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Specialty Payment Model  
Opportunities Assessment  
and Design

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Environmental Scan for Cardiology  
(Task 2): Final Version

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## 1. Introduction

The American health care system currently relies primarily on volume-based payment models, which contribute to rapid growth in overall costs and persistent variations in quality. While volume-based payment models also pay for many needed services, both features cause concern about the value of care that beneficiaries receive. Rising health care costs have also been front and center in national debt and deficit conversations. In addition, integrating innovative treatments, personalized medicine, and new and often costly technology are challenges for both current and future payment mechanisms. These issues, as well as provisions in the Patient Protection and Affordable Care Act (ACA) and expanding initiatives in private insurance plans, have contributed to a renewed focus on alternative payment models (APMs) that are intended to support higher-value care. A number of stakeholders interviewed as part of this project have identified cardiology as a specialty where APMs may support higher quality care to beneficiaries, reducing overall costs of care, and improving population health. Much of the efforts to adopt APMs have focused on primary care, and many of these primary care-focused models have indirect implications for cardiovascular care. However, given the central role of cardiologists and other specialists, payment reforms that involve cardiologists more directly could have important benefits. Many opportunities exist for cardiologists to lead efforts to improve quality of care and reduce costs, such as redesigning care processes, adopting team-based care, utilizing more efficient patient visit modalities (e.g., using telemedicine and wireless technologies), and reducing administrative costs.

Cardiovascular disease, the leading cause of death, disability, and health care expenditures in the United States, is projected to have a substantial influence on the future of the American health care system. The total cost of care for cardiovascular disease is expected to triple by 2030 to \$800 billion.<sup>1</sup> Many cardiovascular conditions can be both prevented and managed in primary care settings. Care outcomes also depend heavily on medical management and behavior change, particularly for patients affected by hypertension, hyperlipidemia, stable angina, and less severe congestive heart failure (CHF). At the same time, intensive therapies such as revascularization (catheter-directed and surgical); inpatient hospitalization for heart failure; and resource intensive testing for common problems (echocardiography, stress testing, and CT scanning for stable chest

pain) are widely used, with significant benefits for patients. However, there is concern that too often these interventions are neither appropriate nor consistent. Overutilization may be encouraged by the underlying FFS payment structure, which pays more for procedures and other interventions than for non-procedural management and care coordination. As a result, realignment of payment may encourage more patient-centered care, resulting in higher quality care and lower costs.

### Opportunities for Reform

There are many opportunities for innovative reform of both delivery and payment for cardiovascular care. They include the following:

**Reduced risk through prevention.** Since the primary risk factors of disease, such as high blood pressure and hypercholesterolemia, can be identified and treated at early stages, preventive efforts and behavior changes are important. For example, one of the goals of the Million Hearts Campaign, a national effort aimed at improving population health by preventing one million heart attacks and strokes by 2017,<sup>2</sup> is to improve medication adherence for patients with hypertension. Through a heightened focus on managing hypertension, more serious cardiovascular disease can be avoided.

**Improved access to data.** Cardiovascular providers have access to an increasingly sophisticated data infrastructure, which lays the foundation for the successful implementation of alternative payment and delivery models. More than half all cardiologists in the U.S. use some type of electronic medical record (EMR) system, which is higher than the average physician uptake of 40%.<sup>3</sup> EMR data provides the necessary longitudinal and population information to determine areas for improvement in patient care. For example, the American Heart Association (AHA) and the American College of Cardiology (ACC) have been able to use data to create treatment guidelines for a variety of clinical conditions. These guidelines are an important resource for providers to determine appropriate, evidence-based care for their patients. Data is also an essential tool for assuring meaningful quality measures, which provide a critical baseline against which providers can be evaluated.

**Greater use of evidence-based care.** Care is often provided in ways that do not reflect the latest evidence and expert guidelines on appropriate care for particular patients. The resulting overuse, underuse, and misuse of medical treatments can result in worse outcomes and higher costs.

**Care coordination.** Current care for cardiovascular disease, according to several stakeholders we interviewed, is often not well coordinated between all the providers involved in a patient's care. Patients often receive care from multiple providers when managing a severe chronic disease, which may often coincide with additional comorbidities. Depending on the severity of a patient's condition, the care "team" may include a primary care provider (PCP), specialists (e.g., cardiologists, radiologists), and subspecialists (e.g., electrophysiologists, interventionalists, cardiac surgeons). Such care is complex, providing many opportunities for better coordination.

The APMs described in this report address these opportunities for reform. As described above, APMs can support a more coordinated approach to cardiovascular care. For example, current FFS payment provides little support for coordinated management of CHF, despite the fact that close management could prevent the need for costly hospitalizations and other intensive treatments. APMs described here are also designed to give providers stronger incentives to deliver care which evidence suggests leads to better outcomes and lower costs. While the opinions of key stakeholders differed with regard to the feasibility and effectiveness of these APMs, especially for smaller practices, each of the models aims to address opportunities for improving cardiovascular care.

The aim of this report is to answer the following questions in order to propose a framework of APMs that could provide higher value cardiology care:

- Does the current FFS system adequately support the services necessary to achieve better care, improved outcomes, and lower costs?
- What are the opportunities for improving care and lowering costs?
- What are the alternative payment structures that could support higher value care delivery?
- What data and infrastructure requirements must be addressed by practices aiming to implement APMs?

This environmental scan will address these questions in sections 2 through 6. Section 2 of this report details the methodology used to conduct a literature review and stakeholder interviews. Section 3 discusses the conditions within cardiology positioned for reform, including the clinical nature of the condition; the costs associated with treatment; and a summary of the findings from stakeholder interviews and a literature search. Section 4 details current and potential APMs in two main areas of cardiovascular disease management — stable chronic disease and acute episodes. Section 5 evaluates the current data and infrastructure landscape, and identifies opportunities for improvement. Section 6 describes the feasibility and implementation issues related to each model outlined in Section 4. A table of cardiology performance measures can be found in Appendix A.

## **2. Methodology**

The project team conducted a comprehensive environmental scan that included: (1) a review of the existing peer-reviewed, gray literature, and traditional media; and (2) 39 semi-structured interviews with key stakeholders.

### **2.1. Literature Review Methodology**

The project team conducted a semi-structured literature review. The team developed and specified Medical Subject Headings search terminology to gain the maximum number of relevant citations compiled by PubMed, Academic Ovid, EconLit, Google Scholar, and LexisNexis. In addition to searching for articles in these databases, relevant articles were identified from bibliographies of retrieved articles. The project team included literature published in English since 1993.

Below are the search stems and additional terms added to each search string. These search stems and strings were used in each of the above databases to retrieve full text articles for review.

- 1.1.1. Cardiology *or* cardiac *or* cardiac care *or* heart *or* heart care
- 1.1.2. 1.1.1 *and* payment *or* payment model *or* alternative payment model *or* finance *or* incentive *or* compensation
- 1.1.3. 1.1.1 *and* prospective payment system *or* PPS
- 1.1.4. 1.1.1 *and* capitation *or* salary *or* per member per month *or* PMPM *or* full capitation *or* partial capitation
- 1.1.5. 1.1.1 *and* episode payment *or* episode-based payment *or* case payment *or* case-based payment
- 1.1.6. 1.1.1 *and* retrospective payment
- 1.1.7. 1.1.1 *and* bundle *or* bundled payment *or* aggregate payment
- 1.1.8. 1.1.1 *and* medical home *or* patient-centered medical home *or* medical neighborhood
- 1.1.9. 1.1.1 *and* accountable care organization *or* accountable care *or* care coordination *or* ACO
- 1.1.10. 1.1.1 *and* shared savings *or* risk sharing *or* integrated delivery system
- 1.1.11. 1.1.1 *and* fee-for-service *or* fee for service *or* FFS
- 1.1.12. 1.1.1 *and* value-based *or* value-based care *or* pay for performance *or* P4P
- 1.1.13. 1.1.1 *and* competitive bidding
- 1.1.14. 1.1.1 *and* Competitive Acquisition Program *or* CAP
- 1.1.15. 1.1.1 *and* pathways *or* clinical pathways *or* value-based pathways

## **2.2. Stakeholder Interview Methodology**

The project team identified a list of potential stakeholders and thought leaders spanning the cardiology space. From this list, the team conducted 39 semi-structured strategic interviews. This group of selected stakeholders included academic researchers, providers in community and academic settings, payers, leaders of specialty organizations, and others. While the environmental scan was comprehensive and all attempts were made to ensure it represents the cardiovascular landscape, there is potential for selection bias due to the survey methods used and the stakeholders selected. This should be taken into account when interpreting this report.

Following each recorded interview, one research team member compiled comprehensive notes, which were transcribed and then summarized. Stakeholder responses were consolidated by stakeholder category and then incorporated into the conceptual framework used to present potential alternative models for this scan.

### **3. Opportunities for Better Care and Lower Costs**

#### **3.1. Clinical and Cost Drivers in Cardiology**

##### **3.1.1. Key Clinical Drivers**

Today, cardiovascular disease is the leading cause of death and disability in the US,<sup>4</sup> and is the root cause of 1 out of every 3 deaths.<sup>5</sup> An American will suffer from some type of coronary event every 25 seconds and die from cardiac-related disease every minute.<sup>5</sup> Moreover, reducing risk factors for the development and progression of cardiovascular disease rank at the top of the nation's public health goals. In designing APMs, it is important to consider the nature of the conditions they are aimed to address. For the purposes of creating APMs in cardiology, we divided potential models into two main categories: stable chronic conditions and acute episodes. While considered here separately, there is significant overlap between these two areas that should be noted. Some patients will undergo an acute episode and never experience chronic disease, while others may have the opposite experience in which they are diagnosed with a chronic disease but never experience an acute exacerbation. In addition, some patients with chronic disease will progress to an acute episode and then return to a state of chronic disease.

Dividing models into these two categories provides a helpful framework because they represent two areas in which care delivery differs dramatically. A patient with a chronic disease requires a different type of care and management than one experiencing an acute care episode. The level of input required from different providers will depend on the severity of the patient's condition. Payment incentives should foster steps toward greater coordination of care to support the prevention of complications and even the occurrence of disease. They should also promote efficient and personalized treatment.

It is also important to consider overutilization in the context of high cost settings such as the emergency department (ED). Due to the unplanned nature of these visits, providers in EDs often order relatively comprehensive diagnostic tests, even if the negative predictive rate for the patient's presented symptoms is high. This particularly occurs when a patient's past history and/or test results are not readily available. While many ED visits are inescapable, APMs should



incentivize appropriate sites of service for the provision of care and help avoid ED visits where possible. They should also promote the proper use of evidence-based guidelines to address inappropriate testing. Both of these strategies can be accomplished through a variety of structures, including add-on or shared savings payments.

*Preventing Cardiovascular Disease and “Ruling Out” Cardiovascular Disease Effectively*

There are a number of opportunities to improve cardiovascular care before patients become sick (i.e. prevention) or when they are first identified in clinical settings outside a cardiologist’s office. First, the burden of cardiovascular disease could be mitigated by strengthening ongoing efforts to improve preventive cardiovascular care – that is, “pre-diagnosis” care. For example, the Million Hearts Campaign is a national effort aimed at improving population health and reducing the burden of cardiovascular disease by preventing one million heart attacks and strokes by 2017.<sup>2</sup> This campaign, initiated by the Department of Health and Human Services (HHS) in September 2011, utilizes existing efforts, as well as new programs, such as those focused on improving the ABCS (Aspirin for people at risk, Blood pressure control, Cholesterol management, and Smoking cessation). Another one of the campaign’s main goals is to include quality measures targeting prevention of cardiovascular disease in primary care-focused models. These measures are intended to incentivize PCPs to work more closely with their patients on avoiding cardiovascular disease, and could be expanded to include cardiologists as well. APMs should support prevention efforts similar to those of the Million Hearts Campaign, with the goal of reducing disease burden and decreasing the significant cost of cardiovascular disease to the health care system.

A second opportunity to improve cardiovascular care delivery is to reduce overutilization of testing and referrals for patients who might have a cardiac problem but could have other causes for their symptoms. A patient’s care needs or expectations can have a significant impact on a provider’s decision-making. In some instances, even when expert guidelines and the physician’s judgment suggest it is unnecessary, providers may order a test or refer the patient to a cardiologist primarily to help satisfy the concerns of worried patients or to make sure that they “ruled out” a remote risk. Rising rates of obesity and concomitant diseases compound the issue as emerging medical literature points to the high rates of heart disease among patients with

obesity, hypertension, and hyperlipidemia. Currently, there are few incentives in place to discourage patients from receiving pre-diagnosis care that may be unnecessary or inefficient; financial incentives are aligned to promote more intensive diagnostic testing. APMs should encourage the uptake of appropriate use criteria and coordination with cardiologists in order to alleviate unnecessary testing.

Lastly, there is an opportunity to improve the process of diagnosing patients with cardiovascular disease by arriving at a diagnosis earlier. This category includes patients whose chief complaint has the potential to be related to cardiovascular disease, such as chest pain, but do not currently have a diagnosis of cardiovascular disease. In this category, underutilization of cardiologists, as opposed to the overutilization of cardiology resources described in the previous paragraph, is the issue. A lack of proper referrals and early input from cardiologists regarding appropriate treatment pathways for these patients can result in inefficient use of health care resources. Cardiologists could help address this problem through mechanisms to provide more timely guidance to help ensure appropriate use of referrals and diagnostic tests. These efforts should be supported by evidence-based decision tools. Early input from cardiologists is also critical in the care of patients at risk for progressing to more serious forms of cardiovascular disease. In general, stakeholders stated that APMs should support greater coordination between primary care and cardiology prior to a diagnosis of cardiac disease, in order to ensure that health care resources are utilized most effectively and patients are diagnosed (or “ruled out”) as quickly and efficiently as possible.

#### Coronary Artery Disease (CAD)

Effective management of coronary artery disease (CAD) involves preventing its progression to unstable disease or acute myocardial infarction (AMI), as well as management of complications. Concerns about preventing CAD complications can present a barrier to evidence-based guideline adherence and lead to overuse of services when other clinical management strategies may be equally or more effective. This is particularly true for diagnostic imaging and cardiac catheterization. This includes newer methods, such as the Corus CAD test for suspected CAD, an alternative to diagnostic imaging and invasive approaches that increase harmful radiation exposure in CAD patients.<sup>6</sup> Unlike current mechanisms, the Corus CAD is a sex-specific test that

studies the gene expression changes associated with atherosclerosis. Current procedures can be more invasive and create more risks of complications, especially with cardiac catheterization.<sup>7</sup> Furthermore, current diagnostic tests, such as EKG, myocardial perfusion imaging (MPI), and echocardiography, perform better in men than in women.<sup>8</sup>

Additionally, patients' concerns and preferences can have a direct influence on providers' choices regarding diagnostic testing and treatments options regardless of whether they meet evidence-based guidelines. By reimbursing for the volume and not the value of services, the current FFS system lends itself to this type of overutilization.

In addition, FFS payments encourage procedures over care management. Invasive procedures such as percutaneous coronary interventions (PCI) and coronary-artery bypass grafts (CABG) are often used when more conservative medical management can achieve comparable clinical outcomes and can help avoid procedure-related complications. In the 2007 COURAGE (Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation) trial, patients received intensive risk factor therapy that resulted in high adherence to guidelines for blood pressure, lipid levels, exercise, diet, and smoking cessation.<sup>9</sup> When PCI was added to the above treatment measures for a set of these patients, there was no advantage in myocardial infarction reoccurrence and only a modest increase in angina relief.<sup>9</sup> As such, inappropriate use of costly diagnostic and therapeutic procedures could decrease while providing clinical benefits to patients by using insight from the COURAGE trial regarding evidence-based care and optimal medical therapy.

Incentives encouraging the use of guidelines and other decision support systems can help make care more consistent and appropriate. However, provider usage of available guidelines and decision-making algorithms is inconsistent, leading to significant variations in care, which may not be evidence-based. As of 2014, over a third of CAD patients in the PINNACLE registry were not prescribed optimal medications. This has led to a significant variation in overall treatment plans across similar patients, including differences in the medication type and dosage prescribed. Sources of variation included differing clinician opinions about therapeutic effectiveness, unawareness of current guidelines, competing interests, and/or 'clinical inertia.' Some or all of

which may present themselves when cardiologists choose to rely on a patient's PCP to prescribe appropriate medications.

If used properly, evidence-based practices may help reduce variations in care unrelated to patient characteristics and improve clinical outcomes. Additionally, greater use of clinical registries and other data tools may help address gaps in clinical guidelines and algorithms, enabling the refined algorithms to be more patient-centered.

### *Congestive Heart Failure (CHF)*

For patients with CHF, care can be divided into two main phases: the ongoing management of chronic disease and care received during an acute episode, such as an exacerbation requiring hospitalization. Coordinating care amongst the various providers involved is imperative in preventing life-threatening and costly acute episodes. In a 2003-2004 acute care study, almost 20% of Medicare FFS patients who were hospitalized for CHF were re-hospitalized within 30 days post-discharge.<sup>10</sup> Payment reforms may be able to help alleviate this particular issue as care coordination between discharge and readmission can be problematic. For example, Oregon's coordinated care organization (CCO) payment reform, implemented in 2012, was associated with a 9 percent decrease from 2011 in ED visits among Medicaid patients within the first year of implementation.<sup>11</sup> Correspondingly, doctor visits increased by 18 percent within the same timeframe.<sup>11</sup> Furthermore, Oregon's CCOs' CHF hospitalizations dropped by almost a third,<sup>11</sup> likely due to increased attention to Potentially Avoidable Complications (PACs). These PACs can account for up to 80% of the costs for conditions like CHF that require intensive management.<sup>12</sup>

Patients with CHF have a condition that can worsen over time, requiring close management during acute episodes of the disease. Additional attention is also necessary upon conclusion of these episodes to ensure intervals between exacerbations extend as long as possible. High-quality care for CHF patients requires close management of the patient's medication, treatment of the underlying contributors to CHF, (e.g., high blood pressure, diabetes) and helping the patient practice risk-reducing personal behaviors (e.g., eating habits, physical activity). In delivering this type of care, it is important that multiple providers collaborate to develop an effective patient

care plan. Often, nurses and other mid-level professionals can deliver effective services for CHF patients. These approaches allow physicians to use their time and resources more efficiently, and provide the greatest attention to patients that need it the most.

In the context of CHF, an acute episode is due to an exacerbation of symptoms, which may result in admission to the hospital. During this episode, patients may receive care involving cardiologists and PCPs who collaborate in the care for the patient. However, most patients with CHF are managed by more than one clinician. Poor handoffs between cardiology and primary care can lead to poor care coordination, patient/provider confusion, and even dangerous complications and errors. Efforts have been made to improve care coordination, but significant opportunities for improvement exist for patients over the age of 65, since over half will be readmitted within 6 months of discharge.<sup>13</sup> Services that should be provided include increased contact post-admission and more home visits, coupled with multiple clinic visits.<sup>13</sup> Some of these include better evaluation at discharge leading to appropriate disposition, in addition to more adequate and aggressive follow-up with patients. Many cardiologists and PCPs believe that these coordination gaps may reflect the fact that many of these services are not reimbursed within the current FFS payment structure. APMs should incentivize providers to follow-up on their patient's care once they have been released from the hospital to ensure that the chronic state of their disease is being appropriately managed following the acute episode.

### *Atrial Fibrillation (AF)*

The management of atrial fibrillation (AF) requires careful monitoring over long periods of time. Coordination between PCPs and cardiologists can help assure proper oversight and control of medications, such as anticoagulants, as well as management of specific risk factors that may exacerbate the condition. Effective management is important as patients with AF are up to five times more likely to suffer a stroke,<sup>14</sup> among other possible complications. As with CHF, a nurse or other mid-level practitioner could theoretically perform much of the ongoing management of the disease without requiring traditional office visits. While the American literature is scarce on this subject, international sources, including Dutch medical literature, have shown that some of the AF care could be overseen by non-physician medical professionals, such as registered nurses (RN).<sup>15</sup> For example, there is evidence that RNs can manage AF-related medical issues such as

chronic fatigue and inconsistent blood supply through telephonic contact with patients.<sup>15,16</sup> The nurse could also serve as “case manager” (e.g., monitoring medication use and fostering PCP/patient communication), in addition to implementing AF medical therapies. However, services such as physician care coordination and team management may not be well reimbursed in Medicare’s current payment models.

By utilizing more telemedicine, in addition to the use of possible remote monitoring systems, it is possible to provide effective medication management without requiring office visits. Additionally, promoting shared decision-making will be critical in reaching appropriate decisions about invasive procedures, such as ablation, in circumstances where patient preferences matter. In order to properly incentivize this type of timely, coordinated care, upfront infrastructure requirements may be necessary. Incentives provided by APMs may affect all of these aspects of care. Further analysis is needed to determine how best to accomplish this within a particular payment structure.

#### *Other Diagnoses and Procedures*

While the above list covers much of cardiovascular disease, there are a range of other acute and chronic cardiovascular conditions and combinations of conditions that are also treated by cardiologists and other health professionals that could be considered. Such conditions include various valve disorders (e.g., infective endocarditis) and ventricular arrhythmias (e.g., ventricular tachycardia).<sup>17</sup> The same clinical principles described above may be applied to these conditions. That is, models should assess the current state of care for additional cardiovascular conditions to identify opportunities for care improvements and cost reductions that are not well-supported by current payment methods.

#### **3.1.2. Key Cost Drivers**

Cardiovascular disease is one of the highest cost disease categories in the U.S. with the estimated associated health care costs, both direct and indirect, reaching \$503 billion in 2010.<sup>5</sup> It also accounts for nearly one-fourth of the total cost of U.S. inpatient hospital care.<sup>5</sup> The average cost for patients with a primary diagnosis of cardiovascular disease is as much as 41% higher than the

average cost of hospital admissions for all patients combined.<sup>5</sup> The three most costly cardiovascular diseases – CHF, CAD, and AF – affect 55% of all Medicare beneficiaries.<sup>18</sup> Cardiovascular disease risk factors such as smoking not only have a longstanding impact on cardiovascular health, but on overall health care costs as well. CHF and other chronic diseases, such as diabetes and hypertension, account for a majority of health care costs.<sup>19</sup> Specific cost drivers for these four main categories are as follows:

#### Prevention/Pre-Diagnosis

Chronic diseases including heart disease, diabetes, and stroke cause 7 out of 10 deaths in the U.S. annually.<sup>20</sup> Prevention of chronic disease, therefore, is an essential consideration for health care payment reform. The Trust for America's Health reported that prevention programs could save the country more than \$16 billion annually within five years. The Commonwealth Fund also estimated that reduced tobacco use and a decline in obesity would lower national health expenditures by \$474 billion over the next decade.<sup>21</sup> Slowing or reducing the rate of chronic disease growth is essential to reducing the costs of preventable complications among Medicare beneficiaries. For example, according to the Robert Wood Johnson Foundation, even a modest five percent cut to chronic disease cost growth through a reduction in preventable complications would save \$5.5 billion per year by 2030.<sup>20</sup>

#### Coronary Artery Disease (CAD)

CAD is the most common type of heart disease, claiming the lives of over 400,000 in 2008 alone.<sup>22</sup> Each year, approximately 785,000 Americans suffer their first heart attack, with another 470,000 suffering an additional attack.<sup>22</sup> In 2010, CAD was projected to cost the U.S. health care system almost \$109 billion, which included the cost of health care services, medications, and lost productivity.<sup>22</sup>

#### Congestive Heart Failure (CHF)

Affecting almost 6 million people in the U.S. according to 2010 statistics, CHF is most common in the elderly.<sup>23</sup> As of 2008, CHF accounted for 43% of all Medicare.<sup>24</sup> However, according to recent statistics, only about 16% of Medicare beneficiaries have the disease.<sup>18</sup> Additionally, CHF is the most common cause of hospitalizations and readmissions among older Americans,

with over 1 million hospitalizations annually.<sup>25</sup> Annual direct medical costs have been estimated at \$39.2 billion, with over 70% attributed to inpatient care.<sup>25</sup>

### Atrial Fibrillation (AF)

AF, which affects more than 2.5 million Americans, is the most common rhythm disorder in adults over the age of 65.<sup>26</sup> It is estimated to cost the Medicare program almost \$16 billion annually,<sup>26</sup> while only affecting 8% of beneficiaries,<sup>18</sup> with an average one-year cost of close to \$24,000 per patient.<sup>26</sup> Furthermore, AF's burden on the health care system, especially within the Medicare-eligible population, is projected to increase considerably. By 2050, the prevalence of AF in the aging adult population will increase to as much as 5 times its current level.<sup>14</sup>

### Other Diagnoses and Procedures

In addition to the costly diseases described above, stroke, as well as symptoms such as high blood pressure and high cholesterol, can also be important cost drivers to consider for many Medicare beneficiaries with cardiovascular conditions. AF in particular is a major risk factor for stroke.<sup>27</sup> In addition to being physically debilitating, stroke, which affects 4% of all Medicare patients, is among the costliest of dyads, as compared with chronic kidney disease (2.0% prevalence, \$51,715 per capita, 2012 figures), COPD (1.4% prevalence, \$49,025 per capita), heart failure (2.3% at \$47,568 per capita), or asthma (0.4 prevalence at \$46,913 per capita).<sup>18</sup> High blood pressure and cholesterol, affecting 58% and 45% of all Medicare beneficiaries respectively,<sup>18</sup> are common precursors to CAD, AF, and CHF.<sup>28</sup> Financially, high cholesterol and blood pressure are the most common co-existing conditions among Medicare beneficiaries, costing \$13,825 per capita.<sup>18</sup> The next most prevalent dyad is high cholesterol and heart disease, which average \$20,529 per capita.<sup>18</sup> Overall, cardiovascular disease has numerous co-existing, cost-burdensome conditions that should be accounted for.

## **3.2. Common Stakeholder Themes**

The stakeholders interviewed all agreed that the current specialist physician payment system does not support providers in delivering the best possible care for patients at the lowest cost. However, there were varying opinions on what the ideal model would look like. The following



questions were discussed by all stakeholders and address common themes seen across interviews.

1. *What specific diagnoses should alternative payment models focus on?*

Stakeholders agreed that focusing on models that encourage addressing patient clinical needs in a more comprehensive way could be helpful, and that models including CAD, CHF, and AF could cover the majority of the impact of cardiovascular disease. These three diseases provide opportunity for payment reform due to opportunities to improve quality of care as well as the potential to improve care coordination.

2. *How can care be better coordinated among specialists and primary care providers?*

Stakeholders all agreed that in order to provide the best possible care, there must be greater coordination between all the specialties involved with the care of cardiovascular patients, with a focus on primary care and cardiology. PCPs play an important role in preventing cardiovascular illness and managing chronic disease. Therefore, they are responsible for ordering the majority of tests for cardiovascular disease and for providing specialty referrals. Current payment systems provide little support for care coordination activities between primary care and specialty settings, which has led to duplicative and ineffective care through inappropriate or inefficient referrals in some cases. Beyond primary care and general cardiology, there are a number of other providers, including hospitalists, electrophysiologists, radiologists, proceduralists, and others who may also be involved in managing cardiovascular disease. Physician assistants (PAs), nurse practitioners (NPs), nurses, and pharmacists may also play a vital role in providing and coordinating a patient's care. Any APM should focus on supporting all these providers to work together efficiently in order to ensure the patient receives high quality care.

3. *How can overutilization of tests and procedures and underutilization of other needed services be addressed?*

In general, the current fee system incentivizes providers to utilize more tests and procedures, and as a result does not pay providers for critical activities such as cognitive care, care coordination, and disease management. However, overutilization and delayed referrals are

separate and distinct issues. Ideally, referrals should only be used when a patient can benefit from additional specialty care.<sup>19</sup> On the other hand, delaying needed referrals may lead to preventable exacerbation of the associated condition. A delayed referral can also cause a patient to approach another specialist without conferring with their PCP or seek a costlier referral from the ED.<sup>19</sup> Stakeholders stated that ideally, cardiovascular disease should be closely managed from the first sign of possible disease development in order to prevent the progression to more serious illness. Providers should have incentives to share and assess data, as well as educate patients, in order to better manage chronic, acute and post-acute care. Stakeholders all agreed that there was significant opportunity to provide higher quality care, while also significantly reducing costs. Several mentioned the prospect of spending additional time with patients in order to develop and implement evidence-based treatment plans in order to prevent more serious forms of illness.

4. *What type of alternative payment models should be considered?*

While the stakeholders broadly agreed on what ideal cardiovascular care would look like, there was less consensus about which type of APM would best support this care, and which APM might be appropriate for different circumstances. A wide variety of APMs were suggested, ranging from payments that build upon the current FFS system (e.g., by adding new payments related to aspects of care quality) to those that would provide a single, capitated payment for overall patient management. However, many stakeholders expressed concern that each of these models has the potential to create some adverse consequences. For example, with a bundled payment arrangement, there may not be sufficient control over the number of bundled episodes. To avoid this, there should be some mechanism or incentive to help assure that all services in the bundle are necessary, so that providers are not simply incentivized to increase the number of episodes. Another challenge in designing an APM is identifying triggers that would attribute a patient to the payment model. Additionally, it has to be clear what services the model will cover. Lastly, various stakeholders were concerned with how the payment system would accommodate multiple providers. If a payment reform were too sweeping in its scope, it could result in patients receiving too few referrals and reduced access to quality care.

5. *How can data and registries support these models and overall care?*

Stakeholders agreed that infrastructure improvements to help clinicians obtain and use actionable data on their patients could support higher quality care. The American College of Cardiology (ACC), the Society of Thoracic Surgeons (STS), and other groups involved in cardiovascular care are already fairly advanced in their application of appropriate use criteria, performance modules, clinical practice guidelines,<sup>29,30</sup> and decision support tools in the form of registries.<sup>31</sup> Building on these steps, stakeholders believed that having these tools embedded into EMRs and available at the point of care would be useful in reducing variation and overutilization. They also believed EMRs that helped provide data on patient treatments and outcomes would support evidence-based refinements to practice recommendations for particular types of patients. Stakeholders also discussed the importance of various other technological infrastructure improvements, such as secure e-mail and other approaches for improved communication with patients. Such approaches include follow-up appointments to help patients manage their cardiac condition. Improved communication offers PCPs avenues for helping patients to control symptoms for other health education. It is essential that patients keep other doctors well-informed of their treatment progress and any decisions made by their cardiologists.<sup>32</sup>

### **3.3. Common Literature Review Themes**

The literature available on cardiac care and payment reform recognizes a significant opportunity to reform our current health care system, and generally emphasize models that are more focused on quality and value. Published clinical research demonstrates significant variation and overutilization in cardiac testing and procedures. Much of this research has involved the development of guidelines and appropriate use criteria to provide support in reducing unnecessary utilization rates for clinicians without compromising outcomes. The literature demonstrates that implementation of these guidelines would encourage an improved quality of care for patients while achieving lower overall cost. Another common theme in the literature is the need for a culture of collaboration and improved provider communication in providing cardiovascular care. A variety of specialists and sub-specialists beyond general cardiologists, as well as advanced practice clinicians, are involved in delivering care for cardiovascular disease

(e.g., PCPs, cardiac surgeons, radiologists, post-acute care providers, nurse practitioners, and others).

The literature discusses a variety of promising innovative delivery models to improve coordination such as patient-centered medical homes (PCMH) and accountable care organizations (ACO). These models shift payments away from FFS and instead pay physicians based on higher quality care, some of which may include or specifically target patients with or at risk for cardiovascular disease. The ACO models also include incentives to reduce overall costs. Many of these models are primary care-focused and do not directly account for the integral role specialists play in a patient's overall health and care. This role includes assistance in promoting more effective cardiovascular disease management in primary care, as well as leadership from specialists in treating patients with more complex cardiovascular disease. This may be one reason why APMs focused on primary care without complementary reforms in specialty payment have had mixed results. For instance, many PCPs in ACOs lack adequate EMR support.<sup>33</sup> Communication between non-hospital and hospital physicians also requires general improvement, with continuing barriers caused by inconsistent electronic recordkeeping.<sup>33</sup> While the prototypical ACO model is primary care-focused, there are a few exceptions including Blue Cross Blue Shield of Florida's commercially-based ACOs and Blue Cross Blue Shield of Michigan's Physician Group Incentive Program. Each program specifically engages cardiologists through a shared savings arrangement based on overall population-based metrics.<sup>34</sup>

While the literature clearly demonstrates significant opportunities and promising directions for reforming cardiology payment models, there is less research available on the implementation and success of new payment models. Much of the available literature on APMs in cardiology focuses on the development and implementation of bundled payments, especially around relatively discrete major procedures such as Transcatheter Aortic Valve Replacement (TAVR) and CABG. As noted above, other models focus mainly on primary care, with cardiology playing a more minor role. Several organizations have developed PCMH or medical neighborhood models that include cardiologists in various ways.

Some organizations have created conceptual innovative delivery and APMs for cardiovascular care, but many have yet to be fully implemented or evaluated, such as SMARTCare (Smarter Management and Resource Use for Today's Complex Cardiac Care) and the models developed by the Society of Thoracic Surgeons (STS) and collaborators. SMARTCare aims to reduce cost discrepancies in stable ischemic heart disease (SIHD) treatment through evidence-based guidelines, predictive modeling, and appropriate use criteria.<sup>35</sup> The STS has put forth APM proposals including a Heart Team Model specific to cardiovascular disease (including CABG and valve repair and replacement procedures).<sup>36</sup> It also includes possible payments for collaboration among a group of cardiac care providers who collectively assess a patient using evidence-based guidelines.<sup>36</sup>

Finally, several Blue Cross Blue Shield (BCBS) plans around the country have developed innovative payment models involving cardiology, which are in various stages of implementation and evaluation. For example, BCBS of Michigan's (BCBSM) Physician Group Incentive Program has limited increases in FFS payments and instead ties physician payment increases to performance results, including both quality measures and measures of utilization and spending growth.<sup>37</sup> While originally primary care-focused, BCBSM has begun to include specialists, such as cardiologists, in these efforts through population-based measures. BCBS of Massachusetts' (BCBSMA) Alternative Quality Contract (AQC) program is another primary care-focused initiative that pays health care providers a comprehensive global payment that covers a patient's entire continuum of care.<sup>38</sup> Lastly, Highmark BCBS of Delaware encourages associated cardiologists to utilize ACC's online support tool, FOCUS, instead of radiology benefit managers to improve appropriateness of cardiac diagnostic imaging tests.<sup>39</sup> This policy change was in response to concerns that patients were being denied access to appropriate diagnostic imaging.<sup>39</sup> Overall, there exists a proliferation of primary care-based models, though with some promising cardiology-specific approaches beginning to emerge.

#### **4. Model Opportunities**

In this section, we propose a model framework that aims to address the clinical and cost drivers discussed in the previous section, by migrating payments away from FFS towards a model

structure that supports greater value, specifically within cardiology. This model framework encompasses the predominant ideas found in the literature and discussed with stakeholders. Figure 1 illustrates where various potential models lie in terms of payment aggregation across providers and level of comprehensiveness of the payment.

Due to the differences in care delivery for conditions of varying stages of severity, we have divided our model framework into two main categories – population health/stable chronic disease management and acute intervention management. In the following sections, we will describe potential model frameworks for each of these two categories and discuss how current examples of models fit into these potential structures. Although in this discussion we have broken the management of cardiac disease into two very broad categories, stable and acute, many patients will move back and forth between the two categories over time.

#### **4.1. Site of Service Payment Differentials**

Another important cost driver repeatedly discussed in stakeholder interviews, the literature, and among policymakers is the Medicare payment differential between free-standing, community-based physician offices, ambulatory surgical centers (ASC), and hospital outpatient departments (HOPDs). MedPAC estimates, for example, that aligning payment rates between HOPDs and freestanding offices for echocardiography and cardiac nuclear tests would reduce program spending by \$400 million and beneficiary cost sharing by a total of \$100 million in one year.<sup>40</sup> Smaller but nonetheless substantial savings could also be achieved by equalizing physician office and HOPD payments gradually over time, or by setting the rate for all such services between the current HOPD and physician office payments.

Medicare's payment rates often differ for the same services provided in different settings. For example, in 2013, Medicare paid 141 percent more for a level II echocardiogram in a HOPD than in a freestanding physician's office. Additionally, Medicare currently pays 78 percent more in OPDs than in ASCs for identical procedures. MedPAC suggests that there are twelve groups of services for which the OPD payment rates could be reduced to the ASC level. These include services with payment rates that could be the same whether they are provided in a 'freestanding'

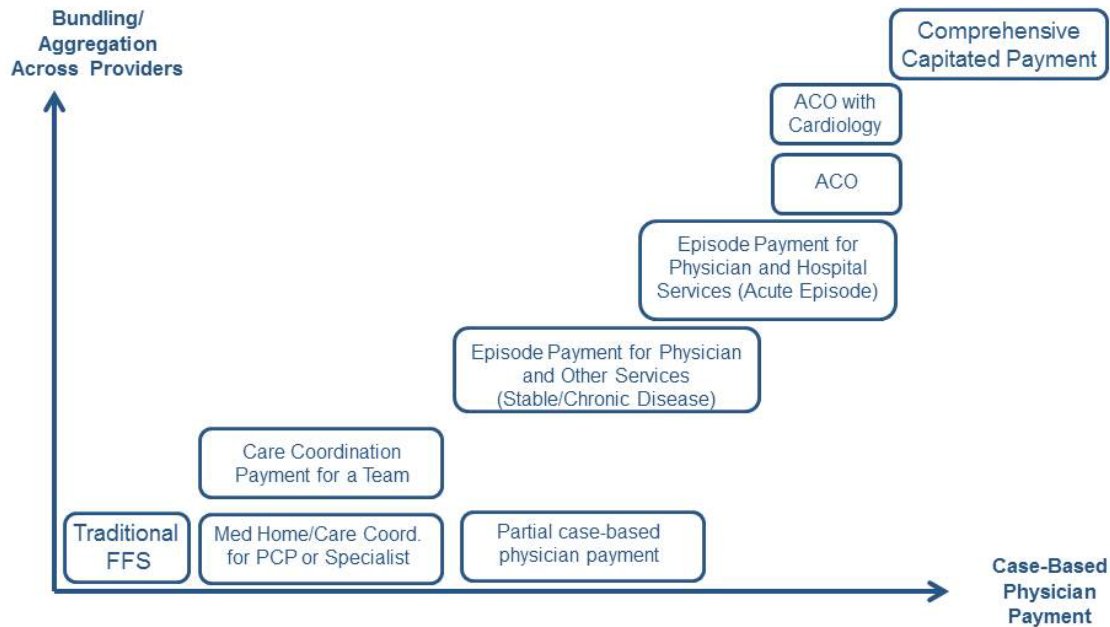


Figure 1: Model progression by case-based physician payment and bundling/aggregation across providers. *Source: The Brookings Institution, 2014.*

office or in an OPD.<sup>40</sup> Stakeholders expressed the opinion that this payment difference is driving the trend of more cardiologists being employed by hospital systems. In fact, a survey by the ACC found that the number of cardiologists employed by hospitals tripled between 2007 and 2012, from 11% to 35%.<sup>40</sup> An argument for the additional facility fees associated with HOPD care is that they are necessary to help subsidize hospital initiatives with regard to standby capacity and provider coordination. However, the payment differentials have generally been increasing without evidence that cost differentials have grown as well.

Designing a voluntary cardiology APM that would encourage more efficient sites-of-service may be difficult without addressing the payment differential. In any model that incentivizes patients to receive services at lower cost sites (away from the HOPD and to the office setting), both the hospital-employed cardiologists (a large and growing number) and the hospital stand to lose, making their voluntary participation less likely.

One proposed solution is to tie payments to the average resources required to treat a patient regardless of site-of-service. Another option might be a partial capitation or gain sharing model for PCPs to enable them to share in the savings of using the most efficient specialists and sites–

of-service. Interestingly, at least one stakeholder who has implemented several ACOs that include such incentives reported that several of the hospitals in their area have now engaged them in discussions about discounted fees for cardiovascular services done in their HOPDs.

Finally, beneficiaries could be engaged depending on what shared savings model is used. In some models, beneficiaries might receive a larger discount based not just on their copayment but on shared savings when they choose high-quality cardiology care in a less costly setting. However, this may not be a feasible option; recent Medicare shared savings models have not included beneficiaries.

#### **4.2. Category 1: Population Health and Stable Chronic Disease Management**

In order to support higher value care delivery for patients with stable chronic disease, these models are aimed at providing physicians with greater ability to manage patients and coordinate care, instead of relying on a FFS payment system that does not reward these high value services. The population health and stable chronic disease management framework includes three broad models of physician payment reform: add-on payment, shared savings, and person-level payment. Figure 2 demonstrates that for each of these models, increased payment for cardiovascular care should lead to reduced payments for all other care while also reducing waste and inefficiency.

The majority of models in existence that address patients with stable chronic disease only address payments for PCPs. However, payment incentives to engage specialists can support better care of these patients. This section is organized into three parts according to which providers are directly affected as part of the model: primary care-focused, cardiology-focused, and team-focused. The payment reform models in Figure 2 apply to each of these cases.

##### Add-on Payment

Primary care, specialty care, and team-based care could all be improved by implementing practices that are not covered under the current FFS system. An add-on payment is an additional per-member-per-month (PMPM) payment intended to cover activities that promote improved



health outcomes among cardiovascular patients not typically paid for under the current fee schedule. This payment could include a variety of care improvements ranging from enhanced communication between patients, providers, and nurse care managers; expanded access scheduling; and/or home-based monitoring. It should be noted that Medicare has released a proposed rule planning to implement a fee beginning in January 2015 under the chronic care management services code proposed for 2015. However, only one of the providers associated with the patient's chronic care will be able to bill out their services under this code.<sup>41</sup>

For a payment model that employs a care coordination fee, there are several considerations that would have to be addressed in more detail prior to implementation. The first is determining an adequate payment amount to cover care coordination activities. This fee will also need to help replace the reduction in FFS payment that should result from higher value care. This will vary based on what the payment is intended to cover, in addition to the time period in which the services are delivered. Specific performance and quality measures would need to be met in order to receive full payment, ensuring that these care coordination models provide improvements in care. The measures and requirements necessary may vary based on what model is used and which clinical condition the model is applied to. For an infrastructure payment, there could be a list of requirements that a practice must implement in order to receive a payment. Examples of standards for improving infrastructure are readily available from the NCQA's PCMH and could be adapted to apply to cardiology.<sup>42</sup>

### Shared Savings

Shared savings refers to a payment structure in which providers that achieve savings as a result of their improved care efforts receive a portion of the money they helped to save. Although still primarily FFS-based, models using upfront add-on fees for care coordination and/or adherence to evidence-based guidelines are implemented by payers with the underlying premise that incentivizing these activities should eventually lead to significant savings. As such, they can provide an important foundational step towards engaging providers in payment and delivery reform. Eventually, they can transition to models that move further away from FFS toward a system that pays for more patient-centered outcomes. Shared savings can either be a stand-alone model or integrated into another model once the data shows potential for real savings.

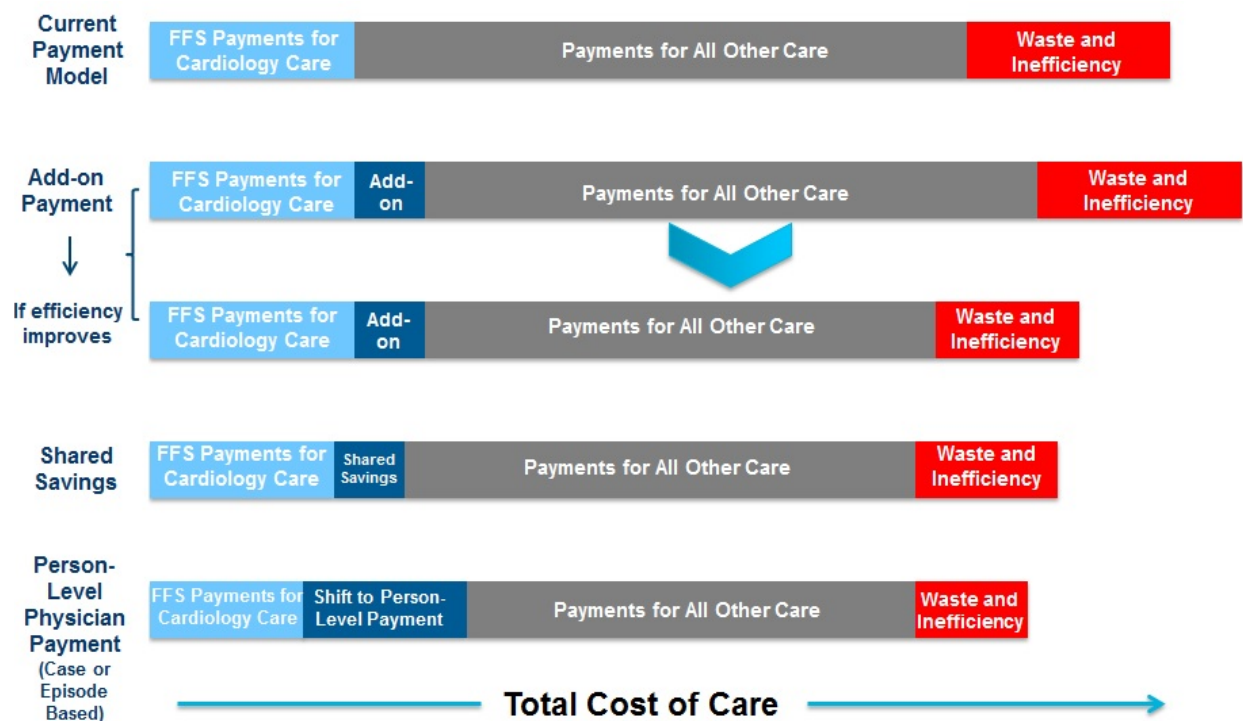


Figure 2: Potential model framework for cardiology alternative payment models in Population/Health Stable Chronic Disease. *Source:* The Brookings Institution, 2014.

An important consideration in shared savings is determining the baseline against which savings will be measured. If providers' quality and cost improvements are being measured, they will need to be able to assess their baseline to determine areas in which they can achieve savings. In addition, deciding how savings should be divided among the various stakeholders (e.g., hospitals, payers, and multiple participating physicians) will become more complex as specialists, such as cardiologists, are incorporated into these arrangements. Some stakeholders have suggested that those who take on the most risk upfront should receive a greater portion of the resulting savings. For example, if a payer agrees to provide upfront payment for infrastructure improvements, they would be eligible for greater savings later on. Another option would be to involve a third party administrator who could facilitate a discussion around the distribution of savings. Over time, more standard models of how to share savings may emerge. As with any model, it will be important to include appropriate quality measures to help ensure that quality is improving while costs are decreasing.

### Person-level Physician Payment/Capitation

A person-level physician payment refers to a model in which some of a physician's FFS payments are replaced by a PMPM payment or payment per case. Instead of receiving some FFS payments, the physician would receive a partially-bundled payment. Eventually this could develop into a single payment to cover all of a patient's care for a specified amount of time, i.e. full capitation, or a single bundled payment for an entire case. The payment shift would be accompanied by performance measures. The case or PMPM payment may also be adjusted based on quality of care. This shift from FFS to bundled or capitated payment de-links payment from the current volume-based FFS schedule supporting a move to a value-based payment system. This is accomplished by enabling providers to redirect more resources to the activities that they believe add the most value for the patient. In conjunction with this flexibility and opportunity to keep more revenues from more efficient care, providers take on more financial risk by having FFS payments reduced either partially or completely.

In order to ensure that providers feel comfortable taking on the risk of caring for patients with a fixed budget, there would have to be accurate risk adjustment for payments. As noted, valid quality measures can help prevent inappropriate reductions in the utilization of services, and the PMPM or case-based payments can start as only limited or partial replacement of FFS payments. However, stakeholders expressed concern that this model could lead providers to select the healthiest (e.g., low cost) patients in order to ensure they minimize their overall costs. Some also expressed concern that cardiologists may be unwilling to accept additional risk for a patient's overall health since they may not have a direct influence on certain aspects of their care.

#### **4.2.1. Primary Care-Focused Alternative Payment Models**

A review of existing APMs revealed that the majority are focused on primary care, while only including cardiology indirectly. Primary care-focused models assume that PCPs control a significant portion of a patient's care, and thus aim to incentivize better specialty care through payments directed towards primary care. There are two main categories of primary care-focused models: the patient centered medical home (PCMH) and accountable care organizations (ACO).

Each model can include only PCPs or PCPs in addition to specialists. Some organizations have also taken on further risk and developed a primary care-focused capitation model. In the following section, we will discuss existing primary care-focused payment models and how they fit into the potential model frameworks.

The overall goals of primary care-focused programs include population health management, care coordination, secure data sharing, and addressing barriers to clinically appropriate treatment. Several programs, such as PCMHs and ACOs, address the issue of population health and patient lifestyle changes through various payment incentives and quality measures. These efforts include tying additional payments to the treatment of and overall improvement in various underlying risk factors, such as high blood pressure and cholesterol. They also work in parallel with other national prevention efforts. However, it is still unclear how cardiologists, and other specialists, fit into these models.

#### *PCMH and the Medical Neighborhood*

The expansion of the PCMH to include specialist practices is commonly referred to as the patient-centered medical neighborhood (“medical neighborhood”). A medical neighborhood emphasizes collaboration between primary care providers, specialists, and even non-medical providers to ensure that all of a patient’s physical, mental, and even socioeconomic needs are cared for.<sup>43</sup> This is only a first step toward promoting care coordination, but it is a significant step beyond coordinated care within the four walls of a practice, or a shared savings model that only accommodates PCPs. The delivery system changes necessary to become a PCMH or medical neighborhood can be supported by various potential model frameworks. Often these models will include an add-on payment to support care infrastructure and/or a person-level payment. However, whether or not one or both of these elements is present varies based on the specific model.

One example of a PCMH and Medical Neighborhood Program is Blue Cross Blue Shield of Michigan’s (BCBSM) Physician Group Incentive Program (PGIP), which was associated with \$155 million in lower medical costs in program year 2011 for BCBSM members.<sup>37</sup> According to a BCBSM stakeholder, the PGIP involves BCBSM’s nearly 18,500 participating physicians,

which includes over 5,900 PCPs and over 12,500 specialists. It is designed around physician organization (PO) members, which can include employed physicians, independent practices, IPAs, and other physician employment arrangements providing primary care service. POs and their physician practices participate in collaboratively-developed initiatives that support PCMH-related care processes based on 12 PCMH domains of function. POs earn incentives based on the PCMH implementation activity of their member practices. BCBSM's PCMH guidelines are similar, but not identical, to NCQA. The program began as a PCMH and is now expanding to a medical neighborhood model by engaging with specialists.

To fund the PGIP reward pool, BCBSM commits an amount of money equivalent to a set proportion of the total professional payment each year through the PGIP PO component. The accumulation of the PGIP PO component on most procedure codes throughout the program year determines the reward pool amount. POs receive infrastructure payments to help practices implement a range of PCMH tools. Once a practice meets the criteria, PCPs are eligible for “fee uplifts”, which equates to a 10% increase in their Evaluation and Management (E and M) fees. These fee uplifts are paid separately from the PGIP reward pool.

In addition, POs that perform well on a range of quality and cost performance measures may get an additional 10% uplift. In the medical neighborhood program, specialist practices are not eligible for upfront infrastructure payments, but they can receive fee uplifts for meeting certain quality and cost measures. In order to be eligible for fee uplifts, specialists must be nominated by a PO in order to show that they are high quality referral partners. Once approved, specialists are then qualified to receive the fee uplifts described above. Thus, they provide incentives for cardiologists and other specialists to coordinate with primary care by tying the payments of cardiologists to population-level quality measures. The specialist payments are based on performance measures for the entire population of patients for the PO practice, not just on the patients that the specialists actually see. Population-level cardiology metrics include:

- Standard cost of various diagnostic procedures [utilize purchased product that provides episode costs (CCGroup Marketbasket System—called “Cave”)]<sup>44</sup>
- Overall PMPM cost metric used for all specialties
- Generic drug prescribing [only metric tracked per practice rather than population-based]

## ACOs

The ACO model refers to a number of different types of organizations, some of which provide incentives only to PCPs, but many include specialists, including cardiologists, in their revised payments models. The ACO model can also include various elements of the potential model framework. Most often, ACOs will include a shared savings component, but may also include a shift from FFS payments to partial capitation. An example of such a model is the BCBSMA AQC model, introduced earlier in the scan.<sup>45</sup>

Initiated in January 2009, the AQC is a modified global payment with annual spending growth limits based on historical total medical expenses, incentive payments to improve quality, and technical support for participating groups.<sup>45</sup> The system involves a five year contract where a per-beneficiary payment benchmark for the overall costs of a patient's care is evaluated for each year of the contract. Participating Massachusetts provider groups are paid on a FFS basis. At the end of each annual performance period, BCBSMA pays each group a surplus or takes back any deficit in comparison to the global payment budget.<sup>45</sup> Providers are eligible for a performance bonus if they meet certain quality targets. In the first year of implementation, all participating groups met their budget and achieved savings.<sup>45</sup> Over two years of implementation, compared to nonparticipating groups, savings were 3.3% in the second year, an increase from 1.9% in the first year.<sup>46</sup> Savings were accomplished by providers offering lower fees and by decreasing utilization.<sup>46</sup>

The global payment covers the entirety of a patient's care, including outpatient, inpatient, rehabilitation, long-term care, and prescription drugs.<sup>47</sup> The AQC quality incentives have been applied to a variety of screening processes for various cancers, depression, and diabetes, as well as ambulatory quality measures for cardiovascular LDL-C screening for cardiovascular disease.<sup>45</sup> While the AQC does not address cardiac disease alone, it does include quality measures related to cardiovascular disease and incentivizes all providers, including cardiologists, to improve their utilization of appropriate treatment methods, technologies, and tests for the same condition. For instance, this incorporates the appropriate use of cardiac catheterization, coronary bypass graft procedures, imaging, and emergency care.<sup>45</sup>

Participating groups vary in size, including one independent multispecialty group practice. Other groups include several independent practice associations that contract on behalf of multiple smaller physician groups such as Atrius Health (with 400 PCPs) and several small physician-hospital organizations such as Lowell General PHO (with 80 PCPs).<sup>45</sup> To qualify for the AQC, a health group must have PCPs caring for a total of at least 5,000 Blue Cross HMO (health maintenance organization) or POS (point-of-service) plan members.<sup>45</sup> All of these groups have varying degrees of experience in contracting for risk.

Other examples of ACOs include: Florida Blue Cross Blue Shield's ("Florida Blue") commercially-based ACOs, the Atlantic Health System ACO of New Jersey ("Atlantic"), Minnesota's Accountable Health Model, and Oregon's coordinated care organizations (CCOs). Currently all of these programs engage specialists, including cardiologists, indirectly in various ways, often through incentivizing PCPs to utilize high-value specialists by making the PCP accountable for the patient's total cost of care.

Florida Blue began offering commercial ACOs in 2013, which has approximately 4 million health care members according to one stakeholder interviewed. They have 25 care coordinators that serve as intermediaries between specialist physicians and hospitals. The stakeholder stated that the cost savings resulting from the work of these coordinators are split among the employers, the health insurers, and the doctors. The plan engages cardiologists by allowing them to share in savings from reduction in total cost of care from patients in the ACOs. The stakeholder mentioned that Florida Blue also specifically targets CHF patients, as well as heart disease patients with co-morbidities, such as COPD and diabetes, using specific quality benchmarks. As discussed in the "Site-of-Service" section, with the resulting shift toward less costly sites of care for cardiovascular patients, it should incentivize hospitals to negotiate discounted rates for cardiac imaging services done in the HOPD.

By utilizing protocol-based approaches that rely on nurse coordination with heart failure specialists and referring physicians (Heart Success Program), New Jersey-based Atlantic Health System's ACO are working to reduce CHF readmissions. However, according to one stakeholder

associated with this program, they have not engaged the cardiologists in a shared savings arrangement as of yet.

Minnesota's Accountable Health Model expands Minnesota's current Medicaid ACO demonstration by shifting payments away from FFS and including specialists in the resultant shared savings through population-based metrics.<sup>48</sup> Such expansion involves 15 accountable health communities forming and assessing models for integrating care across the Minnesota health care system. By using this expanded payment structure, it is expected to have reduced per capita spending and decreased hospitalizations for CHF.

A final example is the Oregon Coordinated Care Organizations (CCO), which began in 2012 for Medicaid patients.<sup>11</sup> CCOs are collaborative networks of health care providers for people covered under the Oregon Health Plan (Medicaid); Oregon's 16 CCOs are regional groups seeking to reduce Medicaid costs, improve quality, and encourage regular doctor visits, instead of waiting and having costly ED admissions.<sup>49</sup> CCOs have decreased overall ED visits and per capita spending, in addition to reduced hospitalizations for congestive heart failure.<sup>11</sup>

### Iora Health

Iora contracts directly with employers to provide intensive primary care services for more complex patients, often those with multiple comorbidities. Though the patients involved account for a large share of costs, the number of covered lives is small. There are three main components of the Iora model: 1) a fixed risk-adjusted fee per patient (primary care capitation), which allows for flexible methods of care delivery; 2) a shared, customized care plan for each patient; and 3) a novel, innovative health IT platform to encourage patient engagement and create an effective method of data analysis and transfer.<sup>50</sup>

Instead of going through a health insurer intermediary, employers directly pay a flat monthly fee for each employee who joins an Iora practice; no claims need to be filed for primary care services, which reduces administrative burden.<sup>51</sup> Insurance coverage outside of the PMPM fee, on the other hand, covers only emergencies, inpatient care, and/or specialty care. Iora also engages preferred specialists by paying them a retainer fee, which is not explicitly tied to the number of patients, according to one stakeholder associated with the Iora system. Within the Iora



system, the costs are roughly twice that of conventional primary care—\$50-\$60 a month as opposed to primary care’s \$25-\$30—reflecting the higher costs of caring for this more complex population.<sup>51</sup>

The goal of Iora Health is to drive value. The program measures quality of care in a variety of ways, including patient experience tracked through patient-centered outcomes such as functional status and self-efficacy, measured through periodic feedback and reinforcement. The Iora model fosters relationships with PCPs, specialists such as cardiologists, and other members of the team. As such, this model is based on a multifaceted cultural change in how care is delivered to complex patients. Patients at Iora Health clinics have access to a multidisciplinary team of health coaches, nurses, and physicians through a variety of mediums—office visits, email, real-time video chat, or phone calls. The goal is more attentive care at a reasonable price.

The Iora health model exceeds national indicators on chronic cardiovascular patients, and has a 30-day readmission rate of 3-6 percent, far lower than the national average of 16.1 percent for Medicare patients, according to 2009 figures.<sup>52</sup> In terms of specific cardiac conditions, patients with Class III and IV CHF, advanced CAD, or cardiac patients with multiple co-morbidities are well suited to this model. Iora reportedly has a net 15% health cost savings.<sup>53</sup> Since this model so far depends on the specific tools and approaches implemented by the Iora team, evidence on its scalability is limited.

#### **4.2.2. Cardiology-Focused Alternative Payment Models**

Since numerous patient care decisions are generated in the primary care setting, cardiology-focused models tend to have less direct control over a patient’s total care. As such, they appear to be less common than primary care-focused models. However, while possibly limited in scope, these models can still be beneficial in improving overall cardiovascular care. For example, one of the primary goals of these models is to provide better financial support for appropriate use of cardiovascular diagnostic testing and procedures. These steps are vital in avoiding unnecessary medical costs and encouraging evidence-based care. Since the majority of cardiovascular care is tied to primary care, many stakeholders believed that this type of model should be integrated into

a larger model that addresses both primary and specialty care.

Within cardiology-focused models, each of the payment structures presented above can be applied. Add-on payments are often focused on building the infrastructure and providing the tools necessary to reduce inappropriate utilization of tests and procedures. There is a wealth of data and decision support tools available in cardiology that can be utilized to support clinicians in choices about when a test or procedure is necessary, and when it could be safely avoided. Examples include IndiGO, which quantifies risk of serious cardiac conditions for individual patients and prioritizes risk-reducing actions,<sup>54</sup> and ePRISM, which is a specially-tailored risk stratification software tool.<sup>55</sup> For maximum impact, these tools should be embedded into an EMR and allow physicians to input patient information in real time. The tools can then return guidance on which pathway is most appropriate at the point of service.

One example of a tool being tested is the HEART Score. HEART is an acronym representing factors included in risk stratification for patients presenting with chest pain: History, ECG, Age, Risk factors, and Troponin. The tool is fairly simple and easy to implement in the emergency room where there is a significant need for better evaluation of chest pain patients. While the HEART score is still being studied, early results are very positive in being able to send patients home earlier without missing acute events.<sup>56</sup>

An essential element will be to have physician buy-in for any model that uses incentives for adherence to guidelines. A number of experts expressed to us that they will need to have assurance that the guidelines are not intended to be absolute, and that there should be a mechanism for doctors to opt out of guideline adherence for an individual patient without penalty if they feel it is clinically appropriate. One method for increasing physician buy-in is to have doctors participate in the development and application of the guidelines. When they can influence the process, providers have more confidence in the guidelines and will be more likely to use them. Several stakeholders who participated in trials using guidelines stated that there was often concern about following guidelines when they were first implemented, but after seeing that they could be used safely, they were much more engaged in implementation.

### Highmark Blue Cross Blue Shield

One example of a cardiology-focused model is that of Highmark Blue Cross Blue Shield of Delaware (“Highmark”). This plan ties payments to Delaware cardiologists to the use of an online support tool in place of radiology benefit managers for cardiac imaging tests, in order to encourage the appropriate use of diagnostic cardiac imaging.<sup>39</sup> The incentive payment for Delaware cardiologists is \$300,000 over a 3-year period, as an addition to current payment methods in place.<sup>39</sup> Highmark’s diagnostic imaging initiative involves Delaware physicians’ participation in FOCUS, specially designed by the ACC for development of cardiovascular best practices in Appropriate Use Criteria (AUC) for stress tests, echocardiograms, and cardiac radionuclide imaging (RNI).<sup>57</sup>

Other plans have incorporated registry reporting as a fundamental component, such as United Healthcare Services Premium Cardiac Specialty Center and the BCBS Association’s Blue Distinction Centers for Cardiac Care Program, but there still may be substantial opportunity to improve care through use of registry reporting.<sup>39</sup>

### SMARTCare

SMARTCare utilizes a patient-centric approach to diagnose and treat known or suspected Stable Ischemic Heart Disease (SIHD). The program uses AUC, greater patient involvement, and regular provider feedback with the goal of reducing complications, and inappropriate and unnecessary use of resources. Decision tools are provided in three key areas: the appropriate use of noninvasive cardiac imaging; the treatment choice between medical therapy, stenting, and bypass surgery; and medication/ lifestyle changes. Continuous monitoring will allow sites to enhance use of their tools over time to help target their impact at specific sites.

Although SMARTCare has not yet been implemented in conjunction with a payment reform, the information from the decision tools along with continuous monitoring can be used to derive a shared savings/bundled payment model for episodes of care (with the potential for neutralizing the payment differential for inappropriate procedures compared to guideline-directed medical therapy) and quality incentive payments. Based on 2011 CMS data, this model could reduce unnecessary use in patients with stable IHD by 10-30% nationally, saving the Medicare program

\$1.08-3.48 billion annually.<sup>58</sup> This APM could be incorporated as a time-defined episode shared-savings payment, possibly tied to some upfront payments to support the infrastructure needed for its implementation. However, specific triggers and definitions of episodes still must be addressed.

### VCSQI

The Virginia Cardiac Surgery Quality Initiative (VCSQI) is a voluntary consortium of 18 hospitals and 14 cardiac surgical practices providing open-heart surgery in the Commonwealth of Virginia. VCSQI's goal is to improve clinical quality across the state in heart surgery programs with a unique database linking clinical and financial outcomes. VCSQI is specifically cardiology-focused, and helped to design a bundled payment demonstration with CMS in 2002, which included all services related to cardiac surgery. The demonstration was initially perceived by CMS to have strong potential for success. However, in July 2004, CMS and the Department of Justice stated that continuing the demonstration would violate federal law (Stark Regulations and Civil Monetary Penalty laws) due to the redistribution of the global payment and incentives tied to this distribution. Eventual dismantling of the demonstration occurred despite ample support from the HHS.<sup>59</sup> VCSQI eventually found success in other ways, encouraging much-needed coordination of care with improved quality, through participation in the adoption of quality measures in cardiac surgery for the National Quality Forum (NQF) in 2005. Furthermore, VCSQI's members perform over 99 percent of Virginia's open-heart procedures, and have assembled since 1996 to exchange data to improve the quality of surgical care and encourage cost containment. The group believes that cost containment in cardiac surgical care can be achieved by focusing on quality. VCSQI is the basis for the STS "Heart Team" model discussed above.

### Cardiology ACO

In addition to the development of ACOs that engage cardiologists and other specialists by allowing them to participate in overall shared savings, BCBS Florida is working on a conceptual model to engage cardiologists more directly. In this model, the plan will use claims data to identify patients who receive the majority of their care from a cardiologist. (This is often the case, for example, with hypertensive patients.) The plan would then set a target for overall

spending for the patient, based on historical claims data. The cardiologist would then have the opportunity to take accountability for overall spending, including non-cardiac services, with an opportunity to share in any savings. This model is still in the very early conceptual phase and details have not been worked out.

#### PCMHs: PCSP

Although not a model, the NCQA's Patient-Centered Specialty Practice Program (PCSP) facilitates coordination of care and communication across providers and patients alike.<sup>60</sup> Launched in March 2013, the program recognizes practices committed to team-based, coordinated care, and encourages communication with providers and patients across the continuum. The PCSP standards will be particularly critical to cardiovascular administrators, as they elucidate their role in the PCMH model. Additionally, it has primarily targeted specialties that often take on a broader care-management role for patients, including cardiology.

#### **4.2.3. Team-Focused Alternative Payment Models**

Team-focused models recognize the fact that a broad range of providers are involved in delivering care for many cardiovascular patients. Therefore, there should be improved coordination among these providers, as well as greater attention paid to appropriate use of testing and procedures.

When applying a payment model framework to team-based care, a number of issues arise. Challenges exist in defining cardiovascular-related costs and determining levels of attribution for care. Since the models have not yet been implemented for cardiovascular care, it is not certain that these concerns have been addressed, or the extent to which anticipated quality improvements and savings would actually be realized. Additional considerations are how the care is coordinated and how payment should be divided among the providers of care coordination. In some cases, care coordination is done by designated case managers, care navigators, health coaches, or other non-physician providers. Another option is to assemble a "heart team" that would consist of the PCP and other providers, who would assess the patient and propose an individualized treatment plan. There may be some conditions that, once they reach a certain level of complexity, are best

managed by a cardiologist. Others can be managed by a PCP in consultation with a cardiologist, with care and navigation through the system overseen by a designated care coordinator. APMs could leave these particular decisions and how to divide payment among participants to the care team involved, provided that they meet minimum criteria.

### *STS Heart Team*

The STS has designed conceptual APM proposals specifically related to cardiovascular disease (including coronary artery bypass grafting (CABG) and valve repair and replacement procedures) and associated treatments.

STS recommended that Medicare adopt an APM which pays for collaboration among a multi-disciplinary team of cardiac care providers. This team would evaluate a particular patient using evidence-based guidelines to optimize patient testing and determine the best course of treatment for that patient. STS proposes three APMs for cardiac care representing different levels of program development, ranging from least to most complex. Two of the models would be appropriate for stable chronic disease management, while another, bundled payments, is better suited for acute episodes/events.

STS' first APM, utilizing an add-on payment, would be based on additional payments to the team that are expected to reduce costs and thus permit shared savings as a result of avoiding high-cost complications and overutilization of resources (e.g., reductions in postoperative AF and transfusions). This would cover certain procedures, such as CABG and AVR. It would use targeted application of best practices to reduce complications and overutilization of resources.

Under this approach, the trigger would occur once a physician has determined a Medicare beneficiary needs revascularization or treatment for CHF related to valvular heart disease. The physician would then refer the beneficiary to a "heart team" of professionals (e.g., cardiac surgeons, cardiologists, cardiac anesthesiologists, and hospitalists) that reviews the patient's file and decides the appropriate intervention and/or treatment for that individual.

Medicare would provide payment to each of the members of the heart team for their role in assessing the case and contributing to a process which results in a treatment recommendation for the patient, as an 'add-on' to the already-existing FFS system. All other payments to providers would continue through the FFS payment system. Over time, this could be expanded to include a shared savings payment model.

STS' second model involves surgical, and possibly post-acute, episode-bundled payments. Once the heart team has consulted and determined the appropriate treatment or intervention, Medicare then would provide a bundled payment for the totality of the patient's surgical care. These bundles may be similar in scope to the bundles discussed later in the acute episode management section. However, the STS model made explicit implementation recommendations that may differ from some of those initiatives. They specifically suggested that CMS implement this surgical bundled payment in a phased-in approach. For example, in the first year of implementation, the bundled payments could focus on limited episodes of care (e.g., hospitalizations during which the patient had a CABG or AVR), only providers in select institutions, or only replace a portion of the traditional Medicare payment. Additional DRG-defined episodes of care for cardiac surgical care could be expanded in future years to include other providers, provider settings, and/or other geographic areas. However, while applicable to current reform efforts, some of the initiatives described above, particularly with regards to inpatient bundles, would potentially duplicate existing efforts within the CMS' Bundled Payment for Care Improvement (BPCI) initiative.

Once a Medicare beneficiary is deemed to need revascularization or CHF treatment, they are, as in the prior proposal, referred to a cardiology team who determines the appropriate, evidence-based intervention. Because members of the team would be paid for their participation in a care-coordination conference or meeting, there would be new support for providers to determine the most appropriate treatment for the patient prior to ordering procedures. Providers could also be given financial support for using registries for appropriate risk-adjustment assessments of Medicare beneficiaries. Essential team members could include a cardiothoracic surgeon, a primary cardiologist, an interventional cardiologist, and primary care provider.

After the heart team has consulted and determined the appropriate treatment or intervention, Medicare would then provide a bundled payment for the totality of the patient's surgical care. This bundled payment would cover all necessary care for the beneficiary for a set period of time (e.g., from 3 days prior to admission until 30 days or 90 days after admission). Heart teams that meet or exceed quality metrics as currently defined in the STS National Database and agreed upon by CMS could be eligible for a bonus payment from CMS above and beyond the bundled payment. This could involve either one or two-sided risk: one-sided in year one (baseline bundled payment with possible bonus) and two-sided in year two with risk taken on by providers (bundled payment can be reduced for poor performance). The two-sided risk model would initiate in the second year, and continue for the following years. CMS could withhold a small percentage of payment (e.g., 1-3 percent), allocated when quality metrics have been met. Bonus payments for efficiency and cost reduction (once quality measures have been met) could also be considered.

The third and most complex model is directed towards longitudinal disease management bundled payments. Patients enter the treatment pathway for the diagnosis and are assigned to a specific intervention (e.g., CABG vs. stent) or continued medical management based on the decision of the heart team. Each meeting of the heart team could be paid through the creation of a new CPT code. Patient outcomes would be tracked longitudinally and monitored. Repeated decisions would need to be made along the patient's care treatment pathway as to whether a cross-over is necessary from specific intervention to medical management or vice versa. This APM would need a significant amount of time to phase-in implementation efforts regarding quality-related, add-on payments for team services coupled with a shift to time-defined bundles.

### **4.3. Category 2: Acute Episode Management**

Some patients with stable cardiovascular disease will have complications from their conditions that require more acute interventions. Other patients might first experience cardiovascular disease treatment as a result of a major acute event. In either situation, additional providers will be involved and supplementary services will need to be provided, often in a more advanced care setting such as a hospital. For many physicians, a bundled payment may be an effective APM for



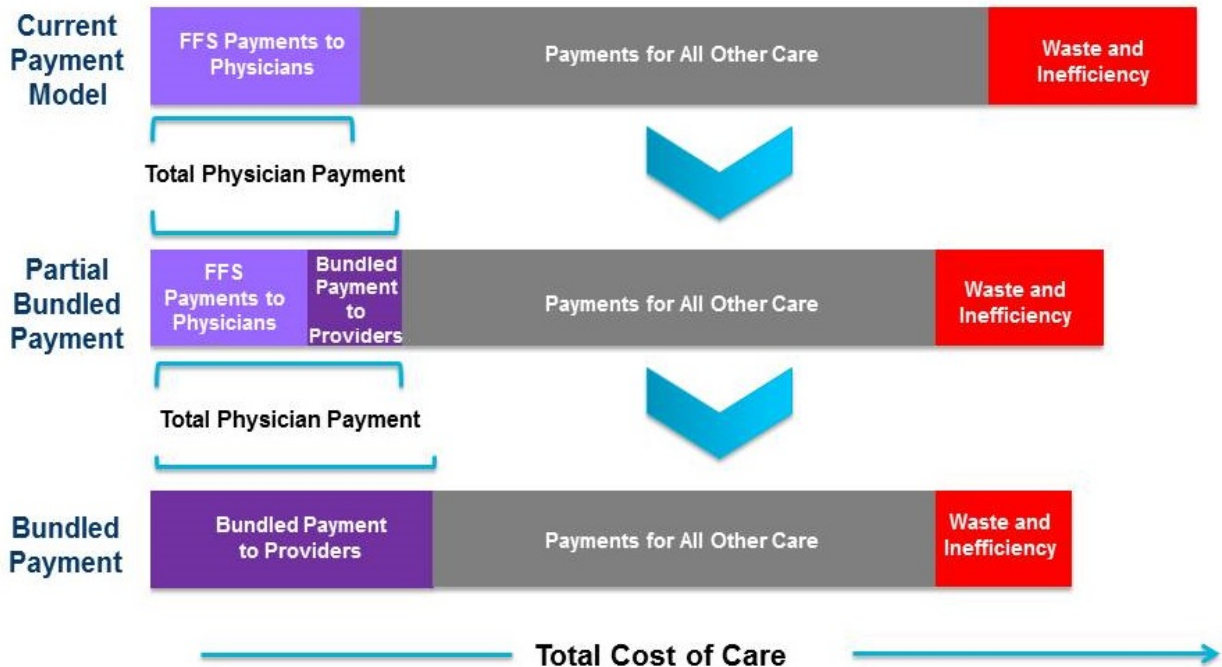


Figure 3: Potential model framework for cardiology alternative payments models in Acute Episode Management. *Source:* The Brookings Institution, 2014.

improving care and reducing costs of the acute episode. An alternative would be to incorporate these high-intensity acute episodes into a person-level payment model, as in an ACO (partially) or an integrated health care organization (fully capitated payment). But most providers are not well organized to support such reforms, at least in the near term. The potential bundled payment framework is described in Figure 3. This chart aims to show that a bundled payment could replace all or some of the physician payment for an acute episode, ultimately leading to a reduction in the total cost of care for a patient. While implementing partial bundles in conjunction with the current fee schedule may increase the total physician payments, their use may still effectively reduce the overall costs of care by decreasing waste and inefficiencies. They may also help reduce overall costs by preventing costly complications and hospital readmissions.

Depending on the condition, bundled payments can generally be designed in two basic ways: either as a bundled payment triggered by an acute event or discrete intervention, such a hospitalization or procedure, or a time-defined episode-based payment for patients diagnosed with stable chronic disease. In an acute-event model, there could be, for example, a hospital admission for AMI or heart failure. The episode payment would then include the hospitalization,

a specified post-discharge period, and could include an agreed upon set of services to be covered within that time frame. In a procedure-based model, the trigger would be the decision on whether a procedure is needed. The services included in the bundle would then be determined in relation to the procedure. Lastly, a time-defined event would cover a specific timeframe in which a provider or set of providers would cover all required care for a patient with a stable chronic disease, such as AF. Unfortunately, little empirical evidence is available to discuss this type of bundle. This may be due to a reluctance of both payers and providers to undertake such a complex model. As such, our literature review and stakeholder interviews primarily centered on bundled payments focused on acute events or discrete interventions.

Bundled payments could apply for patients who have reached certain decision points in the three high-impact conditions examined in this report (e.g., CAD, CHF, and AF). In CAD, the most appropriate settings for bundled payments are around interventions, such as percutaneous coronary interventions (catheterization, angioplasty, stent placement, or CABG), or possibly around major acute events, such as an AMI or serious episode of unstable angina. In CHF, a bundled payment would be most appropriate for a hospitalization related to the condition. For cardiac arrhythmias such as AF, a more targeted bundled payment could be designed when a patient needs an ablation. The following section will discuss the existing examples of bundled payments as well as directions for new bundled payment initiatives. A time-defined episode-based payment could also be applied for stable chronic phases of these conditions, similar to the above discussion of a team-based model.

Models that place greater emphasis on care transitions may be useful complements to episode-based payments. While many bundled payments are focused on improving care during an acute episode, often patients will return to a stable level of chronic disease and continue to require close management. A smooth transition between the providers involved in the acute episode and the chronic phase of a disease is essential to ensuring the success of the acute intervention. This will help ensure that the patient does not regress and require further intervention(s), including hospitalization.

Moreover, as the preceding payment reforms have suggested, many procedures and chronic disease exacerbations may be avoided through more effective care coordination involving cardiologists and other specialists in cardiovascular medicine. One major concern among stakeholders is that bundling for procedures will incentivize providers to participate in more bundles, thus performing more procedures. APMs should encourage coordination between acute and chronic care providers to promote the most appropriate care for the patient. Payments for care coordination between chronic disease management and acute episodes, as well as steps toward patient-level payments including shared-savings models and other team-based care payments, can support this goal. Incorporating population-level quality measures is one way to address this volume issue and fit with these patient-focused payment reforms. Another option would be the use of guidelines, AUCs, or similar mechanism as a part of the bundle. We have described some of these models previously (e.g., in the BCBSM and Highmark payment reforms).

#### **4.3.1. Bundled Payments**

While bundled payments thus far have concentrated on inpatient settings, the focus of this environmental scan was on outpatient/ambulatory settings. However, several bundled payment models for major procedures in cardiology have already been implemented with particular focus on inpatient procedures. ProvenCare is one example of a bundled payment program, implemented at Geisinger Health System in Danville, PA. ProvenCare was a system-wide initiative which redesigned care delivery for a number of inpatient procedures in order to apply a bundled payment model. ProvenCare was first applied to CABG, and has since been expanded to PCI as well as other non-cardiac procedures. Initially, care delivery was redesigned based on the 2004 AHA/ACC Guidelines for CABG surgery.<sup>61</sup> Then all of the professional and technical fees associated with CABG were bundled into one fixed price, which included preoperative evaluation, hospital fees, professional fees, discharge care, rehabilitation, and management of complications up to 90 days after the procedure. The price for the bundle was determined by a retrospective analysis of cost data, and assumed that readmissions and complications would be reduced by 50% as a result of the program.<sup>61</sup> Ultimately, the ProvenCare program significantly increased adherence to guidelines and improved clinical outcomes for CABG surgery. There

were fewer readmissions and complications. Over an 18-month period, the 30-day readmission rate decreased by 45 percent among ProvenCare patients.<sup>61</sup>

There have also been a number of examples of bundled payments already implemented in Medicare, including the Medicare Participating Heart Bypass Center Demonstration, widely regarded as a success in terms of quality and cost improvements in the 1990s, and more recently the Acute Care Episode (ACE) Demonstration. CMS is also implementing the BPCI initiative. A detailed discussion of those fully bundled payment reforms are beyond the scope of this scan. However, we note that the episode-based payment reforms we have discussed in the chronic disease management context could complement these reforms. This includes emphasizing care coordination between providers, defining pivots of care, and distribution of payments among participating providers. As discussed previously, integration or separate data and infrastructure payments may also be necessary.

In particular, two of the models that have been proposed by specialty societies and described in the section on “Stable Chronic Disease Management” address several of the issues around bundled payments, and include a bundled payment for acute interventions as a part of their larger disease management model. In the STS “Heart Team” Model, once a physician participating in the program has determined that a patient requires an invasive procedure, the heart team would convene to determine the appropriate action. Members of the team may vary based on the needs of the patient but could conceivably include a cardiothoracic surgeon, a primary cardiologist, an interventional cardiologist, and a PCP. Other specialists would be included as needed based on the patient’s co-morbidities.

Providers in this model would be paid outside of a bundled payment for their participation in this consultation; however, the remainder of the services would be included in a payment bundle. STS proposed a time-defined bundle beginning three days prior to the procedure and lasting until anywhere from 30 to 90 days after the procedure. The bundled payment would cover all hospital and physician fees, as well as post-acute care costs, and any readmissions during the established time period.<sup>62</sup> Regarding the role of inpatient versus outpatient facilities and care, the inpatient stay starts upon formal admission to a hospital through a physician, which concludes the day

before one is discharged from the hospital. Outpatient stays involve emergency or observation services for instance, and may incorporate lab tests. Here, a physician has not admitted a patient to the hospital under an inpatient status. The payment method within STS “Heat Team” model may vary depending on whether one is an outpatient or inpatient.<sup>63</sup>

STS proposed that payments be based on CPT and DRG codes, in addition to historical Part A and B cost data updated for inflation. STS also proposed the inclusion of an “outlier payment” to cover those patients with very high costs, as well as risk adjustment using the STS database. STS also proposed including an option for bonus payments based on quality beginning as a one-sided risk model and moving to two-sided risk in the second year of implementation or later. Finally, shared savings could be included on top of those bonus payments for providers who met certain quality metrics. Under this model, a third party administrator would receive the bundled payment and determine how to distribute payment to each of the involved providers based on their participation.<sup>62</sup>

Additionally, the SMARTCare model designed by the ACC could be applied to the management of acute episodes and events. One of the main goals of this model is to improve decision making between medical therapy, PCI, or CABG for patients with stable ischemic heart disease. SMARTCare promotes the use of various decision-making tools to change physician behavior and improve patient engagement around decision making. The use of these tools around decision making for procedures could be essential to providing more effective and appropriate acute care.<sup>35</sup>

## **5. Data and Infrastructure Requirements**

As stakeholders contemplate how to proceed with meaningful payment and delivery reforms, all have commented on the importance of better access to actionable patient data and other infrastructure improvements. These tools can help provide physicians with the information and decision support necessary to enable improved care coordination and patient decision making. In this section, we describe some of the developments in terms of a more robust data infrastructure for effective payment and delivery transformation. These data systems can help improve care

delivery and also be used to produce increasingly meaningful performance measures in conjunction with progress on payment reforms.

### **5.1. Cardiology Registries**

A range of cardiovascular registries are designed to provide cardiologists and other physicians treating patients with cardiovascular disease with clinical data on various conditions and procedures to help inform their decision making and provide better care. This data is essential if providers are expected to make changes in their practice as a result of payment reform.

The National Cardiovascular Data Registry (NCDR) includes eight registries managed by the ACC. Before it was called the NCDR, the ACC, in partnership with Summit Medical Systems, Inc., enrolled over 300 hospitals and collected data on more than 301,125 cardiac catheterizations and 166,082 PCIs.<sup>64</sup> In November 1998, the registry was renamed NCDR in order to provide a uniform and comprehensive view of cardiovascular procedures nationally, focusing on high-volume cardiac catheterizations and PCI. The updated version emerged in 2000.<sup>64</sup> Currently, there are seven hospital-based registries in the NCDR, which focus on a range of conditions and procedures, including diagnostic catheterization and percutaneous coronary intervention (PCI), carotid artery stenting (CAS) and endarterectomy (CEA) procedures, congenital heart disease, peripheral vascular intervention, TAVR and aortic stenosis treatment, ICD implantations, and acute coronary syndromes. The Cath-PCI Registry, for example, started collecting in 1997 data on diagnostic and interventional invasive procedures and establishes a national risk-adjusted benchmark so that outcomes can be compared among individual physicians, health systems, or an entire state.<sup>65</sup>

In addition, an outpatient registry, the PINNACLE Registry, collects data on outpatient treatment and outcomes for many cardiovascular conditions and attainment of risk reductions for cardiovascular disease (such as the “Million Hearts” initiative). Like Cath-PCI, the registry establishes a national benchmark so that outcomes may be compared among individual physicians, health systems, or an entire state. Data suggest that physicians routinely

overestimate their adherence to and attainment of treatment goals. Benchmarking and reporting significantly improves adherence seen in PCPs, advanced practice clinicians, and specialists.<sup>66</sup>

Nevertheless, more work is needed to improve data collection, analysis, and submission.

According to a recent report in assessment of ACC data, 45% of providers consider cardiology registry data submission systems to be incomplete.<sup>67</sup> As of 2013, many providers still relied on paper processes for data submission.<sup>67</sup> This creates data duplication and may increase avoidable errors. A single hospital found error rates as high as 90% in its cardiac catheterization lab, while a different hospital uncovered an average error rate of approximately 70% in other cardiology treatment sites.<sup>67</sup> These errors may include cardiac perforation, abrupt closure of the cardiac artery, use of non-sterile instrument, and/or medication mismanagement, which may occur before or after a procedure.<sup>68</sup> Overall, the underlying problem is that many cardiology providers lack the resources and incentives to automate data for accurate analysis, reporting, and ultimately, submission.

At the same time, progress is being made in cardiology adjudication. For example, the Massachusetts Data Analysis Center (Mass-DAC) is a data coordination entity established in 2002 under section 428 of Chapter 159 of the Acts of 2000, which conducts in-state adjudicatory procedures on cardiac surgery and angioplasty data.<sup>69</sup> Their goal is to improve the level and quality of cardiovascular care provided. All Massachusetts hospitals that perform cardiac surgeries or PCI must send such data to Mass-DAC quarterly. Mass-DAC conducts two adjudications per fiscal year to verify coding values. Common subjects for adjudication in cardiology include catheterization lab reports, echocardiograms, EKGs, discharge summaries, risk, and mortalities.

## **5.2. Guidelines/Decision Support Tools**

The availability of registry data has facilitated the development of guidelines and decision-support tools that assist cardiologists in utilizing the most recent data in their practice. The ACC and AHA have collaborated in creating a process that translates the data from registries into practice guidelines. A committee of experts is formed to compile guidelines for each new focus

area or to revise existing guidelines. The final document goes through an extensive review process to ensure consensus around the most recent data. An essential aspect of the guideline creation process is the constant development of existing guidelines based on new evidence, which can be developed from clinical registries, as well as other clinical research studies. Evidence-based guidelines are always considered in development, and new versions are frequently released.<sup>70</sup> Current ACC/AHA guidelines cover a broad range of cardiovascular conditions, from prevention of cardiovascular disease to the management of complex conditions and include guidelines for various procedures.<sup>71</sup>

In addition to evidence-based guidelines, cardiologists have access to various decision-support tools that can be implemented at the point of care. These tools can also provide an opportunity for patients to be involved in decisions about their care. Examples of these tools include IndiGO, FOCUS, and ePRISM.

IndiGO is a unique decision-support tool designed for use by physicians, allied healthcare providers, and patients to calculate and display the risk of an adverse event, such as heart attack, stroke, or diabetes, specific to that patient. It then suggests and prioritizes the interventions with the greatest impact on reducing that risk. IndiGO has been used by various provider groups including PCMHs, ACOs, integrated delivery networks, medical groups, and independent practice associations across the country. As of September 2012, two Oklahoma and Colorado health centers implemented IndiGO, with the addition of Fairview Health Services in Minnesota.<sup>72</sup> As of May 2013, IndiGO extended its deployment to Oakland, California's Kaiser Permanente office, and at the Salt Lake City, Utah's Intermountain Healthcare.<sup>73</sup>

FOCUS is a computerized decision-support tool that incorporates patient-specific information to determine whether imaging meets AUC, and, if so, which test is most appropriate (and cost-effective) for that patient. A large multi-center FOCUS registry has suggested a reduction in total imaging studies performed by up to 30%, improving adherence to AUC, and changing the physician ordering behavior at the time of ordering by PCPs and specialists.<sup>74</sup> FOCUS participants are all located in 49 states covering over 450 locations.<sup>75</sup>



The Kansas City-based company Health Outcomes Sciences (HOS) created ePRISM, which generates predictive models at the point of care. Risk models based on peer reviewed evidence or a hospital's own patient population. The peer reviewed risk models are based on national bodies of evidence and are sponsored by prestigious organizations, such as the American College of Cardiology (ACC) and STS. Through partnerships with research organizations, HOS provides actionable data, at the point of care, that historically has been used for research purposes only.<sup>76</sup>

ePRISM uses published scientific data to assist the physician in choosing various resources with similar outcomes, but different cost (e.g., anticoagulants, stent type). It then recommends actions to reduce complications during or following the procedure. Data suggest that this tool can result in large cost reductions while maintaining quality outcomes. ePRISM can also produce a customized, patient-specific consent form that is both educational and estimates specific benefits and risk of complications for the individual patient prior to invasive cardiac catheterization and/or PCI. Data suggest that many patients will select more conservative (and often less expensive) treatment when shared decision making is presented, including detailed individualized assessment of potential benefit/risk.<sup>66</sup>

One of the main goals of any APM is to reduce inappropriate utilization of services. Guidelines provide an expert-endorsed baseline for determining what qualifies as appropriate utilization, as well as useful justification for doctors to show that their practice is supported by the evidence. Decision-support tools available at the point of care can assist doctors in providing appropriate and efficient care. Additionally, decision support tools can assist patients as well as doctors in improving health care delivery by participating in shared decision-making. Patients engaged in shared decision-making tend to choose less invasive care, and report being happier with both their care and with their health plan.<sup>77</sup> Decision aids come in various forms including interactive online tools, videos, and booklets. However, such guidelines are often based on less than ideal evidence and medical practice continues to evolve.

### **5.3. Electronic Medical Records (EMR)**

Registries and other decision-support resources depend on electronic clinical and administrative data. Electronic medical records (EMRs) and associated data management and extraction tools are increasingly enabling doctors to collect data and submit it to a registry. They also provide a platform for feeding data back to doctors. Many decision-support tools are built directly into or on top of EMR systems in order to make them more readily available at the point of care.

Infrastructure for exchanging key electronic data elements is also critical for facilitating greater collaboration between physicians. Steps to promote data exchange across EMRs and other various health information exchange systems have begun to provide a foundation for this infrastructure. Continuing to develop timely electronic data exchange capabilities will assist practices in working together and in coordinating patient care. Several of the models explored here that support cardiologists and PCPs working together feature important infrastructure components to enable physicians involved in a patient's care to share key patient information.

### **5.4. Areas for Improvement**

While the data infrastructure available in cardiology is considerable, there are still areas in which data and their availability could be improved. Providers have often expressed the sentiment that claims and clinical data are not available at a time or in a format that helps them reform their practice. They have also expressed dissatisfaction with the ability of existing EMR tools and electronic data exchange systems to provide needed support for care. Unless physicians have timely access to the specific data used in performance measures accompanying payment reforms, it is difficult for them to make the necessary improvements to their practice.

Several providers also expressed skepticism regarding the quality of risk-adjustment data used in conjunction with quality and efficiency performance measures. Many providers feel that these data do not capture socioeconomic or other patient compliance factors that have a significant effect on patient outcomes. More generally, stakeholders were not uniformly confident that risk adjustment captures the severity of disease accurately. Therefore, many were unwilling to rely on

risk-adjusted data in measuring their performance. Similarly, several stakeholders expressed the importance of integrating clinical data with claims data to provide a more comprehensive picture of patient care.

## **6. Feasibility of Implementation**

The feasibility of each potential model framework is dependent on the type of care management required (e.g. stable chronic disease or discrete acute intervention management) and which providers are essential (e.g. single provider such as a PCP or a team of providers) to providing high quality, efficient care. Ideally, a single, comprehensive model could address the whole continuum of a patient's care. However, there are significant challenges to creating a totally inclusive model. Each provider's capability to coordinate a patient's care is variable and is dependent on the different practice settings and structures. Therefore, we focused on a variety of models that could potentially provide optimal care for a specific subsection of the patient population contingent on the type and severity of the associated cardiovascular condition.

There are many examples of advanced, integrated health systems that have already implemented a number of the changes discussed in this report. For these organizations, improving care coordination is much easier as they already have the infrastructure in place to support this type of care. Thus, a payment model would only further support their efforts to provide higher quality care. For those providers who are not a part these systems, implementing the delivery system reforms associated with one of these payment models will be significantly more difficult. However, it is all the more important that they implement some type of change since they have the most potential for improvement.

Currently, the majority of reform efforts in chronic disease management have focused on transforming payment and delivery for primary care. Including primary care in any effort to address cardiology is essential, since PCPs provide a large portion of the care for patients with cardiovascular disease. Cardiologists and other subspecialists also have a role in the care of these patients that may vary depending on the severity of the condition. At a minimum, cardiologists may provide vital input without direct contact with the patient. In some cases, the care of the

patient may even be more efficient if it is principally managed by a cardiologist. Most primary care-focused models provide a minimal shift from the current FFS system for cardiology payments. As such, many have already been implemented. However, there are still questions around how to feasibly incorporate cardiologists and other subspecialists into these models.

Many of the current primary care-focused models fail to directly support more effective care coordination between providers. Rather, these models use the power of the referral by PCPs, or other indirect means, to change specialists' behavior. Those that do incentivize cardiologists and other subspecialists in some capacity predominately use population-level metrics to incentivize more efficient care. Stakeholders questioned whether this type of incentive is the most effective way to engage specialists. Additionally, many stakeholders felt it was difficult to properly coordinate care between various providers without upfront data and infrastructure changes for both PCPs and specialists alike. However, most current primary care-focused models only provide add-on infrastructure payments to PCPs. As such, stakeholders felt it was difficult to achieve proper care coordination while using such fragmented payment structures. Without further inclusion of cardiologists and subspecialists in a payment model, the shift to value based payment will be difficult.

While cardiologist-focused models do address the care of specialists and subspecialists more directly, there are not many examples currently being implemented. This could be due to the fact that directing payments towards a portion of the care team is viewed as ineffective in achieving appropriate, coordinated care. However, unlike with primary care-focused models, it is more difficult for cardiologists to use indirect incentives like referrals to change PCP behavior. As discussed above, much of the care for stable chronic diseases can be managed in a primary care setting. Therefore, cardiology-focused models cannot fully address concerns of overutilization or improper use of diagnostic tests and procedures by incentivizing cardiologists as some of these decisions have already been made before the patient is seen by a cardiologist. Additionally, cardiologists are uncomfortable with taking on additional financial risk for care in which their influence and/or oversight is minimal.

Team-focused models address many of the gaps described in the primary care and cardiology-focused models, including properly aligning incentives between providers. Coordination of care is more heavily emphasized to ensure appropriateness of care over volume of services provided. However, team-focused models in cardiology incorporating payment and delivery reform are not yet widespread. One reason for the lack of implementation is the complicated nature of such a model. It is difficult to adequately attribute pivots of care between providers, in addition to defining clear trigger points for when the team should be engaged. There must also be an explicit team structure in which it is clear which providers constitute the team and what their roles are in the patient's care. Each specific cardiovascular disease may also require different teams. Even within each disease category, teams may differ depending on severity. Therefore, explicitly defining and implementing a payment structure associated with this level of management is challenging and may not be reasonable considering how many teams might be required. It may be more feasible to create this type of team dynamic within larger, more integrated systems as payments and provider roles are more clearly defined.

There has already been a significant amount of progress in developing APMs for acute episodes in cardiology, in both the public and private sectors. Initiatives such as Geisinger's ProvenCare and CMS' BPCI have begun bundled payment initiatives that address these acute, intensive exacerbations of cardiovascular diseases and procedures. While these initiatives may be the most feasible option in certain circumstances, a complete shift to a fully bundled payment may be more difficult to successfully implement outside of discrete acute episodes and outside of provider systems that are already relatively coordinated. This is due to the dramatic shift away from traditional FFS. As cardiovascular care can be highly variable, it is difficult to define specific bundles of care outside of those that are procedure-based. Defining the trigger and end of an episode of care is more difficult for longitudinal disease management of conditions such as stable chronic CHF or AF. Additionally, bundled initiatives need to address the transition between acute episode(s) and the chronic phase of a disease in order to avoid unnecessary hospitalizations and/or additional interventions. To support reforms across the full range of cardiovascular disease care, APMs for chronic disease paired with partially- or fully-bundled payment models for certain acute episodes may provide a feasible pathway toward payment and delivery reform.

Lastly, payment reform should promote high quality, efficient care for patients with multiple conditions due to the frequent comorbidities associated with cardiovascular disease. One approach could involve the use of population-level accountable care models like ACO shared savings and the population-based incentives in programs like the BCBSM specialty payment reform model alongside payment reforms focused on cardiology and cardiovascular care.

## **7. Conclusion**

Based on stakeholder interviews and comprehensive literature, there appears to be ample opportunities for innovative reform of both delivery and payment for cardiovascular care. In particular, APMs could increase resources available to clinicians to improve care coordination, evidence-based care, and practice infrastructure to achieve higher-value and less costly care for beneficiaries.

First, APMs could promote better care coordination. While primary-care APMs like medical home payments support efforts by primary care physicians to coordinate care, these payment systems provide little direct support for cardiovascular specialists to participate in care coordination activities, which can lead to inappropriate or inefficient referrals. Cardiovascular APMs should focus on supporting all associated providers to work together efficiently in order to ensure the patient receives high quality care. This should include more effective consultation in the diagnostic process, in order to determine efficiently whether or not a patient is at risk of cardiovascular disease and if so, to prevent the progression to more serious illness and acute complications. The APMs should encourage use of the best evidence by both PCPs and specialists to avoid complications and unnecessary costs associated with chronic cardiovascular diseases. Effective specialist care is essential when acute complications like unstable angina, myocardial infarctions, and heart failure exacerbations do occur. APMs should also promote high-quality care using the best evidence and most efficient treatment methods for acute complications. They should support coordination across providers to follow-up on a patient's care once the patient has been released from the hospital following the acute episode. Providers should have incentives to share and assess data, as well as educate patients, in order to better

manage chronic, acute, and post-acute care. Lastly, APMs should incentivize infrastructure improvements to help clinicians obtain and use actionable data on their patients, which could support higher quality care. If properly implemented, APMs can result in a reduction in overall costs of care while simultaneously improving population health.

It is difficult to implement a single APM to cover all the complexity in cardiovascular care unless such a model is truly population-focused. However, there are barriers and challenges to effectively implementing population-based models, such as ACOs, given the diversity of cardiovascular conditions, the number of different providers involved in care, and the intensity of care involved in the optimal management of chronic diseases and acute events. Therefore, in order to be successful, a combination of APMs should be considered to enable a broad range of physicians to participate. This could include APMs that support cardiovascular disease specialists to coordinate care with PCPs in the chronic management of a population of patients; models like this have been already been implemented in private insurance plans. Bundled-payment models have also been implemented by Medicare and private insurers for major acute episodes. Such models could also complement or reinforce population-based reforms such as ACOs. In contrast, there is limited experience with implementing specialty-focused APMs or bundled-payment models for chronic cardiovascular disease, which come with additional practical challenges. A further challenge in designing cardiovascular-specific APMs is identifying triggers that would properly attribute a patient's care to a particular payment model.

The growing experience with a range of cardiology-related payment reforms indicates that it is possible to define a pathway forward to support better care and lower costs. This is especially true for particular models that have moved to promote effective care coordination in chronic disease management and high-quality, efficient care in acute episodes. Given the importance of cardiovascular disease in health improvement and overall health care costs, implementing effective APMs for cardiovascular care should be a high priority.

## Appendix A. Stakeholders

Organization	Stakeholder Type
ACE Demo Project Consult Nancy	Payer
Aetna	Payer
America's Health Insurance Plans	Payer
American Board of Family Medicine	Care Delivery/Provider
American College of Cardiology	Advocacy/Patient Experience
American Heart Association Berkshire Medical Center	Advocacy/Patient Experience
American Heart Association Brigham and Women's Hospital Harvard Medical School	Advocacy/Patient Experience
American Heart Association CBRE Health Care Services Group	Advocacy/Patient Experience
American Heart Association Christina Care Healthy System Christina Care Value Institute	Advocacy/Patient Experience
American Heart Association INTEGRIS Family Care Central	Advocacy/Patient Experience
American Heart Association Massachusetts General Hospital Harvard Medical School	Advocacy/Patient Experience
American Heart Association Mayo Clinic	Advocacy/Patient Experience
American Heart Association Midwest Heart Specialists in Illinois Midwest Heart Foundation	Advocacy/Patient Experience
American Heart Association Veterans Affairs Palo Alto Medical Center Stanford University	Advocacy/Patient Experience
American Society of Nuclear Cardiology Cleveland Clinic Department of Nuclear Medicine Sydell and Arnold Miller Family Heart & Vascular Institute	Care Delivery/Provider
Appleton Cardiology ThedaCare	Care Delivery/Provider
Association of Black Cardiologists	Advocacy/Patient Experience
Atlantic Health System National Board of Echocardiography	Care Delivery/Provider
Blue Cross Blue Shield Association	Payer
Blue Cross Blue Shield of Florida	Payer



<b>Organization</b>	<b>Stakeholder Type</b>
Blue Cross Blue Shield of Massachusetts Tufts University School of Medicine	Payer
Blue Cross Blue Shield of Michigan	Payer
Brigham and Women's Hospital Harvard Medical School	Payment Policy
Cardiovascular Management of Illinois Cardiology Advocacy Alliance MedAxiom	Care Delivery/Provider
Cardiovascular Research Foundation American College of Cardiology	Advocacy/Patient Experience
Cedars-Sinai Heart Institute, American College of Cardiology University of California, Los Angeles School of Nursing	Care Delivery/Provider
Comprehensive Cardiac Care (DC) Helen Barold Consulting	Care Delivery/Provider
Duke Cardiology Duke Clinical Research Institute	Care Delivery/Provider
Duke Translational Medicine Institute	Advocacy/Patient Experience
Emory University School of Medicine	Care Delivery/Provider
Evolent Health American Academy of Family Physicians	Care Delivery/Provider
The FH Foundation The Archimedes Group	Patient Experience, Research and Quality
Geisinger Health System	Payer
Harvard School of Public Health Harvard Medical School Veterans Affairs Boston Healthcare System Brigham and Women's Hospital	Care Delivery/Provider
Iora Health Massachusetts General Hospital Harvard Medical School	Care Delivery/Provider
Lancaster General Hospital Lancaster General Health Temple University School of Medicine	Care Delivery/Provider
MedStar Health MedStar Physician Partners The Brookings Institution Center for American Progress	Provider Organization and Networks
MedStar Heart Institute Washington Hospital Center	Provider Organization and Networks
Mended Hearts	Patient Experience, Research and Quality

<b>Organization</b>	<b>Stakeholder Type</b>
Million Hearts	Patient Experience, Research and Quality
National Cardiovascular Data Registry	Patient Experience, Research and Quality
North Shore Long Island Jewish Health System Hofstra North Shore-Long Island Jewish School of Medicine	Care Delivery/Provider
Pacific Business Group on Health Stanford University	Payer
Parkview Health (Fort Wayne, IN)	Care Delivery/Provider
Sisters of Mercy Health System Healthcare Transformation Group	Care Delivery/Provider
Society of Thoracic Surgeons Mid Atlantic Cardiothoracic Surgeons	Advocacy/Patient Experience
Sutter Pacific Medical Foundation Physician Foundation Medical Associates Heart Rhythm Society	Care Delivery/Provider
UNITE HERE Health	Payer
UnitedHealth Group Harvard Community Health Plan University of Minnesota School of Public Health, Department of Health Policy and Management	Payer
University of California, San Francisco Medical Center JAMA Internal Medicine	Patient Experience, Research and Quality
University of California, San Francisco Philip R. Lee Institute of Health Policy Studies, University of California, San Francisco American College of Cardiology	Payer
Wake Forest Baptist Medical Center	Patient Experience, Research and Quality
Yale Center for Outcomes Research and Evaluation Yale-New Haven Hospital Center for Outcomes Research and Evaluation	Care Delivery/Provider

## Appendix B. Performance Measures

Process Measures		
<i>Measure Title</i>	<i>NQF #</i>	<i>Source</i>
<b>CONDITION: Atrial Fibrillation (AF)</b>		
Assessment of Thromboembolic Risk Factors (CHADS2)	1524	American College of Cardiology Foundation/ American Heart Association/American Medical Association's Physician Consortium for Performance Improvement
Chronic Anticoagulation Therapy	1525	American College of Cardiology Foundation/ American Heart Association/American Medical Association's Physician Consortium for Performance Improvement
New Atrial Fibrillation: Thyroid Function Test	0600	Resolution Health, Inc.
<b>CONDITION: Coronary Artery Disease (CAD)</b>		
Adherence to Statin Therapy for Individuals with Coronary Artery Disease	0543	Centers for Medicare & Medicaid
Chronic Stable Coronary Artery Disease: ACE Inhibitor or ARB Therapy--Diabetes or Left Ventricular Systolic Dysfunction (LVEF <40%)	0066	American College of Cardiology
Chronic Stable Coronary Artery Disease: Antiplatelet Therapy	0067	American College of Cardiology
Chronic Stable Coronary Artery Disease: Beta-Blocker Therapy--Prior Myocardial Infarction (MI) or Left Ventricular Systolic Dysfunction (LVEF <40%)	0070	American College of Cardiology
Chronic Stable Coronary Artery Disease: Lipid Control	0074 [updated 3/18/14]	American College of Cardiology
<b>CONDITION: Myocardial Infarction (MI)</b>		
ACEI or ARB for left ventricular systolic dysfunction- Acute Myocardial Infarction (AMI) Patients	0137	Centers for Medicare & Medicaid
Aspirin at Arrival	0286	Centers for Medicare & Medicaid
Aspirin prescribed at discharge for AMI	0142	Centers for Medicare & Medicaid
Beta-blocker prescribed at discharge for AMI	0160	Centers for Medicare & Medicaid
Emergency Medicine: Aspirin at Arrival for Acute Myocardial Infarction (AMI)	0092	American Medical Association - Physician Consortium for Performance Improvement (AMA-PCPI)
Fibrinolytic Therapy Received Within 30 Minutes of ED Arrival	0288	Centers for Medicare & Medicaid
Fibrinolytic Therapy received within 30 minutes of hospital arrival	0164	Centers for Medicare & Medicaid
Median Time to ECG	0289	Centers for Medicare & Medicaid
Median Time to Transfer to Another Facility for Acute Coronary Intervention	0290	Centers for Medicare & Medicaid
Persistence of Beta-Blocker Treatment After a Heart Attack	0071	National Committee for Quality Assurance
Post MI: ACE inhibitor or ARB therapy	0594	Resolution Health, Inc.
Statin Prescribed at Discharge	0639	Centers for Medicare & Medicaid

Primary PCI received within 90 minutes of hospital arrival	0163	Centers for Medicare & Medicaid
Cardiac Rehabilitation Patient Referral From an Inpatient Setting	0642	American College of Cardiology
Cardiac Rehabilitation Patient Referral From an Outpatient Setting	0643	American College of Cardiology
<b>CONDITION: Heart Failure (HF)</b>		
ACEI or ARB for left ventricular systolic dysfunction - Heart Failure (HF) Patients	0162	Centers for Medicare & Medicaid
Evaluation of Left ventricular systolic function (LVS)	0135	Centers for Medicare & Medicaid
Heart Failure : Beta-blocker therapy for Left Ventricular Systolic Dysfunction	0083	American College of Cardiology
Heart Failure Symptoms Addressed	0521	Centers for Medicare & Medicaid
Heart Failure: Angiotensin-Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) Therapy for Left Ventricular Systolic Dysfunction	0081	American College of Cardiology
Heart Failure: Left Ventricular Ejection Fraction Assessment (Outpatient Setting)	0079	American College of Cardiology
<b>CONDITION: General</b>		
ACE/ARB Therapy at Discharge for ICD implant patients with LVSD	1522	American College of Cardiology Foundation
Anesthesiology and Critical Care: Prevention of Catheter-Related Bloodstream Infections (CRBSI) – Central Venous Catheter (CVC) Insertion Protocol	0464	American Medical Association - Physician Consortium for Performance Improvement (AMA-PCPI)
Beta Blocker at Discharge for ICD implant patients with a previous MI	1528	American College of Cardiology Foundation
Beta Blocker at Discharge for ICD implant patients with LVSD	1529	American College of Cardiology Foundation
Blood Pressure Screening by 13 Years of Age	1552	National Committee for Quality Assurance
Blood Pressure Screening by 18 Years of Age	1553	National Committee for Quality Assurance
INR for Individuals Taking Warfarin and Interacting Anti-Infective Medications	0556	Centers for Medicare & Medicaid
Lack of Monthly INR Monitoring for Individuals on Warfarin	0555	Centers for Medicare & Medicaid
Participation in a Systematic National Database for General Thoracic Surgery	0456	The Society of Thoracic Surgeons
Proportion of Days Covered (PDC): 5 Rates by Therapeutic Category	0541	Pharmacy Quality Alliance
Risk-Adjusted Operative Mortality for Mitral Valve (MV) Repair	1501	The Society of Thoracic Surgeons
Risk-Adjusted Operative Mortality for MV Repair + CABG Surgery	1502	The Society of Thoracic Surgeons
Statin Therapy at Discharge after Lower Extremity Bypass (LEB)	1519	Society for Vascular Surgery
Hospitalized Patients Who Die an Expected Death with an ICD that Has Been Deactivated	1625	RAND Corporation
Ambulatory initiated Amiodarone Therapy: TSH Test	0578	Resolution Health, Inc.

Emergency Medicine: 12-Lead Electrocardiogram (ECG) Performed for Non-Traumatic Chest Pain	0090	American Medical Association - Physician Consortium for Performance Improvement (AMA-PCPI)
Emergency Medicine: 12-Lead Electrocardiogram (ECG) Performed for Syncope	0093	American Medical Association - Physician Consortium for Performance Improvement (AMA-PCPI)
Adherence to statins	0569	Health Benchmarks-IMS Health
Dyslipidemia new med 12-week lipid test	0583	Resolution Health, Inc.
Cardiovascular Health Screening for People With Schizophrenia or Bipolar Disorder Who Are Prescribed Antipsychotic Medications	1927	National Committee for Quality Assurance
Cardiovascular Monitoring for People With Cardiovascular Disease and Schizophrenia (SMC)	1933	National Committee for Quality Assurance
Ischemic Vascular Disease (IVD): Use of Aspirin or Another Antithrombotic	68	National Committee for Quality Assurance
Stent drug-eluting clopidogrel	0588	Resolution Health, Inc.
Stroke and Stroke Rehabilitation: Anticoagulant Therapy Prescribed for Atrial Fibrillation (AF) at Discharge	0241	American Medical Association - Physician Consortium for Performance Improvement (AMA-PCPI)
Time to Intravenous Thrombolytic Therapy	1952	American Heart Association/American Stroke Association
Male Smokers or Family History of Abdominal Aortic Aneurysm (AAA) - Screening for AAA	0629	ActiveHealth Management
Medical Assistance With Smoking and Tobacco Use Cessation (MSC)	0027	National Committee for Quality Assurance
Preventive Care & Screening: Tobacco Use: Screening & Cessation Intervention	0028	American Medical Association - convened Physician Consortium for Performance Improvement (AMA-convened PCPI)
High Risk for Pneumococcal Disease - Pneumococcal Vaccination	0617	ActiveHealth Management
Perioperative Care: Discontinuation of Prophylactic Parenteral Antibiotics (Non-Cardiac Procedures)	0271	American Medical Association - Physician Consortium for Performance Improvement (AMA-PCPI)
Prophylactic antibiotics discontinued within 24 hours after surgery end time	0529	Centers for Medicare & Medicaid
Surgery patients on beta blocker therapy prior to admission who received a beta blocker during the perioperative period	0284	Centers for Medicare & Medicaid
Anti-Lipid Treatment Discharge	0118	The Society of Thoracic Surgeons
Anti-Platelet Medication at Discharge	0116	The Society of Thoracic Surgeons
Beta Blockade at Discharge	0117	Centers for Medicare & Medicaid
Cardiac Surgery Patients With Controlled Postoperative Blood Glucose	0300	Centers for Medicare & Medicaid
Duration of Antibiotic Prophylaxis for Cardiac Surgery Patients	0128	The Society of Thoracic Surgeons
Perioperative Care: Discontinuation of Prophylactic Antibiotics (Cardiac Procedures)	0637	American Medical Association - Physician Consortium for Performance Improvement (AMA-PCPI)
Pre-op beta blocker in patient with isolated CABG (2)	0236	Centers for Medicare & Medicaid
Preoperative Beta Blockade	0127	The Society of Thoracic Surgeons

Selection of Antibiotic Prophylaxis for Cardiac Surgery Patients	0126	The Society of Thoracic Surgeons
Use of Internal Mammary Artery (IMA) in Coronary Artery Bypass Graft (CABG)	0134	The Society of Thoracic Surgeons

<b>Outcome Measures</b>		
<i>Measure Title</i>	<i>NQF #</i>	<i>Source</i>
<b>CONDITION: Myocardial Infarction (MI)</b>		
Acute Myocardial Infarction (AMI) Mortality Rate	0730	Agency for Healthcare Research and Quality
Hospital 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization.	0505	Centers for Medicare & Medicaid
Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following acute myocardial infarction (AMI) hospitalization for patients 18 and older.	0230	Centers for Medicare & Medicaid
Proportion of Patients Hospitalized with AMI that have a Potentially Avoidable Complication (during the Index Stay or in the 30-day Post-Discharge Period)	0704	Bridges to Excellence
<b>CONDITION: Heart Failure (HF)</b>		
Congestive Heart Failure (CHF) Mortality Rate (IQI 16)	0358	Agency for Healthcare Research and Quality
Hospital 30-day, all-cause, risk-standardized mortality rate (RSMR) following heart failure (HF) hospitalization for patients 18 and older.	0229	Centers for Medicare & Medicaid
Hospital 30-day, all-cause, risk-standardized readmission rate (RSRR) following heart failure hospitalization	0330	Centers for Medicare & Medicaid
Heart Failure Admission Rate (PQI 8)	0277	Agency for Healthcare Research and Quality
<b>CONDITION: General</b>		
In-hospital mortality following elective open repair of AAAs	1523	Society for Vascular Surgery
In-hospital mortality following elective EVAR of AAAs	1534	Society for Vascular Surgery
Operative Mortality Stratified by the Five STS-EACTS Mortality Categories	0733	The Society of Thoracic Surgeons
Proportion of patients with a chronic condition that have a potentially avoidable complication during a calendar year.	0709	Bridges To Excellence
Comfortable Dying: Pain Brought to a Comfortable Level Within 48 Hours of Initial Assessment	0209	National Hospice and Palliative Care Organization
Standardized adverse event ratio for children < 18 years of age undergoing cardiac catheterization	0715	Boston Children's Hospital
Controlling High Blood Pressure	0018	National Committee for Quality Assurance
Bilateral Cardiac Catheterization Rate (IQI 25)	0355	Agency for Healthcare Research and Quality

Hospital Risk-Standardized Complication Rate following Implantation of Implantable Cardioverter-Defibrillator (ICD)	0694	American College of Cardiology
Ischemic Vascular Disease (IVD): Blood Pressure Control	0073	National Committee for Quality Assurance
Ischemic Vascular Disease (IVD): Complete Lipid Profile and LDL-C Control <100 mg/dL	0075 <i>[last updated 4/13; Annual update in progress as of 3/14]</i>	National Committee for Quality Assurance
Optimal Vascular Care	0076	MN Community Measurement
30-day all-cause risk-standardized mortality rate following Percutaneous Coronary Intervention (PCI) for patients with ST segment elevation myocardial infarction (STEMI) or cardiogenic shock	0536	Centers for Medicare and Medicaid Services
30-day all-cause risk-standardized mortality rate following percutaneous coronary intervention (PCI) for patients without ST segment elevation myocardial infarction (STEMI) and without cardiogenic shock	0535	Centers for Medicare and Medicaid Services
Hospital 30-Day Risk-Standardized Readmission Rates following Percutaneous Coronary Intervention (PCI)	0695	Centers for Medicare & Medicaid
PCI mortality (risk-adjusted)©	0133	American College of Cardiology Foundation
Hospital-Wide All-Cause Unplanned Readmission Measure (HWR)	1789	Centers for Medicare & Medicaid
Hospital-level 30-day, all-cause risk-standardized readmission rate (RSRR) following elective primary total hip arthroplasty (THA) and/or total knee arthroplasty (TKA)	1551	Centers for Medicare & Medicaid Services (CMS)
Functional Capacity in COPD patients before and after Pulmonary Rehabilitation	0701	American Association of Cardiovascular and Pulmonary Rehabilitation
Health-related Quality of Life in COPD patients before and after Pulmonary Rehabilitation	0700	American Association of Cardiovascular and Pulmonary Rehabilitation
Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate (IQI 11)	0359	Agency for Healthcare Research and Quality
Death among surgical inpatients with serious, treatable complications (PSI 4)	0351	Agency for Healthcare Research and Quality
RACHS-1 Pediatric Heart Surgery Mortality	0339	Agency for Healthcare Research and Quality
Risk-Adjusted Deep Sternal Wound Infection Rate	0130	The Society of Thoracic Surgeons
Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR)	0120	The Society of Thoracic Surgeons
Risk-Adjusted Operative Mortality for Aortic Valve Replacement (AVR) + CABG Surgery	0123	The Society of Thoracic Surgeons
Risk-Adjusted Operative Mortality for CABG	0119	The Society of Thoracic Surgeons

Risk-Adjusted Operative Mortality for Mitral Valve (MV) Replacement	0121	The Society of Thoracic Surgeons
Risk-Adjusted Operative Mortality MV Replacement + CABG Surgery	0122	The Society of Thoracic Surgeons
Risk-Adjusted Post-operative Renal Failure	0114	The Society of Thoracic Surgeons
Risk-Adjusted Prolonged Intubation (Ventilation)	0129	The Society of Thoracic Surgeons
Risk-Adjusted Stroke/Cerebrovascular Accident	0131	The Society of Thoracic Surgeons
Risk-Adjusted Surgical Re-exploration	0115	The Society of Thoracic Surgeons
Hospital specific risk-adjusted measure of mortality or one or more major complications within 30 days of a lower extremity bypass (LEB).	0534	American College of Surgeons
Risk Adjusted Case Mix Adjusted Elderly Surgery Outcomes Measure	0697	American College of Surgeons
Risk Adjusted Colon Surgery Outcome Measure	0706	American College of Surgeons
Standardized mortality ratio for neonates undergoing non-cardiac surgery	0714	Boston Children's Hospital, Center for Patient Safety and Quality Research

### Efficiency Measures

<i>Measure Title</i>	<i>NQF #</i>	<i>Source</i>
<b>CONDITION: General</b>		
Thorax CT: Use of Contrast Material	0513	Centers for Medicare & Medicaid Services
Cardiac Imaging for Preoperative Risk Assessment for Non-Cardiac Low-Risk Surgery	0669	Centers for Medicare & Medicaid Services
Cardiac stress imaging not meeting appropriate use criteria: Preoperative evaluation in low risk surgery patients	0670	American College of Cardiology Foundation
Cardiac stress imaging not meeting appropriate use criteria: Testing in asymptomatic, low risk patients	0672	American College of Cardiology Foundation
Cardiac stress imaging not meeting appropriate use criteria: Routine testing after percutaneous coronary intervention (PCI)	0671	American College of Cardiology Foundation
Inappropriate Pulmonary CT Imaging for Patients at Low Risk for Pulmonary Embolism	0667	Partners HealthCare System, Inc.

### Structure Measures

<i>Measure Title</i>	<i>NQF #</i>	<i>Source</i>
<b>CONDITION: General</b>		
Participation in a National Database for Pediatric and Congenital Heart Surgery	0734	The Society of Thoracic Surgeons
Surgical Volume for Pediatric and Congenital Heart Surgery: Total Programmatic Volume and Programmatic Volume Stratified by the Five STS-EACTS Mortality Categories	0732	The Society of Thoracic Surgeons



Adult Current Smoking Prevalence	2020	Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion
Participation in a Systematic Database for Cardiac Surgery	0113	The Society of Thoracic Surgeons
Pediatric Heart Surgery Volume (PDI 7)	0340	Agency for Healthcare Research and Quality

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