the FDA for the treatment of cancer (DrugAbacus – FAQ, 2017). The Abacus theoretical price is calculated using a formula that weights elements such as efficacy, toxicity, population health burden, research and development, rarity, and novelty (DrugAbacus – FAQ, 2017). The generated theoretical price is compared to the actual market price to illustrate price deficits or surpluses for a given treatment. Similar to the ICER value framework, this framework is best used to drive policy changes and examine the population-level drug pricing. Its use as an assessment tool for shared decision-making between physician and patient is limited.

The methodology for calculating the Abacus theoretical price is a two-step process with user-assigned weights to each of the eight domains of the MSKCC DrugAbacus. These prices are relevant for a treatment period that is required to achieve the reported benefit in FDA approval trials. Model-calculated prices are for the duration of the treatment used in clinical trials and then adjusted to achieve a monthly price as shown in Figure 4.
An in-depth breakdown of the eight domains of the DrugAbacus are outlined below:

**Efficacy.** This domain is measured as the improvement in overall survival or a substitute endpoint attributable to the drug. This score can be adjusted based on the quality of the clinical trial. In cases with no evidence of overall survival, progression-free survival and response rate can be used.

**Toxicity.** This domain is characterized by the listing of the frequency and severity of side effects experienced by patients receiving the drug. There are two components to this measurement: the effect of the drug on the probability that the patient will experience a severe side effect and the effect of the drug on the probability of discontinuing use of the drug due to severe side effects.

**Novelty.** The novelty of each drug is scored by two clinical experts who are involved with recent, related research. The experts classify each drug into one of three groups: 1)
novel mechanism of action, 2) drugs with known target but novel delivery, and 3) next-in-class.

**Research and development.** The number of human subjects enrolled in the approval trials for the first indication is used as a proxy for overall costs to develop the drug.

**Rarity.** The rarity of the drug is developed from the projected incidence of the disease in 2015 as per the American Cancer Society Facts and Figures Report.

**Population Health Burden.** This domain is calculated from the estimated number of years of life lost due to the disease in the U.S. population. This is defined as the average difference between life expectancy at death and age at death from individuals suffering from the disease.

**Unmet need.** This domain measures the social need for a drug which is determined by the number of recommended treatments in the NCCN’s guidelines for a drug’s target indication at FDA approval.

**Prognosis.** This measures the severity of the disease that each drug is designed to treat. Median survival in the absence of intervention is gathered from the FDA label.

**Annual spending.** This is the consensus estimate for expected U.S. sales in the year 2015 according to the EvaluatePharma database. Estimated sales assumes that the volume of sales of each drug is not impacted by the change in price of the drug.

The MSKCC DrugAbacus is a physician and payer focused value framework that uses weighted value metrics to calculate theoretical prices for drugs. These prices are compared to the market value of drugs to generate conversations about overall benefit and value between manufacturers and payers.
STRENGTHS AND LIMITATIONS OF VALUE FRAMEWORK APPROACHES

The effectiveness of a value frameworks approach to defining the value and ultimately the price of oncology drugs is difficult to quantify. Not only are cancer drugs expensive, they are also toxic with difficult to measure benefits, have high variability between patients and lead to modest overall improvements in patient outcomes (Basch, 2016). At their core, value frameworks exist as a method of combining different treatment characteristics into composite metrics to allow for cross-treatment comparisons, formulary prioritization and pricing assessments. Due to the complexities of the clinical data, there is not a single method to defining value for these drugs. Each framework prioritizes different inputs to arrive at recommendations for the patient and/or the health system as shown in Table 7. However, the end goal for these frameworks is the same: to determine the appropriate use of oncology drugs through the alignment of provider, patient and payor perspectives. The following section examines the strengths and the weaknesses of the value frameworks approach and its application to oncology drug pricing.

Table 7. Comparison of U.S. Value Frameworks for Oncology Drugs

<table>
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<tr>
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<th>ASCO</th>
<th>NCCN</th>
<th>ICER</th>
<th>DrugAbacus</th>
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<tr>
<td>Physician Oriented</td>
<td>Decision-making/Education</td>
<td>Shared decision-making tool</td>
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<td>Decision-making tool for physicians</td>
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<td>Patient Oriented</td>
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<td>Focus on individual patient’s value system</td>
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<td>Payer Oriented</td>
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<td>Technology assessment of drugs and their impact on the health system</td>
<td>Abacus generated price based on input values</td>
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<tr>
<td>Data Source</td>
<td>Clinical trials</td>
<td>Clinical trials and expert consensus</td>
<td>Clinical trials and economic data</td>
<td>FDA approval data</td>
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<td>Cost Data</td>
<td>Cost/month (advanced disease) and cost/course (adjuvant disease)</td>
<td>Affordability Scale (1-5)</td>
<td>Care Value (QALY) and Health System Value (long-term)</td>
<td>Comparison of Abacus derived prices with industry specific price</td>
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Note: Data for Data Source and Cost Data from Schnipper & Bastian (2016), for Value Metrics from Maervoet et al. (2016).

Strengths of the value frameworks approach can be grouped into three main categories: shared decision-making between the physician and patient, defining the concept of value, and greater transparency. While the frameworks utilize these strengths to varying degrees, the benefits of understanding the balance of clinical benefit and cost as well as generating dialogue between the physician and patient are invaluable in this environment of rising drug prices.

**Shared decision-making.** At their core, the majority of US oncology value frameworks act as decision-making tools for fostering patient-clinician communication (Basch, 2016). Due to the rising costs of cancer care, the patient specific clinical benefit conferred by cancer drugs, and the increasing financial burden on patients, clinicians play a greater role than ever in helping patients navigate different treatment options. Value frameworks empower patients to better understand the realities of their situation and work with their
provider to determine the most appropriate course of action given their needs. Although more emphasis on the patient perspective is required to improve the precision of value estimates, these frameworks serve as a first step to understanding and addressing the burden of oncology drugs on patients.

Defining value. Per Schnipper & Bastian, the idea of value is very fluid (2016). Any assessment that examines value at a point in time for a specific clinical indication can change for better or worse depending on the realization of additional benefits or the emergence of complications. Prior to the emergence of the values frameworks approach, it was difficult to quantitatively define the additional value of novel therapies. This issue contributed to the financial burden on patients as the additional cost of new treatments were not measured against projected clinical benefits. With value frameworks, both patients and physicians can make more informed decisions because there is greater clarity regarding the perceived value of new drugs relative to existing treatment options.

Increased transparency. The final strength of the frameworks approach is characterized by transparency both in the value determination process and in the updates to the frameworks. For each framework, there is a systematic approach to incorporate clinical benefits and cost information to arrive at value. ASCO groups inputs into clinical benefit, toxicity, and cost while the NCCN Evidence Blocks uses five categories consisting of efficacy, safety, quality, consistency, and affordability. Using well-defined criteria, both frameworks enable users to arrive at conclusions regarding the appropriate use of oncology drugs. Additionally, transparency is also evident in how organizations seek feedback when updating the frameworks. Both ASCO and ICER elicited public feedback from various stakeholders including providers, payers and pharmaceutical companies.
before making changes to their respective frameworks. This degree of openness and willingness to change ensures the frameworks’ usefulness to users even in the changing healthcare landscape.

Though there are many positives to using frameworks, there are also limitations that reduce the effectiveness of frameworks in the real-world setting. Limitations of this approach revolve around three areas: overdependence on clinical trial data, lack of consistency and transparency with cost data, and the absence of an integrated approach to value. As with the strengths, each of the frameworks addresses these limitations in different ways and some are better at mitigating potential downsides of the frameworks approach.

**Overdependence on clinical trial data.** The majority of the frameworks determine value by measuring clinical benefit relative to cost (Chandra & Dhawan, 2016). As a result, randomized clinical trials (RCTs) are often used to gauge the health benefit of each outcome. However, while these trials can be the standard for clinical evidence, the design of the studies can present challenges in a more general setting. According to Basch, clinical trials often include participants who are not representative of the demographic distribution of the general patient population and endpoints are selected to meet regulatory needs rather than issues of concern to patients (2016).

**Lack of consistent and transparent cost data.** Due to the complex nature of drug pricing, it is difficult to calculate and measure a drug’s clinical benefit compared to its cost. Several frameworks attempt to consider patient out-of-pocket costs when determining overall value but the efficacy of such an approach is limited because of the dynamics between the payer and patient. Often, the payer is responsible for the majority of the cost of treatment and that burden is not necessarily reflected in the calculations. Of
the frameworks, only ICER considers the total cost per patient, including cases where pharmaceutical treatment can decrease other medical expenses such as surgery (Chandra & Dhawan, 2016). Other frameworks can underestimate potential benefits that improve a patient’s quality of life or additional costs associated with increased hospitalizations resulting from drug complications or side effects. Thus, there are several gaps when utilizing drug cost data including the lack of a consistent approach to selecting cost criteria across frameworks and undefined connections between cost and clinical benefit.

**Absence of an integrated approach to value.** The final limitation is the absence of an integrated approach towards the determination of value. Since the concept of value is fluid, each framework interprets value differently based on the combination of inputs and stakeholders involved. For example, the ASCO and NCCN frameworks are primarily used as a shared decision-making tool to enhance provider communication with patients while the ICER framework examines drugs in the context of population level metrics and effect on the health system. A comprehensive method does not exist for measuring value for all stakeholders. Therefore, frameworks can generate inconsistent results from the same clinical encounter, leading to a broad range of recommendations for the patient.

The value framework approach is an important step for understanding the interplay of clinical benefit and cost when considering new oncology drugs. There are clear advantages to using frameworks to make comparisons between different treatment options and communicating those results to patients. Conversely, discrepancies across data sources and limited applicability in the real-world setting creates issues for users when attempting to apply this approach to drug pricing. Thus, the appropriate use of frameworks requires one to acknowledge the strengths and weaknesses of the approach, while being aware of the innate differences between frameworks.
As shown in Table 7, differences between frameworks can be grouped into primary stakeholders, cost data, and value metrics.

**Primary stakeholders.** There are three perspectives at play in the values frameworks approach: the physician, the patient, and the payor. Each framework caters to a subset of these end users, affecting how value is calculated. For frameworks that focus on the physician and patient perspective, there is an emphasis on education and personalized metrics to measure an individual’s response to the treatment. The ASCO and NCCN frameworks illustrate this approach through the patient specific checklist and the physician-generated Evidence Blocks profile. Other frameworks embody the payer perspective with a focus on population-level metrics and overall health system impact. The ICER framework is representative of this approach as it generates a report detailing the short-term and long-term value of a drug. This report includes budget considerations and cost effectiveness measures. Additionally, there are frameworks that straddle the physician and payer perspectives, such as the DrugAbacus framework which generates user-calculated drug prices based on population and individual level metrics. Different perspectives can lead to drastically different interpretations of value. Each stakeholder has a unique set of goals which affects the framework’s structure. Thus, before one can use a framework to calculate a drug’s value, one must identify the framework’s intended audience and goal.

**Cost data.** Cost is an important criterion because increasing drug prices (for patients and society) are the driving force behind the formation of value frameworks. As a result, all of the frameworks have some variation of cost as a part of their value calculation. However, each framework analyzes and presents cost data differently in the context of
the other variables being measured. For the ASCO framework, the cost of treatment is presented as the patient’s out of pocket cost per month and is compared against the net health benefit and the toxicity of the drug. NCCN Evidence Blocks compile the cost data under the Affordability category and assign it a score from 1 to 5 with 5 being the most affordable. Then, the score is displayed along with other category scores to create a visual representation of the drug’s characteristics. ICER has the most comprehensive formula for displaying cost data through short-term and long-term effects. Each ICER report examines short term costs like the potential budget impact of the drug and long term costs including incremental cost effectiveness to arrive at a “fair” price. The MSK DrugAbacus is like ICER because it calculates a “fair” price for drugs given a series of user inputs. However, unlike ICER, the tool is used closer to the point of care and allows providers the flexibility to adjust metrics based on the needs of their patient. Cost is important to value frameworks because value is commonly defined as a drug’s clinical benefit over its cost. Each framework uses cost in different ways. Some compare cost with other metrics to derive a drug’s value; other frameworks generate a fair price given various inputs. Additionally, the source of cost data can vary across frameworks as some only use the patient’s out-of-pocket expenses while others include total costs to the healthcare system.

Value metrics. The final difference is in the breadth of value metrics that are included in the various frameworks. Due to the diversity of the frameworks, only a few metrics remain constant when shifting from one framework to the next. These metrics include efficacy (clinical benefit), toxicity, and cost data. They appear in all the frameworks because they form the core of this concept of value. The other metrics are present depending on the goals of the framework and the needs of the end users. For frameworks
that focus mainly on the payer perspective like ICER, population level metrics like quality of life, disease burden, cost effectiveness and budget impact are included. Those that incorporate physician and payer perspectives like the MSK DrugAbacus incorporates novelty, unmet need, and research costs into the calculations of value. Finally, the frameworks that are physician and patient oriented like the ASCO and NCCN frameworks may have a few additional metrics like quality of life or cost effectiveness. The stratification of value metrics is representative of the variation across value frameworks.

POTENTIAL OPPORTUNITIES TO INTEGRATE VALUE FRAMEWORKS INTO PERFORMANCE-BASED PRICING

The value frameworks approach emerged in response to the rising oncology drug prices. According to Schnipper & Bastian (2016), the goal of these frameworks is to develop a system for valuing medical therapies that is defined by the benefits and costs (physical and financial toxicity) of the therapy on patients. However, while U.S. value frameworks have been proposed as a method to analyze and identify value in new cancer drugs, they are still limited in their ability to impact the cost of new drugs. Rising oncology drug prices contribute to increased financial pressure and can have a negative impact on patient behavior because studies have shown that patients are price sensitive (Wong, et al., 2010). Currently, most US value frameworks are price takers. These price taking frameworks don’t attempt to directly affect the price of new drugs. Instead, they take the price offered by pharmaceutical companies and compare it to the projected clinical benefit to arrive at a value output. Treatment decisions are evaluated by presenting different value outputs and identifying the most appropriate option for the patient. While this process may affect the price of future drugs, that is not the intended goal
at this time. This section will examine whether it is possible for frameworks to directly impact the price of new oncology drugs. Both increased interest from policymakers and the rise of value-based contracts point to an opportunity to integrate the U.S. frameworks approach to performance-based pricing (PBP).

The idea of performance-based pricing is rooted in the idea that the price set is “fair” as the seller is paid based on the actual performance of its product or service (Shapiro, 2002). However, this arrangement is difficult to achieve because the traditional relationship between a buyer and seller is defined by a zero-sum game where one’s gain is the other’s loss. The appropriate use of performance-based pricing can transform pricing into a win-win situation for both buyer and seller. According to Harvard professor Benson Shapiro (2002), there are three primary advantages to performance-based pricing. The first is the alignment of the buyer’s and the seller’s goals. The second advantage to performance-based pricing is that it provides insurance to both the seller and buyer. It creates a greater sense of fairness by protecting the seller from undercharging the buyer and preventing the buyer from overpaying at the individual and institutional level. The third and final advantage is the most important because it forces the buyer and seller to deal with each other’s limitations, objectives and tradeoffs. In doing so, there is a greater appreciation of each other’s position and increased communication between the buyer and seller. As a practice, performance-based pricing is growing because of its economic logic, its ability to foster buyer/seller communication, and its successful implementation across different industries.

When examining the impact of performance-based pricing on the pharmaceutical industry, it is important to understand the payer’s perspective. According to Stanley et al. (2012), payers are looking for more ways to control costs through formulary coverage restriction,
prescription medication distribution programs, and tiered consumer cost-sharing. Due to the payer’s bargaining power, manufacturers are trying to avoid losing product differentiation and market share in an environment that is putting increasing pressure on the price, the reimbursement of, and the access to pharmaceuticals (Stanley et al., 2012). Performance-based pricing enables pharmaceutical companies to validate the value proposition of their medication and redistribute the risk between payer and manufacturers. As a result, these types of agreements have been in use for years with an increased prevalence in recent years as European countries have utilized this strategy to reduce pharmaceutical drug costs in response to budgetary pressures (Stanley et al., 2012).

Although performance-based pricing has been implemented in the pharmaceutical industry, there are still questions about how to apply the insights from those successes to oncology drugs. Health care in the United States presents a unique set of challenges due to the third-party reimbursement structure, the information asymmetry between physicians and patients, and the lack of consensus when determining clinical endpoints. Carlson et al. (2010) conducted a ten-year review (1998-2009) of performance-based health outcomes reimbursement schemes for medical technology, which one can use to lend insight on oncology drug pricing. Their analysis defined performance-based health outcomes reimbursement schemes as agreements between healthcare payers and medical product manufacturers in which the price, level or nature of reimbursement are tied to future measures of clinical or intermediate endpoints ultimately related to patient quality or quality of life (Carlson et al., 2010).

As shown in Figure 5, the authors divided the schemes into two categories: conditional coverage, which includes conditional treatment continuation, and performance-linked reimbursement which includes outcome guarantees and pattern or process of care.
These three types of pricing agreements are the most applicable for oncology drug development. Conditional treatment continuation is where continuation of coverage is based upon meeting short-term treatment goals. Advantages to the payer include minimizing their long-term cost exposure and improving the product’s cost-effectiveness by discontinuing treatment when there is a lack of benefit. These advantages are even greater when the manufacturer bears some of the cost of treatment initiation. Outcomes guarantees consist of agreements where manufacturers provided rebates, refunds, or price adjustments if their product did not meet certain performance goals. In pattern or process of care, the reimbursement is tied to the impact on clinical decision-making or practice patterns. The performance-linked reimbursement schemes are most utilized when manufacturers have sufficient confidence in their product that they are willing to accept a lower reimbursement if certain goals are not met. Both the manufacturer and the payer can take ...
advantage of this relationship as the payer is obtaining a more cost effective product and the manufacturer can offer certain outcome guarantees without conducting additional product research or without altering the drug’s list price. Carlson et al.’s (2010) analysis shows that there are successful examples of performance-based pricing in the healthcare industry that can be applied to oncology drug pricing schemes.

From the analysis of existing performance-based pricing schemes, one can draw conclusions regarding potential drug candidates and barriers to implementing such schemes (Stanley et al., 2012). These conclusions illustrate the strengths and limitations of performance-based pricing and its application to oncology drugs.

**Potential drug candidates.** There are two requirements for selecting drugs for which performance-based pricing tools could be applied. The first is identifying pharmaceutical products that have simple methods of measuring treatment effects and clearly defined outcomes (Stanley et al., 2012). The second requirement is that there are no generic versions of the drug on the market or soon to be on the market (Van der Heuvel, 2016). This is important because a generic version of the drug is assumed to have the same clinical outcomes so the drug must compete on cost to determine value. Additionally, products with a high budget impact due to their high cost or high volume of use are also good candidates due to the increased attention from payers. Typically, payers are focused on treatments in areas with high unmet need, high cost, variable treatment duration and uncertain long-term effects while manufacturers are focused on competitive disease areas like oncology (Stanley et al., 2012). Because of this, oncology drugs are a good candidate for performance-based pricing schemes.
**Barriers to implementation.** While performance-based pricing seems like a great idea for pharmaceuticals and specifically oncology drugs, there are significant barriers to implementation.

**Defining outcomes.** The first step of any performance based agreement is to define the outcome being measured. Although there is clinical literature concerning appropriate endpoints for different treatments, getting buy-in from all stakeholders (manufacturer, payer, clinician, and patient) can be difficult because of stakeholder-specific interests. For example, pharmaceutical companies tend to measure value as the degree of improved efficacy over existing products on the market while payers tend to look more towards longevity and quality of life (Stanley et al., 2012). Moreover, estimating causality between the product and clinical outcome is challenging due to various externalities (life style, compliance etc.) outside of the manufacturer’s and payer’s control (Van der Heuvel et al., 2016).

**Measuring outcomes.** An effective performance-based pricing scheme relies on an integrated system to track the progress of therapies. If a system does not exist, then building the infrastructure will require an upfront cost from the manufacturer and the payer. In addition to startup costs, other issues such as the time interval for assessments, appropriate sample size and shifting patient populations all contribute to measurement difficulties.

**Regulatory and legal barriers.** Performance-based pricing is a relatively new concept for pharmaceutical products. Thus, limitations exist between the current U.S. pricing structure and one that is adapted to facilitate performance-based pricing. Within the United States, government pricing programs like Medicaid Best Price, Medicare Part B,
and 340B are not compatible with the requirements for performance-based pricing (Van der Heuvel, 2016). Medicaid Best Price creates a minimum floor price as pharmaceutical companies must offer Medicaid programs their best price regardless of the structure of the arrangement. For example, if a drug company offered a 50 percent rebate to a commercial payer for individuals who do not respond to therapy, they may then be required to offer certain government programs a 50 percent rebate for all uses of the product, regardless of product performance. There is a similar effect with Medicare Part B Average Sales Price Pricing as performance-based payment arrangements can lower the average price of a product. Another barrier in this category are the anti-kickback statutes. These statutes are intended to prevent fraud and abuse by prohibiting arrangements where inappropriate incentives can sway providers to use one product over another. However, they may also discourage manufacturers and payers from working together to create incentives structured around a drug’s adherence and efficacy in patient populations (Van der Heuvel, 2016).

As it currently stands, there are several barriers to utilizing performance-based pricing for oncology drugs. The frameworks approach is well suited to address some of the implementation challenges of performance-based drug pricing. First, use of frameworks can help stakeholders agree on clinical outcomes and their measurements. This alignment of stakeholders can be achieved through value frameworks because most of them are physician and patient focused. Additionally, the organizations that create these frameworks are objective because they do not directly participate in the purchase agreements between manufacturers and payers. Through frameworks, performance-based pricing participants can discuss which clinical outcomes to measure and the infrastructure to measure them. Second, the frameworks approach can help
create a pricing system that is applicable to most cancer drugs. According to Bach (2016), this new pricing system consists of a new process and formula. The new process will start with a drug price that is based on its success in initial clinical trials. That price will be recalibrated using real-world efficacy data, which will be integrated into a calculation of the drug’s value. Then, a price formula that links price with the value of a drug will provide context for value-based decisions regarding its use. Frameworks can facilitate links between a drug’s price to its value to set up performance-based pricing schemes. To maximize the effectiveness of this approach, one must appreciate the differences across the frameworks. Currently, there is not a prescriptive method that integrates all stakeholders, cost data and value metrics. While standardization for value metrics and cost data can be helpful, having frameworks for different users and perspectives leads to flexibility when designing the pricing schemes around the concept of value.

CONCLUSION

While value frameworks can lay the foundation for performance-based pricing, it is important to remember that there is heterogeneity across the frameworks. Currently, there is not an integrated framework that incorporates all stakeholders, cost data or value metrics. The ASCO Value Framework, the NCCN Evidence Blocks, the ICER Framework and the MSKCC DrugAbacus all take their own approach to calculating a drug’s value. While some standardization is necessary, this lack of consensus is beneficial because it incorporates the views of different stakeholders (physician, patient and payer) and leads to an iterative process. Each of these frameworks are constantly being refined to meet the needs of the end users and provide an adequate measure of value. As these models evolve over time, they have the potential to not only affect the value of a drug but also the price of a drug. Through performance-based pricing
schemes, these frameworks can facilitate purchase negotiations between manufacturers and payers based on the value of the drug to patients. Furthermore, these frameworks can help match cancer drugs to the best care pathways by providing patients with the appropriate drug at the right time. Currently, limitations such as the lack of transparency across frameworks and regulatory barriers in performance based pricing still exist in the pharmaceutical industry. Yet, with the combination of frameworks and performance-based pricing, there is an opportunity to improve the overall value of cancer drugs.
REFERENCES


