



THE COMPARATIVE EFFECTIVENESS RESEARCH LANDSCAPE IN THE UNITED STATES AND ITS RELEVANCE TO THE MEDICARE PROGRAM

PREPARED FOR: The Medicare Payment Advisory Commission

PREPARED BY: Penny Mohr, MA
Sean Tunis, MD, MSc
Raj Sabharwal, MPH
Russ Montgomery, MHS
Linda Bergthold, PhD

FINAL REPORT

MAY 31, 2010

TABLE OF CONTENTS

Executive Summary	iii
Section 1: Introduction and Aims	1
Section 2: Comparative Effectiveness Research in the United States and the Medicare Program	2
• Definitions of Comparative Effectiveness	2
• Brief Legislative History	2
• Contrasting Approaches to Priority Setting and Selection of Topics	3
• AHRQ, NIH, and ARRA Initiatives	
• Medicare’s Research Priorities	
• Transparency of Conflicts of Interest	
• ARRA’s Legacy and Recent Health Reform	9
Section 3: Opportunities for Medicare to Use CER in Coding and Payment	11
• Use of CER for Coding	11
• New Technology Add-on Payments	15
• Medicare’s Least Costly Alternative Policy	18
• Value-Based Purchasing	20
• VBP and CER	
• Value-Based Insurance Design	22
• Medicare and VBID	
Section 4: Coverage with Evidence Development in Medicare	26
• Statutory Framework and Early Use of CED	26
• National Emphysema Treatment Trial as a Precedent	
• Overview of Recent Medicare Initiatives in CED	28
• Development of Two CED Tracks	
• Reactive Approaches to Priority Setting and Study Design Policies	30
• Use of Observational and Experimental Methods	31
• Study Funding and Oversight	32
• Financing and Conflicts of Interest	
• Timing of CED and Technology State of Development	33
Section 5: Conclusion and Future Opportunities	35

References	39
-------------------	-----------

List of Tables

• Table 1: Comparison of Medicare’s Top 20 Research Priorities with IOM CER Priorities and NIH Challenge Grant Priorities	8
• Table 2: Medicare Coverage Decisions Utilizing CED	28

List of Boxes

• Box 1: AHRQ Priority Conditions	4
• Box 2: Case Example: Negative Pressure Wound Therapy	12
• Box 3: Case Example: Drug Eluting Stents	14
• Box 4: Case Example: Embolic Control Devices	16
• Box 5: Case Example: Levalbuterol and Albuterol	18

Appendices

• Appendix A: Key Informants	
• Appendix B: Coverage with Evidence Development Initiatives	

EXECUTIVE SUMMARY

Federal funding for Comparative Effectiveness Research (CER) has increased dramatically in recent years. The hope is that by generating better evidence on what works in medical care, and providing incentives to use care appropriately, it may be possible to both improve health care outcomes and slow health care spending growth. At the same time that funding has increased for CER, there has been an increased focus on finding ways to make Medicare a more innovative and value-based purchaser. Under health reform, Medicare has been given the flexibility to test new payment and delivery systems. It also has been given increased latitude to use CER to inform its coverage and reimbursement policies. With an increased focus on CER as a potentially important policy lever for slowing cost growth, this is an opportune time to assess the potential for creative and effective approaches for Medicare to generate and use CER to become a more value-based and innovative purchaser.

This paper provides an overview of the current CER landscape in the United States, comparing and contrasting approaches to establishing priorities for research, engaging various stakeholders, and ensuring transparency across the federal entities involved. Particular attention is paid to the salience of CER initiatives to the Medicare program, and the mechanisms in place to enable Medicare's involvement. Through case studies that draw on key informant interviews and the authors' own experiences at the agency, we examine existing mechanisms to involve the Centers for Medicare and Medicaid Services (CMS) in CER, some of the barriers to its effective use within the Medicare program, and how the agency could improve its capacity to make better use of CER. Specifically, we review five policy tools where Medicare could use findings from CER to inform its payment policies: coding, new technology add-on payments, least costly-alternative policies, value-based insurance design, and value-based purchasing. Finally, we review Medicare's experience with coverage with evidence development (CED), a policy tool that can help generate improved clinical evidence to support Medicare coverage determinations.

Building on a smaller investment made in the Medicare Modernization Act of 2005, funding for CER increased dramatically in 2009 with the passage of the American Recovery and Reinvestment Act (ARRA), and has become sustained through the creation of the Patient Centered Outcomes Research Institute (PCORI) under the Patient Protection and Affordable Care Act of 2010. Throughout this period, Medicare has been modestly involved in discussions on investment priorities and the nature of the research to be conducted. CER will be credible, timely and more relevant to Medicare beneficiaries only if CMS becomes an active participant in all stages of the research process. This will require Departmental and Agency leadership and an increased commitment of resources. Simply having a CMS participant in broader priority setting efforts is unlikely to result in a clear understanding of the research needs of the Medicare program. Given the unique characteristics of the Medicare population, it will be very helpful for the Medicare program to conduct or to arrange for a CER priority setting process that is focused on the important gaps in clinical evidence for this population.

Of the policy options explored in this paper, there are three areas that offer the greatest potential for near term benefits through use of CER.

- First is the use of CER to support the creation of new billing codes – the point of entry for many new technologies and a process that is not hindered by as many statutory barriers as are Medicare's payment systems. CMS is already working to clarify the standards of evidence that will be necessary to support the creation of a new code, and has solicited a systematic review of

the clinical literature to support one coding decision to date. The use of an independent technology assessment provided CMS with objective, reliable evidence to make a more informed and appropriate coding decision. More extensive use of such assessments would likely require careful consideration of evidentiary priorities. Systematic reviews are time consuming and expensive, and also often fail to produce definitive findings, as the quality of the evidentiary base is so poor, underscoring the importance of investing more in prospective research through CER.

- Second, CER has been and will continue to be directly relevant to support decisions about add-on payments for new technologies (when a temporary premium is paid to provide an incentive for adoption of cost-increasing, but quality enhancing technologies in the inpatient and hospital outpatient setting). To be most effective, add-on payments for both inpatient and outpatient prospective payment systems could be made more clinically specific, so that the additional payments are only provided when clinically appropriate use of the technology is followed. Currently, the add-on payment applies to a specific medical device or drug, but the clinical indications for its use are not specified. Better precision in designating the clinical indications for which health outcomes are improved could avoid providing incentives to use new technologies in patients for whom the benefits are unproven (including off-label uses), and where the harms may outweigh the benefits. There are no statutory or regulatory barriers that preclude Medicare from being more precise in payment regulations, but there are differences of opinion within the agency about whether improved precision could be obtained under existing legal authorities.
- Finally, CER will be beneficial to support the creation of value-based purchasing (VBP) measures that encourage more appropriate use of medical interventions. VBP is an important existing policy mechanism that is increasingly being used in a variety of settings of care. Notably, these programs are only effective if credible and relevant CER studies are available to help providers and patients make informed decisions. A major limitation in VBP is the availability of credible and relevant CER studies that would help providers make informed cost-conscious decisions about a wide range of commonly used services. When reliable CER evidence becomes more widely available, VBP programs could be made more effective by providing incentives to more appropriately use overused services, rather than placing a primary emphasis on rewarding the increased use of underutilized services.

For the remaining policy options reviewed, statutory barriers would have to be removed to pave the way for their use. Least Costly Alternative (LCA) pricing appeared to be an effective and important tool to ensure that Medicare does not make excessive payments for modest enhancements to durable medical equipment (and some drugs). Legal experts believe as the result of a recent court ruling Medicare has lost its authority to use this valuable policy tool. It is unclear why payments should not be equal for technologies that produce similar clinical effects. Moreover, the use of LCA provides industry with an incentive to invest in better clinical research to justify a pricing differential. However, Medicare does not currently have adequate policy tools through which to achieve this result. Most experts believe the agency will need legislative action to allow them to pursue this in the future.

Medicare's potential use of payment innovations, such as the use of value-based insurance design (VBID), continues to be constrained by statutory requirements. Under Medicare Part A and B, statutory

requirements for beneficiary coinsurance or co-payments and the pervasiveness of supplemental insurance significantly dampens the potential effects of VBID policies. Part D requirements that plans may not discriminate against certain groups of beneficiaries and that all enrollees in a plan must be subject to a uniform benefit design, including cost sharing, limit the ability of Part D plans to develop more strategic, targeted VBID programs that would likely yield the most benefits.

Notably, in cases when the Medicare program has attempted to use CER information in the past to develop coding or payment decisions, the issues have provoked tremendous controversy. This was true with the use of LCA in setting the price of levalbuterol, and for the decision to include different negative pressure wound therapy devices in the same code, as discussed in this paper. Use of existing or future authorities by CMS to make these decisions based on CER evidence will never be straightforward, no matter how well designed the CER studies are. To make clinically informed pricing or coding decisions using CER, CMS will need strong legal authority and a clear, transparent, process similar to its national coverage determination (NCD) process that is applied to coding and pricing decisions. Even with such authority, Medicare will need to develop and apply robust and transparent decision-making procedures to be able to apply such authority in ways that would withstand the inevitable pressure that will be applied to each of these decisions.

The lack of quality evidence remains a rate limiting factor in Medicare's ability to use CER to inform policy. Coverage with evidence development (CED) can be an important tool for generating evidence on new technologies that are particularly promising for Medicare beneficiaries. Under this policy tool, beneficiaries gain rapid access to new technologies while additional information is being gathered to inform coverage decisions. Through its role in approving the design of CED studies, CMS has the ability to define evidentiary requirements that meets its needs.

The six case studies that we review in this report highlight a lack of any well-defined consistent approach to selecting topics for CED, decisions on study design methods and strategies for implementation. This reflects the fact that each application was developed in an opportunistic manner, rather than with a clearly defined, forward looking and coherent legal or policy framework. Each of these examples supports the view that the opportunistic approach to implementing CED leads to important compromises on study design that interfere with the ability to achieve the programs' primary goals of informing future CMS decisions and informing patient and clinician decision making. Notably, the use of CED to inform coverage policy has been limited to two cases – lung volume reduction surgery and the use of positron emission tomography (PET) for cancer.

This limited use of CED data is not necessarily the result of flaws in concept of CED, but can at least partially be explained by a combination of statutory, methodological, financial and timing issues. The absence of a clear statutory foundation for CED has served as a major impediment to the development of a well-articulated, coherent and consistent policy approach at CMS. The lack of a designated source of funding to pay for the research costs of CED studies has also led to reliance on other sources of funding, which have inevitably led to compromises in study design and implementation. Overcoming these existing limitations and creating a well-crafted, consistent policy framework is possible, but will likely require a senior executive branch champion for CED or new statutory authority to support the policy.

SECTION ONE: INTRODUCTION AND AIMS

Slowing the trajectory of Medicare spending while maintaining the quality of patient care and timely access to new technology continues to be an urgent concern of policy makers. Under current trends, ensuring long-run solvency of the Medicare program may require increases in beneficiary premiums, changes in payment rates to providers, or other significant changes in spending, none of which are likely to be politically palatable.¹ Health policy experts who have examined factors underlying the rising cost of health care agree that spending on medical technology is a major contributor to rising costs^{2,3,4} and a substantial proportion of use is inappropriate.⁵ By generating better evidence on what works in medical care, and providing incentives to use care appropriately, it may be possible to both improve health care outcomes and slow health care spending growth. This is the premise behind federal initiatives to increase funding for comparative effectiveness research (CER).

The recent establishment of a dedicated funding stream for CER through the Patient-centered Outcomes Research Institute (PCORI) has the potential to support the types of research and infrastructure that could strengthen evidence-based payment and coding within the Medicare program. With increased focus on CER as a potentially important policy lever for slowing cost growth, this is an opportune time to assess the potential for creative and effective approaches for Medicare to generate and use CER to become a more value-based and innovative purchaser.

This paper provides an overview of the current CER landscape in the United States, comparing and contrasting approaches to establishing priorities for research, engaging various stakeholders, and ensuring transparency across the federal entities involved. Particular attention is paid to the salience of CER initiatives to the Medicare program, and the mechanisms in place to enable Medicare's involvement. We also discuss opportunities where Medicare could use findings from CER to inform its coding and payment policies. Finally, we review Medicare's experience with coverage with evidence development (CED), a policy tool that can help generate improved clinical evidence to support Medicare coverage determinations. Throughout, we use case examples to illustrate the statutory, methodological, funding, and timing issues raised. We have compiled information for this paper mainly through a review of the literature and key policy documents and interviews with individuals directly involved with the initiatives discussed. In addition, we have drawn on our own personal experience. Two of the authors served at CMS and were involved in decision making related to several of the case studies; one of the authors had primary oversight for clinical policy at CMS and was deeply involved in the design and implementation of CED, and another has served as a consumer representative on the Medicare Evidence Development and Coverage Advisory Committee (MedCAC). A list of key informants is provided in Appendix A. Case studies for the six CED initiatives implemented since 2004 are provided in Appendix B.

SECTION TWO: COMPARATIVE EFFECTIVENESS RESEARCH IN THE UNITED STATES AND THE MEDICARE PROGRAM

Definitions of Comparative Effectiveness

Although CER has been variously defined, most definitions recognize the following features:

- The research compares two or more treatment alternatives;
- The focus is on how alternative approaches work in practice- that is, their relative effectiveness, as opposed to how they work under ideal conditions, or their relative efficacy;
- The goal is to produce findings that would assist patients, clinicians, purchasers, and policymakers in making informed decisions about health care choices, with the ultimate aim to improve patient outcomes.

While some researchers have stated that CER is just a new name for the type of comparative clinical research that has been done for many years, the emphasis on producing findings that are relevant to decision makers is relatively new, and has important implications for Medicare's role. This aspect of the definition fundamentally changes the nature of how clinical research is designed and implemented – toward a focus on engaging decision makers early and often in the selection of research priorities and the design of clinical studies to ensure their needs are met. Beyond the emphasis that CER should 'respond to the expressed needs' of decision makers⁶ the recent health reform bill has gone further to emphasize the importance of the patient perspective by using the term "patient-centered outcomes research."⁷ With responsibility for more than 40 million elderly and disabled beneficiaries, the Medicare program has a new opportunity for ensuring their views and evidentiary needs are addressed.

Brief Legislative History

CER was first written into law in 2003 when §1013 of the Medicare Prescription Drug Improvement and Modernization Act (MMA) granted the Agency for Healthcare Research and Quality (AHRQ) the authority to "conduct and support research" on the "comparative clinical effectiveness" of "health care items or services".⁸ The legislation authorized up to \$50 million per year for this research, but no monies were appropriated until 2005, and the funding remained substantially below authorized levels until 2009. Medicare's involvement in this CER initiative was clear from the outset. Designed as a complement to the expansion of Medicare prescription drug coverage, the aim was to support the development and dissemination of CER information that would improve the quality and efficiency of the Medicare, Medicaid, and the SCHIP programs. To ensure that research priorities for the Medicare program were adequately considered, AHRQ included a representative from the Centers for Medicare and Medicaid Services (CMS) on the topic prioritization group for this research program, which was subsequently named the Effective Health Care (EHC) program. AHRQ was required to develop a program to disseminate the research findings to Medicare Advantage and Medicare Prescription Drug Plans for use in formulary placement decisions.

However, the MMA placed a number of restrictions on the ways that CMS could use any research findings from AHRQ-funded CER. Under §1013 of the MMA, CMS was prohibited from using CER data produced under that authority for withholding coverage of a prescription drug. Section 622 of the MMA prohibited CMS from applying a functional equivalence standard to pharmaceuticals or biopharmaceuticals under the outpatient prospective payment program, unless the standard existed prior to enactment of the MMA. The concept of functional equivalence was developed to use existing medical evidence to determine the dosage at which alternative drug therapies have equal efficacy, with the goal of setting prices that reflect the clinical effects of the two drugs. Assuming equivalence, the same payment is applied across drugs in the same therapeutic classes. This payment policy was applied in a single instance by Medicare (for setting the price paid for darbepoetin), after which the MMA prohibited further use.⁹

The importance of CER was elevated through the passage of the American Recovery and Reinvestment Act (ARRA) of 2009, which increased federal spending for CER by \$1.1 billion over two years. The ARRA provision for CER required the Institute of Medicine (IOM) to issue a report on spending priorities for this money that considered stakeholder input by June 2009, and created a Federal Coordinating Council (FCC) comprised of 15 federal officials to coordinate CER activities across federal departments and agencies. The latter was also required to produce a separate report on funding priorities by June 2009. The legislation specified that the FCC should include a representative from CMS.

The Patient Protection and Affordable Care Act (PPAC) of 2010 solidifies funding for CER through the creation of the Patient-Centered Outcomes Research Institute (PCORI). This institute will be an independent body dedicated to identifying priorities for and sponsoring the conduct of CER, methods development, and dissemination of findings. PPAC also establishes a Center for Medicare and Medicaid Innovation, which provides the agency with new flexibility to test innovative payment and delivery models. In tandem, these legislative changes provide an opportunity for Medicare payments to be much better aligned with the scientific evidence about what works. The mechanism for Medicare's involvement in PCORI at the time of this writing was not clear. The legislation abolishes the FCC, which was CMS' major entrée into CER, but establishes a governing board that in addition to including AHRQ and NIH directors must include two Federal or state officials (presumably one from CMS). Medicare is required to provide its administrative data for CER and Medicare trust funds will partially support the \$500 million per year that will become available for CER within the next five years. Notably, unlike the restrictions placed under the MMA, CMS is allowed to use CER evidence for coverage and reimbursement decisions, so long as decisions are not based solely on one CER study. There are some additional limits, such as a prohibition on placing a lower value for lives of the elderly or disabled over a younger population.

Contrasting Approaches to Priority Setting and Selection of Topics

AHRQ, NIH and ARRA Initiatives. All of the federal initiatives discussed above acknowledge the importance of establishing a transparent and open process for setting priorities among thousands of competing topics for research. Partly because of differences in timing, goals, and their varied histories, the entities involved in setting priorities for CER do not use criteria and approaches that are consistent with each other. Unfortunately, evidence priorities set by CMS

have not been fully integrated into the processes established by these groups, leading to a situation where any overlap is more by coincidence than by design.

As AHRQ was the first recipient of funding for CER under the MMA, they have been working for the last six years to establish and refine their priority setting process. The MMA explicitly mandated that the agency establish a priority-setting process that had “broad and ongoing consultation with relevant stakeholders”.⁹ The thoughtful and considered framework AHRQ has developed for the EHC program was recently published and was in place when the ARRA money became available.¹⁰ AHRQ solicits the perspectives of patients, clinicians, purchasers, payers, and policy makers at all levels of prioritization including:

- Identification of priority conditions (see Box 1);
- identification of priority therapeutic interventions (e.g., management of uterine fibroids); and
- refining and sharpening priority research questions for their systematic reviews or primary research.

AHRQ has developed an extensive set of topic selection criteria that builds on work done by the IOM. Commonly used criteria include disease burden, public or provider interest or controversy, cost, the availability of prior research, and potential impact, such as the ability of the research to improve health outcomes, quality of life, or decision making.¹¹ Additional criteria were adapted from the priority-setting process used by the National Institute for Health and Clinical Excellence (NICE) in the U.K., and include the opportunity cost of inaction and whether information could be produced in a timely fashion.

AHRQ has worked closely with CMS officials during its priority setting process, as mandated by §1013 of the MMA. AHRQ’s 14 priority conditions were established with input from CMS and the public and, until recently, CMS had been an active and effective voting member on AHRQ’s topic prioritization group [E. Whitlock, personal communication]. This is an internally led 13-member body comprised of representatives from the agency and constituents of the EHC (the Scientific Resource Center and the Eisenberg Center) that makes final recommendations about AHRQ’s research priorities.

NIH, which is the largest public funder of clinical research, has struggled to develop a more objective and transparent process to set priorities for funding. Although NIH institutes hold regular workshops with the input of patients and clinicians to support their own internal strategic plans and priority setting [L. Hudson, personal communication], funding levels for the

Box 1: AHRQ Priority Conditions

- Arthritis and nontraumatic joint disorders
- Cancer
- Cardiovascular disease, including stroke and hypertension
- Dementia, including Alzheimer’s Disease
- Depression and other mental health disorders
- Developmental delays
- Diabetes mellitus
- Functional limitations and disability
- Infectious diseases, including HIV/AIDS
- Obesity
- Peptic ulcer disease and dyspepsia
- Pregnancy, including preterm birth
- Pulmonary disease/asthma
- Substance abuse

institutes are determined through a Congressional appropriations process.^{11,12} Once a broad topic area has been identified as a priority, a key driver of NIH's process is the assumption that the investigator-led process is best for science. The criteria used by the NIH's grant reviewers focus on the Institute's broader aims of expanding scientific knowledge and discovery. Reviewers are asked to weigh: the ability of the proposed research to meet public health needs; the scientific quality of the research; the potential for the research to contribute to scientific progress; portfolio diversification along the broad and expanding frontiers of scientific knowledge; and its impact on providing support of people, equipment, instrumentation and facilities for research.¹²

When ARRA was passed in early 2009, the Institutes were just beginning to define how CER might change their traditional approach to clinical research. The director of NIH created a steering committee comprised mainly of directors of Institutes within the NIH with a significant CER portfolio to establish priorities for ARRA funds [L. Hudson, personal communication]. To learn more about CER and find out about 'real-world' research being conducted elsewhere, this group brought in experts in the field of CER and representatives from other agencies. As mandated by ARRA, NIH officials also worked with AHRQ through the FCC-CER Coordination and Implementation Team to avoid duplication of efforts in their respective priority-setting processes. Each Institute nominated projects ranked by merit that were consistent with their own strategic plans to the centralized steering committee for further consideration. Funding was considered only for grant applications that "compared treatments" in "wide use," and were not further considered if they compared an intervention only with a placebo or "usual care." Priority was also given to grants addressing one of AHRQ's 14 priority conditions (Box 1). As the final grant selection process took place after the IOM and FCC reports were released, higher priority was given to projects addressing either one of the IOM's priority areas, or any of the training and infrastructure building projects recommended by the FCC. Consideration was also given to key evidentiary gaps identified by AHRQ systematic reviews. According to one participant in the priority setting process for allocation of ARRA funds, NIH scientists' now have a better understanding of CER and how it differs from traditional investigator-led science since the passage of ARRA [L. Hudson, personal communication].

Although CMS was not directly involved in the allocation decisions for NIH ARRA funds, the Institutes had been involved in helping Medicare identify its priority research areas (discussed in further detail below), which were taken into consideration by both AHRQ and NIH in developing their spending plans [S. Phurrough, J. Slutsky, L. Hudson, personal communication]. For several years, there have been ad hoc efforts to improve communication between CMS and various NIH institutes about ongoing research, with an emphasis on generating evidence that would be useful to Medicare in developing coverage policies. The effectiveness of these efforts in engaging CMS in the NIH research enterprise varies markedly by Institute and topic, and could be improved. The National Emphysema Treatment Trial and a national registry for left ventricular assist devices were important successes, while FDG-PET scanning for suspected dementia has proven to be a less successful effort.

Under the tight timetable established by ARRA, both the IOM and the FCC had less than six months to develop a process and produce a report on spending priorities. As the legislation required the two groups produce simultaneous reports on spending priorities, both groups interpreted they were not to collaborate and cross-group communication was closed. Although

there was no direct communication between the two bodies in the development of their reports, they focused on distinctly different levels of priority setting. The IOM focused on the identification of broadly defined clinical questions, working from several thousand potential research topics that were submitted in response to a widely distributed request for topic suggestions.¹³ The FCC report focused on “high priority gaps that were less likely to be filled by other organizations and therefore represent unique opportunities for these funds”.⁶ A primary focus of the money vested to the Office of the Secretary (OS) of the Department of Health and Human Services (HHS) is on investment in data infrastructure to support CER.¹⁴ The dissemination and translation of CER findings constitutes a secondary focus. Other secondary considerations include focusing CER research on priority populations (racial and ethnic minorities, persons with disabilities, persons with multiple chronic conditions, the elderly, and children), and priority types of service (medical and assistive devices, procedures/surgery, behavioral change, prevention, and delivery systems). The OS funds may also be used to support investment in training clinicians and academic researchers in CER methods.

In keeping with their legislative mandates, both the IOM and the FCC sought extensive input from public and professional associations. The initial list of several thousand topics considered by the IOM priority setting committee was largely derived from nominations by stakeholders and the public via online submission and public listening sessions, and was supplemented by suggested additions from members of the priority-setting committee to in fill gaps.¹⁴ The priority areas identified in the June FCC report were generated after public input was obtained through three listening sessions and a public comment period for draft documents posted on the FCC’s website. While both intended to be responsive to the evidentiary needs of patients and clinicians, the extent to which the final research priorities were genuine reflections of the views of patients and consumers is uncertain. Little is known about effective strategies for engaging patients and consumers in this process, however a number of best practices are emerging¹⁵ that suggest more extensive efforts than were made in the context of the IOM or FCC priority setting work. Because of the time constraints mandated in ARRA, neither group had sufficient time to explore and implement best practices in this area, and was unable to apply extensive outreach to ensure that the full range of relevant consumer and patient perspectives were captured in their work.

Regarding the engagement of Medicare in this process, the IOM priority setting committee did not include a member from any federal agency (including CMS), though this is consistent with IOM policy regarding membership on their advisory committees. In contrast to the IOM priority setting committee, members of the 15-member FCC were drawn strictly from federal agencies, including a representative from CMS. While the CMS representative was involved in shaping the Council’s vision about priority areas for investing in CER (as reflected in their June 2009 report), he left the agency within three months of the creation of the Council and no new representative from CMS was named. This left the agency without a council voice. There has been no official CMS liaison appointed to provide input into priority setting and investments decisions, perhaps partially due to the absence of a permanent CMS administrator. It may also be a reflection of the relatively limited set of existing policy tools through which the Agency is able to link CER evidence to reimbursement decisions, as discussed in this paper.

According to the former CMS appointee to the FCC, CMS’ main reason for being represented on the Council was to provide a voice around using Medicare data to provide part of the electronic

data infrastructure for CER [T. Valuck, personal communication]. This focus on building data infrastructure was reflected in the FCC's June report. There was no acknowledgement of CMS' clinical research priorities for coverage, coding or payment decisions, or how CER might better support those activities.

Medicare Research Priorities. While not required by legislation, Medicare made an attempt in 2007 to develop its own process for identifying research priorities.¹⁶ At a public meeting of the MedCAC, scientists from several NIH Institutes presented the most important evidentiary gaps from the perspective of their Institutes,¹⁷ and MedCAC panelists, representing a range of stakeholder interests, added priorities from their own experiences and perspectives. The resulting list of 105 topics was reviewed and scored by 50 scientists from the Centers for Disease Control and Prevention (CDC), AHRQ, CMS, FDA, and 13 NIH Institutes and members of the MedCAC. The product was to be a final draft of research needs of most significance to the elderly population.¹⁸ Among the strengths of this process, it provided an opportunity for a variety of expert stakeholders and experts to have input and drew on the scientific expertise of CMS' sister agencies. There was a small but significant selection of topics that gained real consensus among the MedCAC panel members and those representing the various agencies involved.

The process appears to have flaws, as well. The MedCAC that was assembled for this purpose was comprised of a group of clinicians, researchers, policy makers, and consumer representatives without any specific expertise in geriatrics or clinical specialties that could be most relevant to the Medicare population. Many of the panelists did not have experience with defining clinical questions for research purposes; the generated questions were vague, poorly worded, and difficult to interpret for the purposes of voting. For example, one question asked, "In the area of diabetes, what devices or combination of devices provide optimal outcomes?" In addition, some participants also noted the process could have been improved with more explicit priority setting criteria and better overall direction to participants about how to select and define research questions. The criteria given to participants asked them to consider diseases of greatest "burden" and "cost" to the Medicare program, with little additional direction. In the end, the initial list of topics largely reflected the interests and experience of the various stakeholders and entities involved.

A comparison of Medicare research priorities identified through the MedCAC process with the research priorities identified by the IOM report and the NIH challenge grants is presented in Table 1. For disease areas, cardiovascular disease and cancer were the most frequently listed in the IOM report – disease areas that are of high relevance to the Medicare program. The IOM also focused on the use of advanced imaging tests, a topic of major concern for the Medicare program due to rapid increases in use, associated costs, and potential harms associated with radiation exposure and incidental findings. It is notable that several topics of high relevance to Medicare, such as the use of high-cost oncology drugs, and the use of erythropoietin-stimulating agents, were absent. While there is considerable overlap between CMS' explicit research priorities and those identified by the IOM and NIH, it should be noted that the latter were designed to consider broader population concerns beyond the Medicare population.

None of the priority setting processes were conducted with sufficient time, resources, or supportive data collection to ensure that the most important issues were in fact identified. A particular weakness of the IOM and CMS process was the limited amount of effort spent looking at existing evidence reviews to determine where there might already have been important gaps in evidence identified. Priority setting requires a critical mass of very well- informed content experts in each disease or technology field to help identify important questions for future study.

Table 1. Comparison of Medicare’s Top 20 Research Priorities with IOM CER Priorities and NIH Challenge Grant Priorities

Disease Area	CMS Evidentiary Priorities	IOM	NIH
Oncology/Hematology	Appropriate ESA Use in Cancer Patients		
Oncology/Hematology	Benefits of Cancer Prognostic Markers	✓	
Oncology/Hematology	Benefits of High-cost Cancer Drugs		
Oncology/Hematology	New Radiation Treatments for Cancer (e.g., proton beam, IMRT)	✓	
Cardiovascular disease	Treatment of Atrial Fibrillation	✓	✓
Cardiovascular disease	Does Screening for Atherosclerotic Disease Improve Health Outcomes?		
Cardiovascular disease	Effectiveness of CT Angiography	✓	
Cardiovascular disease	Prevention of Congestive Heart Failure	✓	✓
Diabetes	Benefit of Early Aggressive Treatment for Diabetes	✓	✓
Diabetes	Comparative Effectiveness of All Diabetes Treatments Using Hard Outcomes	✓	
Diabetes	Benefit of Weight Loss Medication on Diabetes	✓	✓
Diabetes	Optimal Hemoglobin A1C Goals in the Elderly	✓	✓
Other	Appropriate Use of Hospice Care		
Other	Appropriate End of Life Care	✓	✓
CNS/Neurology/Behavior	Improving Depression Care in Primary Care	✓	
CNS/Neurology/Behavior	Appropriate Treatment of Carotid Artery Disease		✓
CNS/Neurology/Behavior	Comparative Effectiveness of Acute Stroke Treatment: Clot Retrieval versus Reperfusion Drugs		
CNS/Neurology/Behavior	Comparative Effectiveness of Treatment of Intracranial Disease		
Wound Care	Comparative Effectiveness of Treatment for Ulcers: Off-loading, Debridement, Biologics, Revascularization	✓	✓

Note: Table published on the CMS website places an asterisk next to the 20 highest priorities, but only 19 had an asterisk.

Transparency of Conflicts of Interest. Stakeholders that serve on committees charged with selecting research priorities wield substantial influence over the CER agenda. For this reason, procedures need to be in place to ensure the voting process is not driven by vested interests or the underlying biases of committee members. Establishing clear conflict of interest policies can help mitigate some of these concerns, as well as facilitating an open and transparent voting

process for topic selection. The MedCAC, AHRQ, IOM, FCC, and the NIH have extensive conflict of interest policies. While the MedCAC published how each committee member voted for its topic prioritization process, member-specific votes for the FCC, IOM, and for many of AHRQ's processes have not been made public. Even with these extensive policies, however, it is inevitable that topics selected will reflect the interests of the individuals sitting on the prioritization committees. This bias is not necessarily related to any financial interest of those involved, but simply the fact that individuals tend to propose and/or endorse topics related to their respective areas of expertise and professional backgrounds.

Bias can also enter into the topic selection process in the way that topics are nominated, as it is difficult to ensure that the voices heard are truly those of the public and not dominated by industry interests. The fact that the preponderance of topics submitted to the IOM focused on health care delivery systems, traditionally the realm of general health services research and not a major focus of CER, illustrates the potential for this bias. Using recent systematic reviews to identify critical research gaps is one way to avoid these potential biases, and AHRQ is increasingly leveraging their work to produce systematic reviews as a means of identifying the most important areas for future research. NIH also used systematic reviews to identify research priorities for its allocation of ARRA funds, and some institutes use them to develop institute-specific strategic plans [L. Hudson, personal communication]. Finally, through work on the FCC-CER Coordination and Implementation Team, AHRQ has suggested they would like more assistance in identifying major evidentiary gaps, and NIH has agreed to dedicate more resources for this activity.

The ARRA Legacy and Recent Health Reform

The influx of money for CER under ARRA has helped build a foundation for interagency coordination, stakeholder engagement, and priority setting processes for future federal CER efforts. However, the short time frame for distribution and spending presents a host of operational challenges that hopefully can be avoided with the PCORI. One of the most frequently cited tenets of CER – the role of stakeholders in setting priorities and helping to design new studies – implies the use of a robust and considered process for engaging stakeholders, as well as considerable training of both lay and clinical participants. This adds to the lead time to design process for clinical trials. Despite continued improvement in the efficiency of trial design through use of Bayesian or adaptive methods¹⁹, it still takes a considerable amount of time to conduct high-quality prospective clinical trials and to obtain outcome measures that are meaningful to patients. Some, including proponents of the learning health care system,²⁰ suggest the most economical way to understand the comparative effectiveness of health care interventions is to develop better mechanisms to link and analyze routinely collected data through observational research. This is an attractive and innovative proposal, but with limited examples of success to date. Such a strategy will require many years of investment in infrastructure, methods, and modified decision-making paradigms. Perhaps one of the most important lessons from ARRA is that funders, researchers, and the public alike need to be realistic about the time required to see concrete results.

PCORI is charged with developing a formal and transparent process for selecting research priorities and through its governing board will continue to provide a vehicle for cross-agency collaboration. As its operational processes are being developed, it will be important to not

forget that Medicare is also a stakeholder. As noted earlier, the legislation provides the agency with latitude to use CER for coverage, reimbursement and incentive programs, within limits. Maintaining this flexibility is important as some have suggested better use of improved clinical information could potentially produce substantial savings in the Medicare program.^{21,22} Establishing a more direct line of communication between PCORI and the new Center for Medicare and Medicaid innovation could help ensure better use of the clinical information to shape innovative reimbursement programs.

SECTION THREE: OPPORTUNITIES FOR MEDICARE TO USE CER IN CODING AND PAYMENT

Medicare already has some experience with using CER to be a prudent health care purchaser, both through its process to establish codes that identify new technologies, and through the establishment of payment rates for new technologies. Below we highlight some of Medicare's experience to date with use of CER in coding, the establishment of new technology add-on payments, its use of least costly alternative authority for pricing of drugs and devices, and performance-based payment initiatives. The issues raised through selected case studies illustrate both the opportunities for greater use of CER within Medicare and the obstacles that must be addressed in order for new research to improve programmatic efficiency. We also discuss the potential for use of value-based insurance design, a policy option that adjusts co-payments to reflect the strength of evidence that a given treatment is effective and appropriate for a specific population. Although this policy tool has not been used to date by Medicare, the health reform law contains provisions that would permit patient payment rates to be modified to encourage the use of services that promote health and value within Medicare.

The Use of CER for Coding

Medicare payment in many settings is linked to a billing code, which determines payment rates for an item or a similar group of items. New codes are developed to differentiate an item or service based on their function or because they are believed to produce significant therapeutic differences. While the creation of a new code does not guarantee coverage, it is a critical pathway for developers who seek additional payment for expensive new medical technologies.²³ As the process for developing new codes considers comparative therapeutic effects, better comparative effectiveness data offers the potential to improve coding decisions. Once a new code has been created, payments are often determined by statute and it becomes difficult for CMS to be a prudent purchaser across health care substitutes.

While all coding systems used by Medicare are potential receptors for better CER data, CMS has the most latitude over the creation of codes used to define outpatient products or services that are not physician services through the Level II Healthcare Common Procedural Coding System (HCPCS). These include items such as drugs, biologicals, durable medical equipment, prosthetics, orthotics, and supplies. CMS also controls the creation of ICD-9-CM procedure codes used in the inpatient setting, and the definition of prospective payment categories that group items or services together, such as Diagnosis Related Groups (DRGs). It is in these areas where CMS would have the greatest potential to establish evidentiary standards for new codes. Two case studies provide examples in which CER was used to support the creation of HCPCS codes and DRGs (see Boxes 2 and 3).

According to CMS officials, CER has been used to support the creation of new codes since the inception of the Medicare program [C. Hake, L. Anderson, personal communication]. Coding staff at CMS currently work closely with the staff in [CMS' Coverage and Analysis Group](#) and AHRQ to ensure they are using good practices for assessment of the clinical evidence and understand existing standards of evidence that are in common use. In conjunction with AHRQ, efforts are also underway to clarify the standards of evidence for that would be used for making coding decisions [C. Hake, personal communication]. For the most part, coding decisions are

based on clinical evidence submitted by the manufacturer in their request for a new code, and may not include all relevant studies. A formal, systematic assessment of the clinical literature in support of a coding decision has been conducted only once to date – in the case of Negative Pressure Wound Therapy (NPWT), discussed in Box 2.

This NPWT case illustrates manufacturers' common practice of arguing equivalence to predicate devices in order to receive relatively quick FDA approval, but then making an argument that the product offers a 'substantial therapeutic benefit' over existing devices for the purpose of receiving a new Medicare payment code [C. Hake, personal communication], a supposition that could be supported by CER. For durable medical equipment (DME) and devices, the path for Medicare payment is relatively straightforward. Generally, items are approved by the FDA through a 510(k) clearance – which usually does not require new data on clinical effectiveness. An NCD, which would review the clinical evidence for coverage, is not routinely performed, leaving coverage to Medicare's regional contractors through local coverage determinations. Unless the item is an inexpensive version of an existing item, the manufacturer often attempts to secure a new HCPCS code for payment.

NPWT is classified as DME for Medicare reimbursement. While most DME is paid through a fee schedule, when new codes are designated for new technologies, Medicare uses a gap-filling process to calculate a new fee schedule amount. That is in cases for which there are no comparable items already reimbursed through the DME fee schedule, Medicare pays on the basis of manufacturer's suggested retail price (MSRP). Medicare's current processes allow manufacturers to set their own payment rates for new items. In this case, the price set was several-fold higher than the price for the simple suction pump used as a predicate device for FDA approval.

Box 2: Case Example – Coding for Negative Pressure Wound Therapy

The Technology. Negative pressure wound therapy (NPWT) uses suction under airtight wound dressings to promote healing of chronic wounds that have not responded to standard therapies. The technology consists of three parts: 1) a vacuum-assisted closure (VAC) pump; 2) a dressing set; and 3) a canister to assist the VAC, each of which is paid for under a separate code.

Policy Context. In 1995, a VAC pump was approved by the FDA for use in wound care under a 510(k) exemption, declaring the pump was "substantially equivalent" to a simple predicate suction pump. As this was a new indication for the pump, the manufacturer secured a new HCPCS code and as the sole supplier Medicare reimbursement was based on manufacturer's suggested retail price (MSRP), which was 76 times the price of the predicate device.²⁷ Beginning in 2005, two new suppliers came into the market charging prices 20 percent of the fee schedule rate.²⁵ The original manufacturer sought a new code for its pump and Medicare Improvement for Patients and Providers Act (MIPPA) of 2008 required CMS to conduct a review of billing practices and consider whether coding changes were necessary.

Policy Decision. The MIPPA requirement gave CMS the opportunity to solicit a technology assessment through AHRQ's Evidence-Based Practice Centers, marking the first time the agency had solicited a formal technology assessment to support a coding decision.

Result. The AHRQ assessment did not find any clinical evidence supporting any one system or component of a system over others. With this evidence, the HCPCS Work Group at CMS determined that existing codes were adequate. The imbalance in pricing, nevertheless, remains.

The case of Medicare payments for NPWT pumps has received wide publicity, and has been the subject of two separate Office of Inspector General (OIG) reports^{24,25} in recent years because of concerns about fraud and abuse related to their use and excessive payment. In recent years, several competitors have entered the market with dramatically lower prices, but the fee schedule payment is still based on the early rate established by the first manufacturer to secure a new code. Several years after the manufacturer acquired a new HCPCS code, CMS used NPWT as a case example in a pilot study with the aim of developing a more robust analytical framework to support pricing and coding decisions for DME.²⁶ The framework would determine how the technology in question differs from existing technology, examine the true production costs of a technology, and analyze a new technology's effectiveness relative to existing technology. The review conducted for this pilot showed the NPWT pump provided modest convenience and durability benefits over a standard suction pump, but the authors concluded the price difference was likely not justified by these modest benefits. The review raised similar concerns about other components of the NPWT system. It also demonstrated that such reviews are feasible and can be very useful for supporting Medicare coding and payment policies, and in the case of NPWT may have averted establishing an unreasonably high price when the initial code was granted.

Based on the findings from this pilot study, CMS could have used their 'inherent reasonableness' authority¹ to set payments at a lower rate, but the agency did not follow through on these findings because implementation of a DME competitive bidding program was pending. In the initial round of bidding focused on a few market areas in the United States, only the new competitors submitted bids that would have resulted in marked reductions in Medicare's payment for NPWT in those geographic areas. The Medicare Improvement for Patients and Providers Act (MIPPA) of 2008 instructed CMS to exclude NPWT from competitive bidding, but it also required the agency to conduct a review of billing practices and consider whether coding changes were necessary.²⁷ It should be noted that the inherent reasonableness process has been used rarely by CMS, and the GAO has noted that it is a "slow and cumbersome" process which requires a detailed notice and comment period.²⁸

CMS took this opportunity to solicit a formal and public technology assessment through one of AHRQ's Evidence Based Practice Centers. The clinical review conducted through AHRQ did not find any clinical evidence to support any one system or component of a system over another,²⁹ and the HCPCS work group concluded a coding change was not necessary. The use of an independent technology assessment provided CMS with objective, reliable evidence to make a more informed and appropriate coding decision [C. Hake, personal communication]. While doing more of these systematic reviews would be helpful to support coding, they are expensive and can take a long time to complete. More extensive use of such assessments would likely require careful consideration of evidentiary priorities. Systematic reviews also often fail to produce definitive findings, as the quality of the evidentiary base is so poor, underscoring the importance of investing more in prospective research through CER.

¹ Inherent reasonableness is the authority provided to correct payments that are grossly out of line with market prices or the cost necessary to produce an item. This authority can be used to correct payments for items or services not paid under the physician fee schedule or a prospective payment system.

In the case of drug-eluting stents (DES), summarized in Box 3, Medicare approved two new DRGs to pay for this newer and more expensive version of the coronary stent even before they had received final FDA approval. This proactive policy decision was based on promising medical evidence demonstrating near-term benefits in reduced rates of restenosis, but questions about their long term benefits remained. While this decision undoubtedly improved patient access to a beneficial technology and allowed CMS to quickly establish a payment rate for DES that reflected the higher production costs of the device, it also may have contributed to rapid diffusion in patients who were less likely to obtain benefit from DES compared to bare metal stents.

Diffusion has been more modest in Canada, partly based on the requirement that all patients receiving the DES enter into a provincial registry study sponsored by the government of Ontario, which was designed to capture long-term data on DES performance. In that study, DES was found to be effective in reducing target-vessel revascularization among a specific subgroup of potential candidates, such as patients with diabetes or those with particularly long or narrow lesions with the highest risk for restenosis,³² but had no effects on death or myocardial infarction. Based on this study, the Ontario Health Technology Assessment Commission (OHTAC) recommended DES be restricted to use among high-risk patients. OHTAC believes that they have markedly improved the appropriate use of DES and saved an estimated \$35 to \$58 million due to controlled diffusion of stents, and shifting practice patterns away from those seen in the United States.³³ Their registry data also prompted calls for additional research in the US and elsewhere to better understand the causes of complications, and to determine how those could be avoided.

In 2006, clinical studies called the long-term safety of DES into question, suggesting an increased risk for late stent thrombosis, a potentially fatal event.^{34,35} More recently, large observational studies of DES use in the US and other countries have produced findings suggesting that broader

Box 3: Case Example – Coding for Drug Eluting Stents

The Technology. Drug-eluting stents (DES) are placed in diseased arteries to reduce narrowing and release a drug to block cell proliferation, assisting in the prevention of restenosis. If successful, DES can prevent readmission and/or postpone the need for invasive surgery, such as coronary artery bypass.

Policy Context. Experts contended that DES would improve patient outcomes and reduce Medicare spending, and there was considerable pressure on the agency to provide a higher DRG payment for the new and more expensive version of the coronary stent.

Policy Decision. CMS approved two new DRGs for DES in 2002, before the devices had received FDA approval. This decision was based on medical evidence showing a 70 percent or greater reduction in the rate of target lesion revascularization compared with bare metal stents.³¹

Result. The establishment of new codes likely contributed to very rapid adoption of DES before there was much evidence on long-term effectiveness of the device, and across all subpopulations. The use of DES grew to about 90 percent of the U.S. market for coronary stents.³²

Meanwhile, adoption was much slower in Canada, partially due to Ontario's use of coverage with evidence development (CED) through a patient registry.³³ While recent clinical evidence appears to support the long-term safety of DES in a broader population, this case study demonstrates the importance of collecting longer-term data, the dynamic nature of clinical evidence and the need for flexibility in policy response.

use of DES is associated with lower mortality and surgical bypass rates in a broad population.^{36, 37, 38} A number of additional randomized controlled trials (RCTs) and registries are underway to further delineate the optimal use of DES. This case study illustrates the challenges of attempting to link coding policy (and associated reimbursement) to even the type of high quality CER studies done for FDA approval (the DES trials used bare metal stents as the comparison group, not standard medical therapy). Highly positive results on short term outcomes create substantial pressure from the clinical and policy community for Medicare and other payers to remove payment barriers for potentially breakthrough innovations. However, it is clear that long-term risks cannot be known until after a product has been approved and has been in use for an extended period in a broad population. In this case, the evidence of potential unanticipated risks was generated by the use of a CED-like policy in Ontario, and similar studies were not implemented in the US. It may have been wise for Medicare to have used CED in this instance, however, the policy mechanism had not yet been developed at that time. The case study highlights the scientific, clinical and political complexity of linking CER information to coding and payment policy, but also suggests that careful review of such experience may offer approaches that achieve multiple desirable policy goals.

New Technology Add-on Payments

Medicare pays a temporary (2-3 year) premium for selected new medical technologies in both the hospital inpatient and outpatient settings to encourage early adoption of some cost increasing, quality-improving technologies. These payments are known as transitional pass-through payments in the outpatient department and new technology add-on payments in the inpatient setting. (For ease of discussion, we use the term new technology add-on payments to apply to this payment mechanism in both settings.) To qualify for add-on payment, technologies must meet a cost threshold; devices in the outpatient setting and all products or services in the inpatient setting must also demonstrate that they provide a “substantial clinical improvement” over existing technology. It is the use of “substantial clinical improvement” where decisions are made about the weight of clinical evidence of a technology’s comparative effectiveness.

In determining whether technologies meet the “substantial clinical improvement” standard, clinical staff in CMS’ Coverage and Analysis Group work with staff from the payment policy divisions to evaluate the medical evidence and make determinations about whether a technology would meet the threshold for ‘substantial clinical improvement’. The manufacturer is required to substantiate its claims about clinical benefits by submitting relevant supporting literature. CMS then considers the following criteria in making its determination:

- The technology offers a treatment option for a patient population unresponsive to, or ineligible for, currently available treatments;

- the technology offers the ability to diagnose a medical condition in a patient population where that condition is currently undetectable or diagnose a medical condition earlier in a patient population than allowed by currently available methods and it must change provider management of the patient;
- and use of the technology significantly improves clinical outcomes for a patient population as compared to currently available treatments.³⁹

Evidence of reduced mortality, reduced complications, reduced re-hospitalization rates or subsequent diagnostic or therapeutic interventions, more rapid resolution of the disease process, decreased pain, bleeding, or other quantifiable symptom, and reduced recovery time may all be used to qualify a new technology for add-on payments. These criteria apply in both the inpatient and in the outpatient settings.

The case study of embolic capture devices (Box 4) highlights the potential and the difficulties of using CER for decision making when selecting technologies for add-on technology status. These devices accounted for the highest proportion of outpatient add-on technology spending on devices in 2004 and 24 percent of all outpatient add-on payments in that year, or an estimated \$39 million.⁴⁰ At the time of CMS' review of the clinical evidence, data from a well-designed RCT showed use of embolic capture devices during stenting procedures in the saphenous vein grafts could nearly halve the risk for myocardial infarction.⁴¹ CMS approved the add-on application on the basis of these strong results. Notably, saphenous veins are particularly friable. The use of embolic protection with angioplasty for native vessel acute myocardial infarction has failed to show a clear benefit.⁴² European guidelines do not recommend the use of embolic capture devices in native vessels.⁴³ Moreover, the devices were being used for several indications that had not yet received FDA approval. However, the policy was applied to all uses of embolic capture devices in the outpatient setting. This case study illustrates even when the medical evidence is relatively

Box 4: Case Example – Add-on Payment for Embolic Capture Devices

The Technology. Embolic capture devices are temporary devices that capture and remove atherosclerotic particles and embolic debris dislodged during angioplasty, with or without stenting procedures. Removing this debris reduces the risk of major adverse cardiovascular events, such as myocardial infarction, stroke, and death.

Policy Decision. Add-on payment status was approved for the Guardwire Plus[®] Temporary Occlusion and Aspiration System, which had been approved by the FDA in 2001 for use in saphenous vein grafts. The approval decision came after clinical trials suggested the devices could significantly improve patient outcomes. With the device, the risk for MI during stenting procedures in the saphenous vein graft was nearly halved. Shortly thereafter, several additional embolic capture devices were approved under the same pass-through category.

Result. The add-on payment decision meant that embolic capture devices were now covered for use not just for saphenous vein grafts, but also for native vessels. The use of the device for that indication was not FDA-approved, and a study failed to show a clear clinical benefit.⁴¹ Moreover, use of the device in several other expanded off-label indications was being investigated, including use in carotid stenting, coronary bypass surgery, renal artery stenting, peripheral vascular disease, and others. Notably, safety and efficacy for other vasculature had not been demonstrated. CMS has not tracked the extent to which add-on payments were used in these indications.

This example illustrates how add-on payment would be more effective if targeted only toward those indications for which substantial improvement has been demonstrated.

strong to support the addition of a new technology add-on payment, the policy applies generally to all uses of the device or drug.

Most new technologies are effective for some subpopulation or in some clinical indications. In order for CMS to be a prudent purchaser, payment incentives such as new technology add-on payments would be more effective if they were targeted only toward those indications for which a substantial clinical improvement has been demonstrated. Without this restriction, it is possible to provide incentives for the use of new technologies in populations where the risks may in fact outweigh the harms, a circumstance that may have been inadvertently responsible for the extensive off-label use of drug-eluting stent, as noted in the prior discussion on coding, with potential patient harm as a result. In discussing this issue with CMS staff, they remarked that while there is no statutory barrier prohibiting the use of restrictive indications for new technology add-on payments, achieving the right balance between providing incentives for new technologies against requiring stringent evidentiary standards is difficult [C. Bazelle, personal communication]. Pursuing a more restrictive set of indications could be done through an NCD, but Medicare issues only a few NCDs every year. With both the resources required to issue an NCD and the time delay imposed, the question arises whether the extra costs to Medicare are worth the additional precision.

Another observation from this case study is that dramatic clinical results on which add-on approval was based stemmed from research conducted in an inpatient setting, although add-on use was approved in the outpatient setting. Presumably lower-risk patients are receiving the devices in the outpatient setting. It is not clear whether similar clinical improvements would have been found in this lower risk population. While CMS officials note that a clinical review group reviewing applications would consider the relevance of the inpatient studies to an outpatient setting [C. Bazelle, personal communication], this nevertheless highlights the importance of basing payment policy on clinical evidence derived from settings and populations that are most likely to receive the treatment. Notably, most early clinical evidence is from trials conducted in academic settings, where study populations are highly selected.

Many devices have been approved by the FDA through a 510(k) waiver, which does not require comparative evidence about health outcomes, but is based on whether the device is similar to a predicate that has already received approval. In order for appropriate policy decisions to be made about new technology add-ons, more relevant clinical studies would need to be done earlier in the life cycle of the drug or device. A CMS official noted that the evidence provided in outpatient add-on technology applications is generally of poor quality [C. Bazelle, personal communication]. Often the studies lacked any comparators, were conducted in small numbers of patients and limited to a few centers or physicians. Most have not examined the benefits or harms in a Medicare-relevant population. Often the poor quality of the evidence is a major barrier for manufacturers seeking to obtain approval.

Although drugs are not required to meet the “substantial clinical improvement” criterion in the outpatient setting, this case study demonstrates how use of CER can be useful for determining when to pay more to provide better beneficiary access to costly, new technologies. It is not clear why drugs should be held to a different standard than other technologies. Under the add-on technology provisions, Medicare is still paying a premium to incentivize hospitals to adopt costly new drugs.

As an observer to the process, we noted that CMS does not have substantial resources to devote to the review process for these technologies. While the staff person assigned examines the material submitted by the manufacturer and some other salient clinical literature, they do not have the time or resources to perform a systematic review of the clinical literature. For outpatient services, add-on technologies are determined on a quarterly basis, allowing CMS staff only a few months to review each application. This leads to the potential for missing critical clinical information, or potentially basing decisions on biased submissions. There is also a limited depth of expertise in biostatistics and the skills required to interpret the clinical literature within the agency making it difficult to effectively use clinical information when it is available.

Moreover, the term ‘substantial clinical improvement’ is inherently subjective. Outside observers have noted CMS has been applying increasingly stringent rules about substantial clinical improvement, which has narrowed the numbers of qualifying technologies.⁴⁵ This had led to continual pressure for CMS to clarify its criteria for ‘substantial clinical improvement’. Manufacturers complain that simply by requiring evidence about substantial clinical improvement, the agency is already providing payment incentives for technologies relatively late in their life cycle after

Box 5: Case Example – Least Costly Alternative Policy for Levalbuterol and Albuterol

The Technologies. Levalbuterol and albuterol are two short-acting bronchodilators used to treat asthma and chronic obstructive pulmonary disease (COPD). Levalbuterol and albuterol have the same molecular formula, but levalbuterol is the more recently identified *R-enantiomer* of albuterol.

Policy Context. Several comparative studies of the two treatments showed mixed results on the effect of the drugs on lung function and length of hospital stay. Despite similar patient outcomes, there is considerable difference in cost between the two. One dose of levalbuterol costs about one dollar, while one dose of albuterol costs six cents.⁵¹

Policy Decision. In March 2008, due to the studies indicating little difference in outcomes between the two treatments, Durable Medical Equipment Review Contractors proposed an LCA policy for setting payment for levalbuterol. In the public comment period, manufacturers of brand name levalbuterol products disputed that evidence of comparative effectiveness was unclear. They also questioned the authority of CMS and its contractors to use LCA. Subsequently, CMS decided to postpone the LCA policy and opened a NCD.

Results. In its NCD process, CMS found that systematic reviews and retrospective studies were not helpful and that a large prospective trial was needed. From 2007 to 2008, payment for each was paid under a single code based on the volume-weighted average of 106 percent of the average sales price (ASP). However, due to a provision in the Medicare, Medicaid, and SCHIP Extension Act of 2007, payment for each drug is now based on the lower of (1) the volume-weighted average of 106 percent of sales price for both or (2) 106 percent of the ASP for the specific drug, establishing a form of reference pricing.^{44, 54}

the evidence has accumulated [C. Bazelle, personal communication]. It is difficult to know whether CMS is striking the right balance.

Medicare's Least Costly Alternative Policy

Through Medicare's Least Costly Alternative (LCA) policy, third-parties that administer Medicare claims have had the discretion to use relative costs in setting payments if there are two alternative items or services with equivalent efficacy. When applied, a payment contractor pays the price for only the lesser priced service, however, patients may elect to pay the difference and receive the more costly service.⁴⁶ This is a form of reference pricing, like generic substitution policies which have been used by Medicaid and managed care programs in the US for many years. It is a valuable tool to promote the generation of sound clinical evidence to support a pricing differential.

LCA was first implemented in 1995 for DME, such as power wheelchairs or crutches.⁴⁷ The LCA policy does not exist in statute; however CMS based this policy on its authority to deny payment for treatments or services that are not "reasonable and necessary".⁴⁸ The Medicare Program Integrity Manual, notes that "Contractors have the discretion to apply this principle to payment for non-DME services as well," which allows for the application of LCA to other products or services covered under Medicare.⁴⁹ Further, CMS has noted that none of its changes in pricing implemented in recent years supersede a contractor's ability to apply an LCA policy.⁵⁰

To date, the LCA policy has been applied outside of DME in a limited manner. One notable exception involved the application of LCA to the luteinizing hormone-releasing hormone (LHRH) agonists leuprolide and goserelin for the treatment of prostate cancer. An OIG report showed more than 80 percent (47 of 57) of Medicare's jurisdictions had adopted local review policies that found these drugs to be clinically comparable, but goserelin was 27 percent less expensive.⁵¹ According to their analysis, if contractors in the remaining jurisdictions introduced an LCA policy, Medicare could save \$40 million per year. CMS responded to OIG's recommendation that the agency does not influence the application of local medical policies, but would facilitate communication between carriers who had established such policies and those that had not. Notably, HHS general counsel has advised the agency against implementing national LCA policies, questioning the legal basis for this authority [S. Phurrough, personal communication].

A less successful example of the use of the LCA policy was in setting reimbursement for levalbuterol and albuterol, inhalants used to treat asthma or chronic obstructive pulmonary disease (see Box 5). Although prices for levalbuterol, the nebulized form of the drug, were 16 times higher per dose than for the commonly-prescribed albuterol, the clinical studies showed mixed results on lung function and hospital stay.⁵² The Durable Medical Equipment Medicare Administrative Contracts (DME MACS) issued an LCA payment policy in 2008 for these drugs, which was rescinded two months later when the manufacturer questioned Medicare's legal authority for this policy, and the agency decided to pursue a national coverage determination. Ultimately, payment rates for these drugs were set by statute.

Another unsuccessful example involves the application of LCA by some Medicare contractors for the vitamin-D analog drugs calcitrol and paricalcitol in the early 2000s. This decision was

eventually retracted by CMS, following complaints by the manufacturer, strong political pressures, and a 2003 retrospective study that suggested better outcomes, including a survival advantage for patients on hemodialysis receiving paricalcitol compared to those who had been receiving calcitrol.⁵³ Efforts to work with the manufacturer to conduct a prospective comparative effectiveness study of the two drugs were not successful for technical and financial reasons.

One limitation of LCA and similar cost containment policies is the fact that the medical evidence for CMS to determine whether one product is a medically equivalent alternative to another may be lacking, as previously reflected in the case of levalbuterol versus albuterol. Any decision to use LCA must start with a determination that two or more products are substitutable, based on credible comparative studies. Therefore, current and future increased investments in research comparing different products could potentially inform an expanded use of LCA. If existing medical evidence is not robust that a new technology offers a clinical improvement over existing treatments, broader application of LCA or like policies may encourage the generation of better clinical evidence to inform setting of a price differential. For example, policies that allow higher payments for drugs only when there is credible evidence of improved health outcomes would provide an incentive for the pharmaceutical industry to invest in well designed comparative studies.

Medicare has lost its legal authority to utilize the LCA policy recently following a series of court rulings involving DuoNeb, a combination inhalation treatment of albuterol and ipratropium for chronic obstructive pulmonary disease.⁵⁴ In April 2008, several Medicare Administrative Contractors (MACs) applied the LCA policy to set the reimbursement rate for DuoNeb at the less costly combined averages sales prices for the generic version of the two individual component drugs, rather than more expensive price for DuoNeb itself, which was sold as a branded product.⁵⁵ A Medicare beneficiary and the manufacturer challenged this policy, and in the October 2008 *Hays vs. Leavitt* ruling, the U.S. District Court for the District of Columbia ruled that the HHS Secretary lacked the authority to apply the LCA policy to DuoNeb. The court denied CMS's argument that it had the ability to determine whether an expense is "reasonable and necessary" because "reasonable and necessary" in the statute modifies the word "expenses", rather than the phrase "items and services." Further, the court noted that once an item or service was determined to be "reasonable and necessary", reimbursement rates were determined through statutory formulas, meaning CMS could not use LCA to set a different reimbursement rate. CMS appealed the case in November 2009 to the U.S. Court of Appeals for the District of Columbia, utilizing the same reading of "reasonable and necessary" in the statute modifying the word "expense", and that through its LCA policy, the government attempts to find a balance between CMS's fiscal responsibilities and patient choices.⁵⁶ On December 22, 2009, the Court of Appeals affirmed the lower court ruling and interpretation of the statute.

On April 19, 2010, CMS determined that existing LCA decisions, including those for the LHRH agonists, will no longer be enforced⁵⁷, suggesting that the agency will not pursue further appeals. As such, CMS has lost an important tool allowing Medicare carriers to balance costs with the value of a new technology. In addition to the case studies just discussed, the ability to use LCA at a local or national level would also have enabled CMS to establish a substantially lower reimbursement rate for NPWT given the lack of studies showing that the high cost alternative produced better outcomes than much cheaper versions of the therapy, as discussed

earlier in this paper. Moving forward, any future LCA or LCA-like policies would require specific legislative language from Congress.

Value-Based Purchasing

In comparison to traditional fee-for service programs, value-based purchasing (VBP) aims to link payment for health care services to the quality of care provided. Hospitals, physicians and other health care providers receive higher payments when they achieve higher scores on specific performance measures of quality and/or efficiency. VBP may also include disincentives, such as reduced payments for medical errors, avoidable complications, poor clinical outcomes or otherwise not meeting specific metrics of performance. As a result, VBP is designed to serve as a catalyst for providers to provide higher quality care and lower total costs.

In recent years, as numerous private payers and health systems implemented VBP programs, the MMA, Deficit Reduction Act of 2005, and other provisions have allowed CMS to incorporate VBP efforts in current payment systems for hospitals, physicians, and skilled nursing facilities. CMS views VBP as part of its effort to transform itself from a passive payer of services into an active purchaser of higher quality, affordable care, and has initiated several major VBP initiatives and demonstration projects, as highlighted below.⁵⁸

- The Physician Quality Reporting Initiative (PQRI), a quality reporting system that includes incentive payments of 2% of allowable charges for eligible professionals who satisfactorily report data on quality measures for covered professional services furnished to Medicare beneficiaries. In 2009, PQRI included 153 measures across areas such as osteoarthritis, rheumatoid arthritis, back pain, coronary artery bypass graft (CABG), chronic kidney disease (CKD), melanoma, oncology, coronary artery disease, hepatitis, and HIV/AIDS
- The Premier Hospital Quality Incentive Demonstration, which provides bonus incentives for improving quality of care in five clinical areas: acute myocardial infarction (AMI), pneumonia, heart failure, CABG, and hip and knee replacement. Approximately 250 hospitals in 38 states participate in this demonstration.
- Non-payment provisions for certain Hospital Acquired Conditions (HACs), which do not allow higher payments for selected conditions acquired during hospitalization which could reasonably have been prevented through the application of evidence-based guidelines.

VBP and CER. Partly due to the quantity and state of the available evidence on clinical medicine, there are a limited set of quality metrics and measures available on which to base VBP efforts. Most of the existing measures are process measures; therefore, they are not directly tied to patient outcomes. The fact that more process measures are available than outcome measures reflects the fact that process measures have been in use for a longer period, as well as the difficulty with appropriately applying risk-adjustments to outcome measures.⁵⁹ For certain conditions, including acute myocardial infarction, heart failure, and pneumonia there have been significant intellectual investments in the methodology for risk adjustment.⁶⁰ As such, Medicare publically reports risk adjusted, 30-day mortality measures for these three conditions using Medicare claims data. These measures are included in the Hospital Compare website and complement existing process and readmission measures specific to these conditions.⁶¹ Another criticism of the metrics currently in use for VBP is that they were developed through a

consensus-based process, utilizing often weak clinical evidence, which may be subject to bias.^{62,63}

The results from CER can certainly influence value-based purchasing through the creation of more meaningful VBP measures. As VBP evolves, it will require the development of more outcomes based measures such as those noted above and outcomes related metrics, such as moving beyond a process measure for whether or not a patient receives an A1c measurement for diabetes, to determining the proportion of patients with A1c counts below a certain number and steps taken to successfully lower A1c in diabetic patients.

CER offers that potential, but as researchers have noted, Pay for Performance, or P4P programs are “unlikely to affect spending trends as long as their primary emphasis is rewarding providers for delivering underused services rather than for judicious use of potentially overused treatments.”⁶⁴ The use of DES, discussed in the previous section on coding, highlights an instance where a CER-based measure could be used to reduce inappropriate use of services. In that case, clinical research has shown DES are particularly effective at reducing restenosis in high-risk patients – those with diabetes, or for patients with particularly long or narrow lesions. These findings could be developed into a meaningful metric for VBP to discourage hospitals from placing DES in low risk patients. As noted in Ontario’s experience, the potential savings for the program could be significant if hospitals adopt a more measured approach to using DES over bare metal stents.

VBP is often viewed as complementary to bundled payment systems. Implementation with bundled payments can counter provider incentives to under-provide expensive services. As VBP evolves to utilize more outcome-based measures within a bundled payment system, this may create an incentive for providers to achieve better results at lower costs. In doing so, providers are likely to become motivated consumers of information generated by CER and examine their own outcomes and practices in light of evidence-based or emerging clinical technologies, while helping to diffuse “best practices” among Medicare providers.^{65,66}

VBP differs from the concept of value-based insurance design (VBID), which is discussed below, in several distinct ways. Through VBID, co-payment rates are determined based on the determined value of a clinical service, which includes the benefit and the cost of the service, rather than cost alone.⁶⁷ Perhaps the most significant difference between VBP and VBID is the former’s focus on the physician/providers of care as opposed to the patient. Further, VBP relies heavily on the ability to risk-adjust in order to provide a fair compensation to providers who treat more severe or clinically complex patients. Coordination of VBP across multiple providers raises issues surrounding implementation and may have unintended consequences on referral patterns and patient selection. Nonetheless, when VBP is appropriately implemented, it has the potential to improve patient health outcomes.

Value-Based Insurance Design

Value-based insurance design (VBID) incorporates value into plan benefit design by providing incentives that encourage the use of products with the greatest evidence of value, and by corollary, discourage the use of products that do not demonstrate evidence of value. For patients, VBID provides lower costs for those services deemed to be of high value, while conversely potentially requiring higher costs for services deemed of low value.

The incentives included in VBID most often include reduction in co-payments for patients, but may also take the form of deductible adjustments and/or contributions to health savings accounts. The notion is that by removing economic barriers to care, patients will better adhere to proven therapy, and potentially avoid costly downstream consequences of disease. Health economics literature dating back to the 1970s suggests that patients use less care when they have to pay more out-of-pocket for their medical treatments.⁶⁸ That is, patients tend to respond to increases in co-payments and co-insurance by purchasing fewer health care services.

When drugs or other health care technologies provide demonstrated value for the patient, payers have a stake in encouraging patients to utilize these products as prescribed by their physicians. Unfortunately, many patients do not adhere to physicians' recommendations for a variety of reasons, including their inability to pay. In some cases, patients may be able to afford medicines but decide not to purchase a prescribed medicine because they do not fully appreciate the therapeutic benefits or the side effects discourage use. VBID presents an opportunity to restructure health benefits by changing the focus away from cost alone to the clinical value of health services, address patient adherence issues, and obtain the greatest positive health impact from medical expenditures.⁶⁹

The concept of VBID uses two general approaches. The first approach targets high value services for co-payment reduction. This approach recognizes that certain services provide substantial benefit to most patients, and marginal benefits to other patients, often without differentiating amongst the two groups. A number of proactive, self-employed insurers have utilized this general approach. Most notably, Pitney Bowes and Marriott have reduced co-payments for drugs commonly prescribed for diabetes, asthma, and hypertension.^{70,71} As VBID has evolved, more nuanced programs, such as those implemented by ActiveHealth, a subsidiary of Aetna, exclude patients with specific contraindications to the high-value services.⁷²

The second general approach to VBID creates differential co-payments based on individual patient characteristics. Typically, patients in specific subgroups, such as those with high levels of low-density lipoprotein (LDL) cholesterol are targeted for secondary prevention with lower co-payments for specific high-value services, such as statins. Again, as VBID has evolved, payers have expanded this approach to provide reduced co-payments for high-risk enrollees that actively participate in disease management programs. One prominent example of this disease management approach is the City of Asheville (North Carolina) Project which, through collaboration with local pharmacists, provided free medications and testing equipment for diabetic patients that attended educational seminars.⁶⁹

A third approach to VBID includes efforts to discourage the use of low-value services. In part due to the difficulty of determining which services should be considered of low-value, this

approach is far less common. Still thought leaders have noted that imposing disincentives for the use of substantiated low-value services is necessary to fulfill the promise of VBID programs in moderating cost growth and improving overall value.⁷³

Generally, researchers have noted that there is no conclusive evidence regarding the return on investment from VBID programs, it holds promise to ultimately improve the effectiveness and efficiency of healthcare.”⁷⁴ Obviously, the information generated though CER can provide and inform evidence that is used in the design and implementation of VBID. Specifically the determination of the clinical benefit may be clarified through CER. Researchers have suggested that VBID will only be successful if future research further differentiates high-and low-value services, and that enhancements in the targeting of patients groups will require more detailed evidence than currently exists in many disease areas. Simply put, better evidence will support better benefit design.

Medicare and VBID. To date, CMS has not formally implemented a VBID program for Medicare beneficiaries. One of the major barriers to using VBID in traditional Medicare (Medicare Part A and B) is that nearly 90 percent of beneficiaries have supplemental insurance, shielding them from policies imposing differential rates of co-payment. The DHHS Office of General Counsel (OGC) and the Office of Management and Budget (OMB) have consistently denied Medicare’s use of adjusted copayments within the context of demonstration programs, [R. Mentnech, personal communication] as it raises questions about the fairness of the program and who would be targeted.⁷⁵ Without dramatically restructuring the Medi-Gap market, it would be difficult to use VBID in traditional Medicare. In addition, beneficiary co-payments are set by statute for most services, meaning broader use of VBID would require some legislative change, at least in traditional Medicare.

Private health plans that contract to provide Medicare health services under Part C and D have more flexibility to implement VBID policies. In particular, integrated Part C plans may have significant incentive to implement innovative benefit designs, as they incur the costs associated with poor adherence to drugs and preventive therapies. Under current policies, chronic care special needs plans (CC-SNPs) under Part C are able to, and may even be encouraged to adopt VBID for drugs used to treat the plan’s target condition.⁶⁶ Such efforts may allow CC-SNPs to demonstrate their efforts to provide specialized care, by lowering cost sharing for drugs used to treat the plan’s targeted chronic condition. Further, as the SNP program is under increasing scrutiny by policymakers, the implementation of VBID may offer these programs the ability to demonstrate how they provide targeted care and improve beneficiaries’ health status in comparison with other plans. An initial analysis suggests that a few diabetes specific SNPs are already utilizing VBID in their benefit design, with low co-payments for all covered diabetes drugs. Given the initial successes of private payers with VBID programs targeting statins and other cardiovascular therapies, one can assume the CC-SNPs targeted to cardiovascular disease or congestive heart failure may have interest in reducing costs for specific drugs that treat their targeted conditions, or in future demonstration projects.

As many VBID programs have targeted changing co-payments or co-insurance for drugs, the Medicare Part D program is the most obvious candidate for innovative approaches to using VBID in Medicare. At least one Medicare Advantage Part D Plan has utilized VBID and reduced co-payments for selected diabetes, asthma, and seizure medications.⁷⁶ Leading thought-leaders on

VBID have offered several distinct options for the implementation of VBID in the Medicare Part D Program.⁶⁶ Specifically, they state that no policy changes are necessary for Medicare Part D plans to utilize VBID through reducing or eliminating cost sharing for specific drugs as long as the plans continue to meet minimum standards for Part D coverage, CMS' formulary guidelines, and rules on actuarial equivalence. Further, they suggest that plans may provide coverage for select high-value drugs or drug classes during the coverage gap, when enrollees may otherwise be required to pay for prescription drugs out-of-pocket, but that there is little current incentive for stand-alone plans to do so, and under health reform the coverage gap will be eliminated entirely by 2020.

Implementation of a more targeted form of VBID in Part D that reduces cost-sharing for beneficiaries who meet specific indications for therapy or selectively for only some chronic conditions or reducing cost sharing for enrollees in medication therapy management programs faces more barriers. Specifically, these actions would require specific legislation that addresses the uniform benefit and nondiscrimination provisions of Part D and clearly establishes CMS's authority to use VBID approaches that target a clinical subset of plan beneficiaries. Current CMS regulations for Part D programs state that plans must offer a uniform benefit in terms of premiums and cost-sharing for all enrollees. Interestingly, the legislation on which these regulations are based does not specifically require equivalent cost-sharing, which may allow CMS to revise its regulatory guidance and offer the opportunity to include cost-sharing in a demonstration program. Similarly, the nondiscrimination clause limits plans from offering benefits that "substantially discourage" the enrollment of certain beneficiaries. One could argue that those beneficiaries that are not offered reduced cost-sharing through VBID, such as those without high cholesterol not being offered a VBID program that offered lower co-payments for statins, would be considered discriminated against. The distinct parameters of VBID benefit design that includes the targeting of patients would require legislation that provides some type of exception to the non-discrimination clause.^{66,77}

The addition of preventive benefits, such as colonoscopy and the "Welcome to Medicare" physical presented an opportunity for using VBID to encourage use of these preventive services. In fact, Congress instituted a form of VBID for preventive services with the passage of health reform. Starting in 2011, Medicare beneficiaries will not have any cost sharing for preventive services with a high evidentiary rating by the US Preventive Task Force. Outside of drugs and preventive services use of VBID by Medicare for surgical procedures or devices, may be more problematic. For devices, hospital procurement policies often dictate which item or service is utilized. Use of VBID for these types of services will require physician education to appropriately inform patients regarding differential co-payment requirements for elective surgery. Finally, it will be important for Medicare to coordinate future VBID efforts with existing or planned VBP programs to ensure that there are consistent incentives on both patients and providers to make informed decisions regarding the value and effectiveness of products and services. The coordination of VBID and VBP efforts by Medicare could lead to more potent and coherent programs. Conversely, if Medicare chooses to view and implement VBID and VBP separately, there is potential for suboptimal results and the wasting of financial resources.

SECTION FOUR: COVERAGE WITH EVIDENCE DEVELOPMENT IN MEDICARE

In recent years, both public and private payers have introduced the concept of coverage for evidence development (CED) as an approach to coverage decisions for potentially important new technologies for which important evidence gaps remain. CED is generally defined as a special provision or program that provides policyholders with temporary coverage for a medical technology deemed “experimental” or “investigational” and excluded from normal coverage.⁷⁸ Such coverage is contingent on the policyholder’s participation in an organized, payer approved, clinical research program. The primary objective of CED is to provide access to potentially important health care services while generating evidence to assist payers as they make coverage decisions and patients and physicians in making more informed clinical decisions.

CED has attracted the attention of policymakers for a number of reasons. First, the increasing recognition of the high prevalence of critical gaps in evidence around existing and emerging technologies suggests the need for policy mechanisms that support the creation of new evidence that addresses those gaps. Of particular interest are studies with a primary goal of informing clinical and health policy decision-making, the explicit purpose of comparative effectiveness research (CER). Second, there is continuing pressure to enable rapid access to potentially important new technologies, frequently at a point when those technologies have not yet been fully evaluated.

Definitive evaluations of the risks and benefits for new technologies can take years to complete, while initial studies suggesting potential health benefits are available much sooner. For many medical devices and procedures, regulatory approval is granted when the evidence on clinical effectiveness is relatively limited. This inevitably creates a tension between the need to learn more about the health impacts of these technologies and the desire to make them available to the public in a timely manner. In such circumstances, public and private payers are viewed as the primary barrier to access to the “state of the art” technology, frequently accompanied by the belief that the payer’s refusal is driven by cost considerations, rather than to genuine concerns about the harms and benefits of the service. When done properly, CED offers the potential to avoid this recurring dilemma by offering a mechanism to provide coverage for selected promising technologies while also ensuring the completion of studies that will address the critical areas of uncertainty. Given that few other policy strategies have been developed to serve this function, the level of interest in CED has continued to rise

This section provides an overview of the challenges encountered by CMS in the implementation and evolution of the CED policy, focusing on statutory, operational, and methodological issues, as well as financial conflicts of interest and timing concerns. Further, we briefly discuss the general impact of the CED policy thus far and potential for process refinements.

Statutory Framework and Early Use of CED in Medicare

The statutory authority for CED, including the requirement to submit data in order for a service to be reimbursed, is rather complex and the legal rationale has evolved over time. Medicare’s general coverage authority as established by §1862(a)(1)(A) of the Social Security Act states that payment can only be made for items or services that are “reasonable and necessary” (R&N) for the diagnosis and treatment of illness and injury. Much of the complexity and uncertainty of

coverage decisions revolves around the lack of a statutory or regulatory definition of “reasonable and necessary,” although the term has been generally interpreted to mean that the item or service must be likely to provide a net health benefit to the patient.⁷⁹ The standard language used by Medicare to characterize services that meet the R&N standard is that there must be “adequate evidence to conclude that the item or service improves net health outcomes.”⁸⁰

The R&N authority is only one mechanism by which reimbursement has been linked to a requirement for data collection, though the term CED implies a focus on the use of the coverage authority, rather than other payment mechanisms that might be aligned with a requirement for ongoing data collection. For example, payment policy mechanisms were used to impose the requirement to submit hematocrit data with all claims for use of erythropoietin (EPO), as well as the requirement to submit data on all organ transplant patients to the national registry of organ transplants. While these policies share a number of similarities to the better known examples of using the R&N (coverage) authority to implement CED, they are outside of the scope of this analysis.

The National Emphysema Treatment Trial as Precedent. Medicare first applied the CED concept in 1995 through an NCD on lung volume reduction surgery (LVRS), a surgical treatment for emphysema. While small case series suggested potential clinical benefits from this procedure and numerous centers began to perform the surgery, a review of Medicare claims data suggested a high rate of patient deaths within one year of the operation. Despite these adverse events, and because there was a potential for important clinical benefits to patients with an otherwise fatal condition, CMS (then HCFA) determined that the procedure should be considered R&N when provided with the additional protections provided by participation in a well-designed study.⁷⁶ Medicare’s NCD allowed access to the procedure for beneficiaries’ at 19 academic centers that agreed to participate in a research protocol developed in collaboration with the National Heart Lung and Blood Institute (NHLBI) of the National Institutes of Health (NIH) – known as the National Emphysema Treatment Trial (NETT). The results of this trial were published in 2003, and demonstrated that LVRS had a higher mortality rate than rehabilitation alone for some patients, and provided only small improvements in quality of life with no increase in survival in another subset of patients.⁷⁵ While Medicare’s NCD was modified to cover the procedure for all patients like those who obtained benefit in the NETT, use of the procedure has essentially been abandoned by the clinical community. This highlights the fact that in some circumstances, the generation of relevant and important evidence impacts clinical decision making even when those services are being covered.

The policy rationale and regulatory framework developed to support the NETT was relied upon in 2004 when the CED approach was next applied in the Medicare program. The fundamental principle articulated by CMS to provide a statutory platform for CED was again the R&N authority, based on the argument that some promising but unproven services could be considered to meet the R&N standards only for patients enrolled in a trial and/or treated in accordance with a well-crafted clinical research protocol. Under this formulation, study patients were expected to experience a net health benefit, while those receiving the same service outside of a trial would not. Over the next several years, the viewpoint at CMS and the HHS OGC shifted to considering §1862(a)(1)(E) of the Social Security Act as a more robust legal foundation for CED, and this view was reflected in the CED guidance document issued in July of

2006.⁸¹ This evolution in the legal arguments for CED carried implications for the respective roles of CMS and AHRQ in the CED process while highlighting the limitations in the existing statutory authority for CED and restricting the approach to implementing specific CED policies, as discussed in detail below.

Attention to CED rapidly increased following application of the policy to PET scanning for suspected dementia, implantable cardioverter defibrillators (ICD), and certain off-label uses of cancer drugs. After CMS issued multiple CED policies in rapid succession, the Secretary instructed the agency to develop more formal policy guidance on when this approach would be considered a viable alternative to the standard coverage or noncoverage decision, with emphasis on the legal authority, topic selection, study design requirements, and other issues. An initial draft guidance was issued in April 2005, which was extensively modified in the version that appeared in July 2006.

As illustrated by the CED studies provided in Appendix B, each use of this policy mechanism has many unique features, reflecting the fact that the thinking on CED at CMS was evolving with each application. The decision to apply or not apply CED in any particular case was made somewhat opportunistically and generally in the context of strong pressure, based on the need to develop policy around technologies that happened to present themselves.

Overview of Recent Medicare Initiatives in CED

To date, Medicare has announced at least 11 NCDs that include CED as a condition for coverage, as listed below in Table 2 below. Appendix B provides detailed case examinations for six CED initiatives that have been implemented since the term “Coverage with Evidence Development”

Table 2. Medicare Coverage Decisions Utilizing CED.

Service	Year Released	Type of Study	Study Implemented?
Lung Volume Reduction Surgery*	1995	Clinical trial	Yes
Carotid Artery Stenting*	2001	Clinical trial	Yes
FDG-PET for Dementia	2005	Clinical trial	Yes
FDG-PET for Cancers <i>National Oncologic PET Registry (NOPR)</i>	2005	Registry	Yes
Implantable Cardioverter Defibrillators (ICD)	2005	Registry	Yes
Off-Label Drugs for Colorectal Cancer	2005	Clinical trial	Yes
Cochlear Implantation	2005	Clinical trial	No
Long-Term Oxygen Treatment	2006	Clinical trial	Yes
Artificial Heart	2008	Clinical trial	Yes
Continuous Positive Airway Pressure Therapy	2008	Clinical trial	No
Pharmacogenetic Testing for Warfarin Response	2009	Clinical trial	Yes

* Decision issued before the term ‘coverage with evidence development’ was used by CMS.

was first used by the agency.

One critical challenge that has had significant impact on several of the CED case studies is the reliance on the R&N authority as the statutory foundation on which to implement the CED requirement. In 2001 and 2002, CMS had worked toward providing a more transparent and consistent application of the R&N criteria by using standards language to characterize the quality of evidence available for each technology reviewed. As noted above, the language included in every NCD decision memo after 2002 noted that the item or service would be considered R&N when there is “adequate evidence to conclude that the item or service improves health outcomes.”⁷⁶ The original concept of CED, as described to support the NETT and later adopted in several NCDs issued in late 2004 and early 2005 and the original CED guidance, argued that that selected technologies were not supported by evidence that was slightly less than was “adequate to conclude” that health outcomes would be improved. In these cases, the service would not be R&N when provided in standard clinical practice, but would cross over the line to being likely to “improve health outcomes” when it was provided under the carefully structured circumstances associated with a clinical trial. Essentially CMS was arguing that the close supervision of the clinical care of the research study participants would increase the chances of patient benefit just enough to cross the threshold from “inadequate evidence” to “adequate evidence” of improved health outcomes.

Of note, the coverage policy associated with the NETT would have provided coverage for any patients managed according to the National Heart Lung and Blood Institute study protocol, whether or not they were formally participating in the NETT. That fact was not widely publicized, but followed from the logic that linked the R&N determination to the additional benefits of being treated under controlled clinical research conditions. There is some empirical support suggesting that patients have better outcomes in clinical trials than in clinical practice, but it is not extensive, consistent or universally accepted.⁸²

Overall, this rationale for CED required a generous interpretation of the R&N statutory language. Further, the 1995 NETT interpretation was clearly a novel translation of R&N, though it did not appear to be challenged at that time. Because the rationale for the NETT policy was codified in regulatory language at that time, the NETT trial provided a basis to adopt the same basic arguments in 2004 with the coverage decision on PET for suspected dementia, particularly because there was such strong pressure for establishing this route to coverage for this clinical use of PET. These arguments were again applied to support CED policies for the ICD in January 2005, the off-label oncology drug NCD in January 2005, and in the first draft of the CED guidance in April 2005. Now that CED had been applied several times to high visibility technologies, there was more serious and sustained attention from the HHS OGC, the Assistant Secretary for Planning and Evaluation, OMB, and others, which prompted more extensive discussion about adequacy and appropriateness of using the R&N authority to support the policy.

Development of Two CED Tracks. Much of the evolving legal thinking was ultimately reflected in the revised version of the CED guidance, issued in July 2006. This included the two different CED tracks: 1) coverage with appropriateness determination (CAD); and 2) coverage with study participation (CSP). The former generally has been implemented through the use of registries, and the rationale for data collection is primarily to allow CMS to ensure that a service that has been determined to be R&N is provided in a way that meets the criteria for being clinically

appropriate. CMS has legal authority to require this as an extension of their R&N authority. CSP generally involves studies of experimental design, and the legal authority for this is more problematic for many of the reasons discussed above. Overall, the internal discussions gradually evolved toward a preference for citing §1862(a)(1)(E), rather than §1862(a)(1)(A), to justify the use of CSP. This authority is considered to be under the authority of AHRQ, which has increased the role of AHRQ in the implementation of all forms of CED.⁷⁷

This evolution highlights the extent to which the lack of well-defined statutory authority for CED has been a subject of intense internal debate. This legal formulation and the lack of explicit definitions of “necessary” or “appropriate” has led to internal disagreement within HHS about the legality of CED, and this has served as one important impediment to the development of a well-articulated policy approach to CED at CMS. The result is that each application of CED has involved much wrangling, which has imposed undesirable restrictions on the decision to use CED, the clinical indications for which it may be applied, and the study design chosen.

Reactive Approach to Priority Setting and Study Design Policies

The case studies in Appendix B highlight a critical characteristic of CED as applied by CMS, which is a lack of any well-defined, consistent approach to selecting topics for CED, decisions on study design methods, and strategies for study implementation. This reflects the fact that each application of this approach was developed in an opportunistic manner, rather than with a clearly defined, forward-looking and coherent legal or policy framework.

The National Oncologic PET Registry (NOPR) study was designed by a coalition of positron emission tomography (PET) advocates as a mechanism that would allow Medicare to pay for the service. While sophisticated methodologists played an important role in the design of NOPR, the range of study methods that could be seriously considered was limited by the reimbursement policy objectives that were considered acceptable by these advocates. An observational design, with physician self-report of the primary outcomes of the study, and absence of any validation of data reporting were all compromises that allowed for faster, broader coverage for PET, but which substantially reduced the value of the study results.

The ICD registry was established in part as a response to concerns at CMS regarding the very substantial expansion of the population for which this service would be covered. CMS believed that there would be some benefit in having a system in place to track patterns of use, and potentially provide additional data to identify patients more or less likely to benefit from an ICD. The internal focus on this again began during the National Coverage Determination (NCD) process, placing strict limits on the time available to evaluate the clinical and scientific issues involved, while also making it extremely difficult to obtain objective and unbiased input. The decision about where to house the ICD registry was also driven by matters of convenience. The American College of Cardiology (ACC) had already created the organizational infrastructure to house cardiology registries, and given constraints of timing and funding, provided an attractive option to house the ICD registry. Not fully appreciated was the fact that governance of that registry was transferred from CMS to the governing board of the ACC, which is dominated by the cardiology community. The priorities for what registry data would be collected and how it would be used therefore came to reflect the priorities of the governing organizations, and was

not fully reflective of the priorities of CMS, patients, FDA, and others with specific interests in potential uses of the ICD registry infrastructure.

The consequence of these factors is that all Medicare CED projects were essentially created “from scratch” and formulated in response to the specific circumstances at play in each case. The primary implications of this opportunistic and situation-specific approach to CED are that the process becomes very labor intensive, unpredictable, and quite susceptible to the influence of small groups of organizations or individuals within specific organizations with explicit agendas.

In summary, most of the CED case studies highlight the frequency with which decisions about research questions, study design and implementation strategy were influenced by the policy circumstances surrounding those decisions and/or the strategic interests of public and private organizations other than CMS. Each of these examples supports the view that the opportunistic approach to implementing CED leads to important compromises on topic selection and study design that interfere with the ability to achieve the program’s primary goals of informing future CMS decisions and informing patient and clinician decision making. A more formal and transparent process of obtaining public input on priorities for CED, as well as dedicated funding stream to allow for the development of an objective and independent study design to meet the agency’s needs would help alleviate some of these concerns.

Use of Observational or Experimental Methods

Both the NOPR and the ICD registries underscore the strong and problematic link between application of CED and the use of observational data. The basic dilemma is that observational studies have well known limitations with respect to generating valid information on comparative clinical effectiveness. On the other hand, CED is most acceptable to many key stakeholders (e.g., industry, clinicians, patients) when the data collection obligation is implemented with an observational approach, as this allows for most or all patients to receive the service no matter where they live, and it also allows providers and industry to get paid for the service/product for a much larger population of patients than is possible through experimental studies.

For the NOPR, and to a lesser extent the ICD registry, the design of the observational studies, and the data oversight mechanism, were not done to the highest existing standards, again reflecting the limited leverage maintained by CMS in working through these design and implementation issues. Whether or not an observational approach is particularly useful for evaluating the clinical utility of cancer imaging continues to be an area of active debate, but the political circumstances surrounding the establishment of NOPR did not allow the scientific and statistical considerations to get primary consideration.

Equally challenging is the use of RCTs as a method for conducting studies supported through CED. The NETT example highlights a major challenge of using CED to support an RCT – the project took 7 years, during which time about 1,200 patients underwent the surgery. For a promising technology, such a timeline does not represent a meaningful increase in rapid access to a potential innovation, and such an arrangement has no financial appeal to clinicians or product developers. On the other hand, an observational study of LVRS was considered and rejected in 1995, due to fears that selection bias would make it impossible to interpret the

results of anything other than a randomized study. In retrospect, it is unclear whether or not that is true, since a well-done registry of LVRS patients with carefully matched controls might have shown the limited clinical benefits of the procedure compared to medical therapy.

The main message related to the appropriate use of observational and experimental methods in CED studies is that there needs to be a process that supports a thoughtful clinical and scientific discussion of what study design is adequate. This all links back to the critical need for a priority setting mechanism that can identify technologies that may be appropriate for CED early enough that the scientific, methodological, financial, and other issues can be worked through systematically, with appropriate external consultation.

Study Funding and Oversight

The observations made above regarding the variability in the methodology in CED studies are equally applicable to finding a source of funding for the research costs of these studies, with the same list of key primary underlying factors noted in the bulleted list above. For the most part, a critical weakness of the Medicare CED process as implemented to date continues to be the opportunistic, reactive, situation-specific implementation strategy, which leads to a wide range of different, and usually suboptimal, approaches to funding and oversight.

Financing and Conflicts of Interest. Because CED projects can only go forward when a source is identified to pay for the research costs of these studies, the design and oversight of each study will be heavily influenced by whatever entity provides the funding. As noted below, the source of funds and funding mechanism for the ICD registry, NOPR, and oncology drug trials, had significant implications for the nature of questions addressed, as well as which entities took responsibility for data collection and analysis.

In the case of NOPR, funding and other aspects of the research were largely driven by the Academy of Molecular Imaging (AMI), an organization that represents entities with commercial interest in PET. All of the study design and governance issues were negotiated between CMS and AMI, with considerable involvement of lobbyists and consultants hired to assist with CMS reimbursement strategy. Similarly, studies of colon cancer drugs were all National Cancer Institute (NCI) funded clinical trials, the design of which was entirely determined by NCI staff and the clinician-researchers who develop and implement oncology clinical trials on behalf of NCI. The design and oversight of these studies were the standard approaches applied by NCI to any clinical research funded by them, and CMS had little input on the study hypotheses or trial design.

The major portion of the funding for the ICD registry came from the medical device industry, who understandably wanted to keep the focus of the registry limited to evaluating several potential new indications for ICD use. This reflected an agreement with CMS at the time of the January 2005 NCD. All of the study implementation tasks were eventually assumed by the National Cardiovascular Data Registry (NCDR), which runs all registries affiliated with the American College of Cardiology, a professional society and trade association for US-based cardiologists. Many of the decisions about priorities for data analysis, as well as policies for use of the data, were under the supervision of the NCDR and its existing governance mechanisms. This governance structure likely ensures that the registry work is guided in ways that do not

represent threats to the interests of the cardiology community. Efforts to secure sufficient funding to use the registry to conduct risk stratification studies continued over four years, and the several million dollars needed to do this work has only been recently identified through AHRQ. Over this period of time, Medicare has spent between \$10 and 15 billion on ICDs.

In any case, there is a consistent pattern reflected in the CED projects indicating that CMS evidentiary priorities receive limited attention, and it will be useful to consider alternative approaches that increase the degree to which CMS perspectives can be considered in an environment where evidence and science is given priority over stakeholder pressure.

Timing of CED and Technology State of Development

The proper timing of CED policies is one of the key challenges for effective implementation and has presented recurring challenges for CED implemented by Medicare as well as in other countries. CED is very difficult to implement once a technology has gained a moderate level of clinical adoption, since this increases resistance from providers and patients to enrolling in a study. The perception is that study participation and data submission should not be required for reimbursement, and CED should not limit patient access to the technology. The attempted application of CED to cardiac CT angiography illustrates such difficulties. CMS proposed use of CED for this technology in December 2007, but strong resistance from imaging companies, cardiologists and radiologists (including the ACC and American College of Radiology (ACR)) persuaded CMS to preserve broad local coverage. In September 2009, over three years after the MedCAC meeting on CCTA that concluded the evidence was inadequate, the NHLBI announced funding for a large RCT to evaluate CCTA. The results of this study may be available in 4 to 5 years and might have some impact on clinical practice, but will clearly be too late to inform coverage policy. The optimal timing for CED in this case would have probably been around 2004 or 2005, when it was already known that the technology had considerable promise. Proposing CED in late 2007 and starting a study in late 2009 was much too late to provide any meaningful evidence regarding appropriateness prior to widespread usage.

As a corollary to the need to apply CED early enough in the lifecycle of emerging technologies, it is also necessary to create a horizon scanning function that is actively looking out for promising emerging technologies that may be suitable candidates for CED. For the most part, by the time a technology is presented to CMS or other payers for a coverage determination, the window of opportunity to apply CED may be limited or closed. In the case of CCTA, the Medicare local contractors were developing policies long before it came to the attention of the national program. It is therefore unlikely that a passive approach to CED, in which Medicare responds to an emerging technology once it is brought to their attention, will be an effective approach. Active surveillance will be required, along with a set of criteria and a deliberative process to determine whether a particular technology is a good CED candidate.

Another important reason for earlier CED consideration is that the dialogue between product developers and CMS is primarily focused on the manufacturer's interest in obtaining coverage, that does not allow for an objective analysis of the scientific evidence. The pressure being applied by product developers does not allow for reasonable debate about the need for CED, and the types of studies that would be adequate or appropriate through the CED mechanism. This has historically resulted in the use of registries whether or not an observational study was

preferable, as was the case with the National Oncologic PET Registry. Registries are appealing, in that they allow most or all Medicare patients to receive the service, while clinical trials are generally more limiting. In general, there is little opportunity for objective debate about scientific principles in the high stakes context of coverage policy.

The need to look for promising, early stage technologies as candidates for CED also raises the potential for applying CED too early. This has not yet been an issue for any of the Medicare CEDs, but is an important potential risk should future policies focus on technologies in earlier stages of product development. For some technologies, such as surgeries and medical devices, early CED evaluation may “catch” a technology before it has evolved to an adequately mature form. This is similar to the general challenge of CER on procedures and medical devices, in that these technologies continue to evolve over time, making it challenging to design a study that will reflect the impact of the version of the technology that will be in use at the time that the study results are finalized. Another potential drawback to early application of CED is that Medicare and other payers may begin to subsidize the costs of product development at a time when these research costs should be borne by the product developers themselves. CED should not become a mechanism by which the costs and risks of clinical development are routinely shifted to payers, particularly public payers. Again, this requires a mechanism to accurately identify technologies at the point at which there is sufficient evidence to determine that they are genuinely promising and with large potential public health impact.

SECTION FIVE: CONCLUSION AND FUTURE OPPORTUNITIES

The influx of money to support CER provides unique opportunities for CMS to improve its policies to ensure medical services are used more appropriately. Unlike many clinical research and health services research studies, an important distinguishing feature of CER is its focus on ensuring relevance to decision makers. This includes patients, clinicians, and payers such as CMS. Although many of the major entities involved in supporting CER have been reaching out to CMS officials to consider their views, efforts to engage CMS have been somewhat ad hoc and disjointed to date, encumbered particularly by time constraints imposed on funds made available through ARRA. To continue to ensure the relevance of federally-funded CER to the Medicare program, there is potential for better integrating CMS in the process of selecting research priorities and advising on the research methods and study designs that will best meet Medicare programmatic needs. Recognizing how payer perspectives differ from those that inform the traditional research enterprise requires a cultural change and some time, though that process is underway as a result of the initial investment in federal CER.

Even if CMS has an active voice in these activities, the agency will need comparative studies that address issues specific to the elderly, chronically ill, and disabled populations it serves and where there is the highest potential for improved efficiency in Medicare. This raises the question about how these research priorities will be identified and funded, since they may not consistently rise to the top of the list for entities supporting CER and other stakeholders. To identify research priorities, CMS' previous attempt to establish research priorities—despite its faulty implementation—should be improved and sustained because it is an important mechanism to highlight Medicare-specific issues. This process could be improved by clarifying the criteria used for ranking across competing research topics, systematizing the way in which priority questions are identified, defining a more structured approach to selecting the experts and stakeholders who participate in the process, and developing mechanisms to better engage Medicare beneficiaries and the public. Given the salience of CER for improving Medicare's coding and payment systems and supporting innovative insurance designs under demonstration programs, it also makes sense to coordinate the priority setting process across the centers and offices within CMS.

An ability to afford expanded health insurance coverage through the recent health reform legislation depends heavily on Medicare being able to realize substantial programmatic savings by becoming a more value-based purchaser. Translating innovative payment approaches developed through the new Center for Medicare and Medicaid Innovation to the whole of Medicare is one mechanism to achieve this. Establishing a more direct line of communication between PCORI, the new Center, and others within the agency who have more experience with interpreting clinical evidence could help ensure better use of the clinical information to shape innovative reimbursement programs. Maintaining the agency's latitude to use CER for coverage, payment, and incentive programs, as authorized under PPAC will be vital.

As we have noted there are opportunities to for the Medicare program to make better use of CER through its payment and coding policies, and CMS does have some experience in this area, but there are also statutory and operational barriers that will need to be removed to allow the agency to be truly innovative. Of the policy options explored in this paper, there are three areas that offer the greatest potential for near term benefits through use of CER.

- First is the creation of new billing codes, a process that is not hindered by as many statutory barriers as are Medicare's payment systems.
- Second, CER should be directly relevant to supporting decisions about proposed add-on payments for new technologies.
- Finally, CER will be beneficial to support the creation of VBP measures that encourage more appropriate use of medical interventions.

All three of these processes already depend on reviews of the clinical evidence, and are frequently hampered by the limited relevance and/or quality of studies available to make judgments about the comparative clinical effectiveness of the new technology in relation to existing alternatives. For example, many clinical studies include low numbers of Medicare patients and are not comparative.

Another avenue for improvement would be for the agency to be more clinically specific in its application of CER to either payment or coding. Better precision in designating the clinical indications for which health outcomes are improved could avoid providing incentives to use new technologies in patients for whom the benefits are unproven (including off-label uses), and where the harms may outweigh the benefits. There are no statutory or regulatory barriers that preclude Medicare from being more precise in payment regulations, but CMS officials currently maintain that there is a distinction between payment – which sets reimbursement for items determined to be (or assumed to be) reasonable and necessary – and coverage – which can address in considerable detail for whom and in what settings an item is reasonable and necessary. There are differences of opinion about whether this distinction could be surmounted under existing legal authorities.

As noted, the quality of evidence CMS receives for decision making has often been poor, resulting in numerous decisions in which the uncertainty has caused the Agency to make coding and payment decisions that were not value-driven. Increased funding for CER and better clarity about the methodological standards to be met presents the opportunity to improve the quality of this evidentiary base for policymaking. CMS is already working with AHRQ to help clarify the standards of evidence that will be necessary to support the creation of a new code. While clarifying standards of evidence can help provide incentives to industry to invest in the types of studies that will meet these standards, the regulatory requirements for scientific evidence to support approval of many devices are minimal. There will be a need for greater coordination with the FDA to ensure scientific requirements are aligned to the greatest extent possible. Historically, efforts to coordinate CMS and FDA policymaking have been controversial and challenging, but there are some examples of successful collaboration and more attention to this will be essential as CER continues to evolve.

There are several other constraining factors preventing CMS from fully taking advantage of an improved evidentiary base. These include a lack of staff trained in clinical sub-specialties, evidence review methods, and biostatistics, as well as the lack of internal resources to devote to review, the time to devote to critical review of the evidence, and the internal expertise to better inform manufacturers about the types of study designs that would best meet the agency's

needs. Collaborations with AHRQ can help augment CMS' capabilities in this area, but are not a substitute for expanding the internal capacity in the Medicare program.

For the remaining policy options reviewed, statutory barriers would have to be removed to pave the way for their use. LCA has been an effective and important tool to ensure that Medicare does not make excessive payments for meaningless "enhancements" to durable medical equipment (and some drugs), but the agency's authority to use this tool is in serious legal jeopardy. In the case of NPWT pumps discussed in this report, CMS obtained an evidence review that offered clinical support for their decision to not create new codes. However, the pricing imbalance within the existing code for the pumps remains, likely resulting in excessive payments for these devices. CMS' legal counsel has cautioned the agency away from using LCA for a national policy without further clarification of its statutory authority. While inherent reasonableness may be the next best solution, burdensome public comment and review procedures have led to the rare use of this policy option.

Medicare's potential use of payment innovations, such as the use of value-based insurance design, continues to be constrained by statutory requirement for beneficiary coinsurance or co-payments under Medicare Parts A and B and anti-discrimination⁸³ and uniform benefit clauses under Medicare Part D. Under Medicare Parts A and B, the pervasiveness of Medi-gap insurance significantly dampens the potential effects of any VBID policies and raises questions about who is being targeted. Anti-discrimination and uniform benefit clauses in Part D severely limit the ability of Part D plans to develop more strategic, targeted VBID programs that would likely yield the most benefits. For example, while reducing the price for statins may be beneficial for one group of beneficiaries, it would likely lead to overuse in beneficiaries who would benefit marginally, if at all, from their use.

As a final note, systematic reviews of the evidence commonly conclude there is a lack of high-quality studies to support policymaking about the relative effectiveness of health care interventions. Data are often missing on long-term effects, and on the performance of new technologies under usual practice patterns. While systematic reviews are one technique in the array of methods used under CER, conducting new prospective research is most likely to generate the information decision makers, like CMS, will find most useful. CED can be an important tool for generating evidence on new technologies that are particularly promising for Medicare beneficiaries. Through its role in approving the design of CED studies, CMS has the ability to more clearly define evidentiary requirements that meet its needs. As shown by the Ontario case study for DES, controlled diffusion of new technologies while gathering relevant evidence has the potential for greatly improving the efficiency of the program.

To date, the use of data generated by CED to modify coverage policy has been limited to the use of NOPR data for the expansion of coverage for FDG-PET for the diagnosis of cancer (see Appendix B). The absence of consideration of CED data can be at least partially explained by the statutory, methodological, financial, and timing issues discussed above. Most notable is the absence of a fully established statutory platform for CED. This imposes unnecessary legal constraints on potential applications of CED. In addition, the lack of a clear prioritization process limits the clinical indications for which CED may be applied and opens the process to undue influence on topic selection and study design from outside entities with financial stakes in the policy. An ongoing, transparent, explicit priority setting mechanism, including ongoing horizon

scanning and regular consideration of technologies that might be appropriate candidates for CED, would provide CMS with a rigorous and defensible process for selecting topics for CED that would genuinely benefit from this policy mechanism.

In summary, the CED policy mechanism has had limited success to date because of an identifiable set of circumstances that have limited the effectiveness of most CED initiatives to date. The shortcomings of CED are not necessarily intrinsic to the CED approach, but appear to reflect the need to further refine how the policy is implemented. As discussed above, the critical limitations to date include:

- The absence of a clear statutory foundation for CED, which has allowed ongoing internal debate within HHS about the circumstances under which CED could be legally applied. This has served as one important impediment to the development of a well-articulated, coherent and consistent policy approach to CED at CMS.
- The lack of a formal mechanism to select topics for use of CED.
- The pattern of partially successful, ad hoc efforts, unsupported by any apparent organized strategy, feeds ongoing doubts about the utility and viability of this policy mechanism within HHS and among external stakeholders.
- The initiation of each CED program for situation-specific reasons in the course of an NCD, resulting in short time frames and strong pressure that require compromises in decisions about study design and oversight.
- The selection of study design methods for CED-supported studies has been driven by stakeholder consideration, with inadequate consideration of the methodological principles that influence the validity of study results.
- The lack of a designated source of funding to pay for the research costs of CED studies leads to reliance on outside sources of funding, which inevitably influence how studies are designed and implemented.
- Overcoming these existing limitations and creating a well-crafted, consistent policy framework is possible, but will likely require either a senior executive branch champion for CED or new statutory authority to support the policy.

References

- ¹ Centers for Medicare and Medicaid Services Boards of Trustees. Annual report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds. Baltimore, MD: Centers for Medicare & Medicaid Services; 2009.
- ² Smith SD, Heffler SK, Freeland MS. The impact of technological change on health care cost increases: An evaluation of the literature. Working Paper, 2000.
- ³ Cutler DM. Technology, health costs, and the NIH. Paper prepared for the National Institutes of Health Economics Roundtable on Biomedical Research; 1995.
- ⁴ Newhouse JP. Medical care costs: how much welfare loss? *J Econ Perspect* 1992;6(3):3-21.
- ⁵ Leape LL, Park RE, Solomon DH, et al. Does inappropriate use explain small-area variations in the use of health care services? *J Amer Med Assoc* 1990;263:669-672.
- ⁶ Federal Coordinating Council for Comparative Effectiveness Research. Report to the President and Congress. Washington (DC): US Department of Health and Human Services; 2009.
- ⁷ Patient Protection and Affordable Care Act of 2010, H.R. 3590, 111th Cong., 2nd Sess. (2010).
- ⁸ Medicare Prescription Drug, Improvement, and Modernization Act of 2003, Pub. L. No. 108-173, 117 Stat. 2066 (December 8, 2003).
- ⁹ Danzon P, Wilensky G, Means K. Alternative strategies for Medicare payment of outpatient prescription drugs – Part B and beyond. *Am J Manag Care* 2005;11:173–180.
- ¹⁰ Whitlock EP, Lopez SA, Chang S, et al. Identifying, selecting and refining topics for comparative effectiveness systematic reviews: AHRQ and the Effective Health Care Program. *J Clin Epi* 2009;(epub): 1-11.
- ¹¹ Institute of Medicine (US). Scientific opportunities and public needs: Improving priority setting and public input at the National Institutes of Health. Washington (DC): National Academies Press; 1999.
- ¹² Gross CP, Anderson GF, Powe NR. The relationship between funding by the National Institutes of Health and the burden of disease. *N Engl J Med* 1999;340(24):1881-7.
- ¹³ Committee on Comparative Effectiveness Research Priorities. Initial national priorities for comparative effectiveness research. Washington (DC): National Academies Press; 2009.
- ¹⁴ Conway PH, Clancy C. Comparative effectiveness research - Implications of the Federal Coordinating Council's report. *N Engl J Med* 2009; 361(4):328-330.
- ¹⁵ National Working Group on Evidence-Based Health Care. The role of patient/consumer in establishing a dynamic research continuum: Models of patient/consumer inclusion. August 2008. Available online at <http://www.evidencebasedhealthcare.org/download.cfm?DownloadFile=9DE777DF-1372-4D20-C85E4F48846514FD>. Accessed May 13, 2010.

-
- ¹⁶ Centers for Medicare and Medicaid Services. Medicare evidentiary priorities. Available online at http://www.cms.hhs.gov/CoverageGenInfo/07_EvidentiaryPriorities.asp#TopOfPage. Accessed July 1, 2009.
- ¹⁷ Centers for Medicare and Medicaid Services. CMS MedCAC meetings: CMS evidentiary priorities, October 27, 2004. (Accessed October 18, 2009, at <http://www.cms.hhs.gov/mcd/viewmccac.asp?where=index&mid=41#questions>).
- ¹⁸ Centers for Medicare and Medicaid Services. CMS MedCAC meetings: Medicare evidentiary priorities, April 30, 2008. Available online at <http://www.cms.hhs.gov/mcd/viewmccac.asp?where=index&mid=42>. Accessed October 18, 2009.
- ¹⁹ Luce BR, Kramer JM, Goodman SN, et al. Rethinking randomized clinical trials for comparative effectiveness research: The need for transformational change. *Ann Intern Med* 2009;151(3):206-9.
- ²⁰ Olsen L, Aisner D, McGinnis M. The learning health care system: Workshop summary. Institute of Medicine Roundtable on Evidence-based Medicine. Washington (DC): National Academies Press; 2007.
- ²¹ DeMaria AN. Comparative effectiveness research. *J Am Coll Cardiol* 2009;53:973-5.
- ²² Schoen C, Guterman S, Shih A, et al. Bending the curve: Options for achieving savings and improving value in U.S. health spending. Washington, DC: The Commonwealth Fund; 2007.
- ²³ Centers for Medicare and Medicaid Services. Innovators' guide to navigating CMS. Version 1.0. Baltimore (MD): Centers for Medicare and Medicaid Services; 2008.
- ²⁴ Office of Inspector General. Comparison of prices for negative pressure wound therapy pumps. March 2009. Report no. OEI-02-07-00660. Washington, DC.
- ²⁵ Office of Inspector General. Medicare payments for negative pressure wound therapy pumps in 2004. June 2007. Report no. OEI-02-05-00370. Washington, DC.
- ²⁶ Presentation by Navigant Technologies before the Council on Technology and Innovation, June 2005.
- ²⁷ Medicare Improvements for Patients and Providers Act, H.R. 6331, 110th Cong., 1st Sess. (2009).
- ²⁸ Medicare: Use of revised "inherent reasonableness" process generally appropriate: Report before the Subcommittee on Health, Committee on Ways and Means, House of Representatives. Washington (DC): General Accounting Office; 2000 July. Report no. GAO/HEHS-00-79.
- ²⁹ ECRI. Negative Pressure Wound Therapy. Technology Assessment. June 2009. Rockville, MD: Agency for Healthcare Research and Quality. Available online at <http://www.ahrq.gov/clinic/ta/negpresswtd/>. Accessed October 22, 2009.

-
- ³⁰ Jeremias A, Kirtane A. Balancing efficacy and safety of drug-eluting stents in patients undergoing percutaneous coronary intervention. *Ann Int Med* 2008;148(3):234-238.
- ³¹ Decision Resources. Drug-eluting stents: Can the market rebound from recent setbacks? April 27, 2007. Available online at <http://www.marketresearch.com/product/display.asp?productid=1492601>. Accessed December 3, 2009
- ³² Tu JV, Bowen J, Chiu M, et al. Effectiveness and safety of drug-eluting stents in Ontario. *N Engl J Med* 2007;357(14):1393-1402.
- ³³ Goeree R. CFFE: Ontario Style. Apples and oranges? Assessing comparative effectiveness and comparative value in the US and other countries. Presentation at the International Society for Pharmacoeconomics and Outcomes Research Symposium; 2009 May 15; Orlando.
- ³⁴ Urban P, Gershlick AH, Guagliumi G, et al.; e-Cypher Investigators. Safety of coronary sirolimus-eluting stents in daily clinical practice: one-year follow-up of the e-Cypher registry. *Circulation* 2006;113:1434-41.
- ³⁵ Pfisterer M, Brunner-La Rocca HP, Buser PT, et al.; BASKET-LATE Investigators. Late clinical events after clopidogrel discontinuation may limit the benefit of drug-eluting stents: an observational study of drug-eluting versus bare-metal stents. *J Am Coll Cardiol* 2006;48:2584-91.
- ³⁶ Kirtane AJ, Gupta A, Iyengar S, et al. Drug-eluting stent versus bare-metal stent use: meta-analysis of randomized trials and observational studies. *Circulation* 2008;118(S):1040.
- ³⁷ Liistro F, Fineschi M, Grotti S, et al. Long-term effectiveness and safety of sirolimus stent implantation for coronary in-stent restenosis. *JACC* 2010; 55:613-616.
- ³⁸ Douglas PS, Brennan M, Anstrom KJ et al. Clinical effectiveness of coronary stents in elderly persons: Results from 262,700 Medicare patients in the American College of Cardiology – National Cardiovascular Data Registry. *JACC*. 2009;53(18):1629-1641.
- ³⁹ CMS. Medicare program: Changes to the hospital outpatient prospective payment system and calendar year 2004 payment rates; Final rule. *Federal Register* 68, no. 216 (2003): 63398-63446.
- ⁴⁰ Medicare program: Changes to the hospital outpatient prospective payment system and calendar year 2010 payment rates; Final rule. *Federal Register* 74, no. 223 (2009): 60465-60514.
- ⁴¹ Baim DS, Wahr D, George B, et al; Saphenous vein graft Angioplasty Free of Emboli Randomized (SAFER) Trial Investigators. Randomized trial of a distal embolic protection device during percutaneous intervention of saphenous vein aorto-coronary bypass grafts. *Circulation* 2002;105(11):1285-90.
- ⁴² Muramatsu T, Suwa S, Koyama S, et al. Design, rationale and early results from the ASPARAGUS Trial. *Circulation* 2004;68:176.

-
- ⁴³ Silber S, Albertsson P, Aviles FF, et al. Guidelines for percutaneous coronary interventions: The task force for percutaneous coronary interventions of the European Society of Cardiology. *Eur Heart* 2005;26(8):804-47.
- ⁴⁴ Medicare, Medicaid, and SCHIP Extension Act of 2007 (Extension Act), Section 112(b)(2)). S. 2499, 110th Cong, 1st sess. (2007).
- ⁴⁵ Clyde AT, Bockstedt L, Farkas JA, et al. Experience with Medicare's new technology add-on program. *Hlth Aff* 2008;27(6):1632-1641.
- ⁴⁶ American Urological Association. Practice resources: Least costly alternative policy changes. Available online at <http://www.auanet.org/content/practice-resources/reimbursement/leastcostly.cfm>. Accessed December 2, 2009.
- ⁴⁷ HCFA Ruling 95-1. Requirements for determining limitation on liability of a Medicare beneficiary, provider, practitioner, or other supplier for certain services and items for which Medicare payment is denied. Baltimore: Health Care Financing Administration; 1995.
- ⁴⁸ Social Security Act §1862(a)(1)(A); 42 USC 1395y(a)(1)(A)
- ⁴⁹ Centers for Medicare & Medicaid Services. Medicare program integrity manual. Chapter 13, p. 8. Available online at <http://www.cms.hhs.gov/manuals/downloads/pim83c13.pdf>. Accessed November 4, 2009.
- ⁵⁰ Centers for Medicare & Medicaid Services. Medicare program; Revisions to payment policies under the physician fee schedule for CY 2006 and certain provisions related to the competitive acquisition program of outpatient drugs and biologicals under Medicare: Final Rule. *Federal Register* 70, no. 223 (2005).
- ⁵¹ Vito RA, Ragone LM, Tawes D, et al. Medicare reimbursement for Lupron. Final report. Dept. Health and Human Services (US), Office of Inspector General; 2004 Jan. Report No.: OEI-03-03-00250. Available online at <http://www.oig.hhs.gov/oei/reports/oei-03-03-00250.pdf>. Accessed December 3, 2009
- ⁵² Pesola GR, D'Costa VC. Albuterol Or levalbuterol for the treatment of asthma. *Asthma, Allergy and Immunology* 2004;3(1):
- ⁵³ Teng M, Wolf M, Lowrie E, et al. Survival of patients undergoing hemodialysis with paricalcitol or calcitriol therapy. *N Engl J Med* 2003;349(5):446-456.
- ⁵⁴ *Hays v. Leavitt*, 583 F. Supp. 2d 62, 69 (D.D.C. 2008)
- ⁵⁵ Department of Health and Human Services, Office of the Inspector General. Semiannual report to Congress. September 2009. Available online at http://oig.hhs.gov/publications/docs/semiannual/2009/semiannual_fall2009.pdf. Accessed May 27, 2010.
- ⁵⁶ Foley Hoag, LLP. Summary of *Ilene Hays vs. Kathleen Sebelius*. U.S. Court of Appeals for the District of Columbia Circuit. 5 Nov 2009.

-
- ⁵⁷ PBSI Medicare Services. Least costly alternative provisions in local coverage determinations (LCDs). April 22, 2010. Available online at <http://www.arkmedicare.com/provider/viewarticle.aspx?articleid=8432>. Accessed May 27, 2010.
- ⁵⁸ Centers for Medicare and Medicaid Services. Roadmap for Implementing Value Driven Healthcare in the Traditional Medicare Fee-for-Service Program. January 2009. Available online at http://www.cms.hhs.gov/QualityInitiativesGenInfo/downloads/VBPRoadmap_OEA_1-16_508.pdf. Accessed November 17, 2009.
- ⁵⁹ Lindenauer PK. Public reporting and pay-for-performance program in perioperative medicine: Are they meeting their goals? *Clev Clin J Med* 2009;76(S4):s3-s8.
- ⁶⁰ Mortality measures overview: Publicly reporting risk-standardized, 30-day mortality measures for AMI, HF and PN. QualityNet. Available online at <http://www.qualitynet.org/dcs/ContentServer?cid=1163010398556&pagename=QnetPublic%2FPage%2FQnetTier2&c=Page>. Accessed December 30, 2009.
- ⁶¹ Centers for Medicare and Medicaid Services. Outcomes Measures (Mortality). Available online at http://www.cms.hhs.gov/HospitalQualityInits/20_OutcomeMeasuresMortality.asp. Accessed December 30, 2009.
- ⁶² Woolf SH. Do clinical practice guidelines define good medical care? The need for good science and the disclosure of uncertainty when defining 'best practices'. *Chest* 1998;114(3):950.
- ⁶³ Locatelli F, Andrulli S, Del Vecchio L. Difficulties of implementing clinical guidelines in medical practice. *Nephrol Dial Transplant* 2000;15:1284-1287.
- ⁶⁴ Mechanic RE, Altman SH. Payment reform options: Episode payment is a good place to start. *Hlth Aff* 2009;28(2):w262-w271.
- ⁶⁵ Tompkins CP, Higgins AR, Ritter GA. Measuring outcomes and efficiency in Medicare value-based purchasing. *Hlth Aff* 2009;28(2):w251-w261.
- ⁶⁶ Academy Health. Incorporating costs into comparative effectiveness research. Available online at <http://www.academyhealth.org/files/publications/ResearchInsightsCER.pdf>. Accessed December 13, 2009.
- ⁶⁷ Chernew ME, Rosen AB, Fendrick AM. Value based insurance design. *Hlth Aff* 2007;26(2):w195-w206.
- ⁶⁸ Gruber, Jonathan. The Role of Consumer Copayments for Health Care: Lessons from the RAND Health Insurance Experiment and Beyond. 2006. Washington DC: Kaiser Family Foundation.
- ⁶⁹ Murphy L, Carloss J, Brown RE, et al. Value-based Insurance design in the Medicare Prescription Drug Benefit. March 2009. Washington DC: Avalere Health and University of Michigan Center for Value Based Insurance Design.
- ⁷⁰ Fendrick AM. Value-based insurance design landscape digest. July 2006. Washington DC: National Pharmaceutical Council.

-
- ⁷¹ Learner N. Health insurers roll out value-based prescription drug plans, tap a growing demand. October 20, 2008. Available online at http://www.aishhealth.com/DrugCosts/DBN_Insurer_Roll-Out_Value-Based.html. Accessed November 12, 2009.
- ⁷² Chernew, ME, Rosen AB, Fendrick AM. Value based insurance design. *Hlth Aff* 2007;26(2): w195-w206.
- ⁷³ Neumann PJ, Auerbach HR, Cohen JT, et al. Low value services in value-based insurance design. *Am J of Managed C* 2010;16(4): 280-286.
- ⁷⁴ Fendrick AM, Chernew ME. Value-based insurance design: Aligning incentives to bridge the divide between quality improvement and cost containment. *Am J of Manag C* 2006;12(SP): SP5-SP10.
- ⁷⁵ Kaiser Family Foundation. Medicare Chartbook. Available online at <http://www.kff.org/medicare/upload/Medicare-Chart-Book-3rd-Edition-Summer-2005-Report.pdf>. Accessed November 5, 2009.
- ⁷⁶ Senior Dimensions Lowers Prescription Drug Co-Payments on Many Widely Used Brand-Name Maintenance Drugs. September 24, 2008. Business Wire.
- ⁷⁷ 42 CFR, sec. 423.272(b)(2), 2005.
- ⁷⁸ Center for Medical Technology Policy. Coverage for Evidence Development: A Conceptual Framework. Baltimore: Center for Medical Technology Policy; 2009.
- ⁷⁹ Carino T, Sheingold S, Tunis S. Using clinical trials as a condition of coverage: Lessons from the National Emphysema Treatment Trial. *Clin Trials* 2004(1):108–121.
- ⁸⁰ Tunis S, Pearson S. Coverage options for promising technologies: Medicare’s ‘Coverage with Evidence Development.’ *Hlth Aff* 2006(25):1218-1230
- ⁸¹ CMS. National coverage determinations with data collection as a condition of coverage: Coverage with evidence development. July 2006. Available online at https://www.cms.hhs.gov/mcd/ncpc_view_document.asp?id=8. Accessed January 6, 2010.
- ⁸² Peppercorn JM, Weeks JC, Cook EF et al. Comparison of outcomes in cancer patients treated within and outside of clinical trials: conceptual framework and structured review. *Lancet* 2004;363(9405):263-70.
- ⁸³ Section 1860D-11(e)(2)(D) of the Social Security Act (42 U.S.C. 1395w-111(e)(2)(D))

APPENDIX A:

KEY INFORMANTS

Lori Anderson

Director, Division of Home Health, Hospice & HCPCS
Centers for Medicare and Medicaid Services (CMS)

JoAnna Baldwin

Lead Analyst, Coverage and Analysis Group
Centers for Medicare and Medicaid Services (CMS)

Amy Bassano

Director, Hospital and Ambulatory Policy Group
Centers for Medicare & Medicaid Services (CMS)

Carol Bazell

Director, Division of Outpatient Care
Centers for Medicare and Medicaid Services (CMS)

Patricia Graves

Director, Division of Operations and Information Management, Coverage and Analysis Group
Centers for Medicare and Medicaid Services (CMS)

Cynthia Hake

Director, HCPCS Workgroup
Centers for Medicare and Medicaid Services (CMS)

Rosemarie Hakim

Senior Epidemiologist, Coverage and Analysis Group
Centers for Medicare and Medicaid Services (CMS)

Tzvi Hefter

Director, Division of Acute Care
Centers for Medicare and Medicaid Services (CMS)

Kathleen Hewitt

Associate Vice President
American College of Cardiology

Lynn Hudson

Director, Office of Science Policy Analysis
National Institutes of Health

Louis Jacques

Director, Division of Items and Devices, Coverage and Analysis Group
Centers for Medicare and Medicaid Services (CMS)

Renee Mentnech

Director, Research & Evaluation Group
Centers for Medicare and Medicaid Services (CMS)

Arthur Meltzer

Epidemiologist, Coverage and Analysis Group
Centers for Medicare and Medicaid Services (CMS)

Curt Mueller

Director, Division of Research on Traditional Medicare
Centers for Medicare and Medicaid Services (CMS)

Steven Pearson

President, Institute for Clinical and Economic Research
Harvard Medical School

Steve E. Phurrough

Medical Officer
Agency for Healthcare Research and Quality (AHRQ)

Bruce Quinn

Senior Health Policy Specialist
Foley Hoag LLP

Barry Siegel

Co-Chair, NOPR Working Group
Professor of Radiology and Chief of the Division of Nuclear Medicine
Washington University School of Medicine in St. Louis

Jean Slutsky

Director, Center for Outcomes and Evidence
Agency for Healthcare Research and Quality (AHRQ)

Tamara Syrek-Jensen

Assistant Director, Coverage and Analysis Group
Centers for Medicare and Medicaid Services (CMS)

Madeline Ulrich

Lead Medical Officer, Coverage and Analysis Group
Centers for Medicare and Medicaid Services (CMS)

Tom Valuck

Senior Vice President of Strategic Partnerships
National Quality Forum

Evelyn Whitlock

Associate Director, Oregon Evidence-based Practice Center
Oregon Health and Science University

Laurence Wilson

Director, Chronic Care Policy Group
Centers for Medicare and Medicaid Services (CMS)

APPENDIX B:

COVERAGE WITH EVIDENCE DEVELOPMENT INITIATIVES

TABLE OF CONTENTS

- 1. FDG-PET for Dementia**
- 2. FDG-PET for Cancers**
- 3. Implantable Cardioverter Defibrillators**
- 4. Off-Label Uses of Drugs Approved for Colorectal Cancer**
- 5. Home Use of Oxygen**
- 6. Artificial Heart**

FDG-PET FOR DEMENTIA (2004)

Service

Fluorodeoxyglucose (FDG) - positron emission tomography (PET) is an imaging technique that can detect abnormal molecular cell activity and is used for the diagnosis of various degrees of neurodegenerative disease, including Alzheimer's disease and fronto-temporal dementia. FDG, a radioactive substance that emits subatomic particles as it decays, is introduced into the body through injection. The subatomic particles are attracted to higher areas of metabolism in the brain, highlighting abnormalities in metabolic function that are indicative of neurodegenerative disease. FDG-PET images are useful in diagnosis because the brains of patients with Alzheimer's and those of patients with FTD have sharply different patterns of glucose metabolism, although autopsy is the only definitive way to diagnose Alzheimer's [1]. Prior to consideration of FDG-PET for dementia and Alzheimer's, Medicare covered PET for use in the diagnosis, staging and restaging of various cancers, myocardial viability, and other neurological disorders. [1, 2]

A National Coverage Decision (NCD) issued in 2004 provided coverage without conditions for use in the differential diagnosis between fronto-temporal dementia and Alzheimer's disease. [2, 4] Patients must meet the diagnostic criteria for both Alzheimer's disease and fronto-temporal dementia and have been evaluated for specific alternate causes of dementia. There must also be documented uncertainty on the cause of the clinical symptoms. This NCD also established a CED policy to cover PET for patients with suspected early dementia if they are enrolled in a large, CMS-approved, practical clinical trial.

Rationale for CED

In 2001, due to uncertainty about its clinical effectiveness, CMS solicited a technology assessment through AHRQ on the use of FDG-PET in the diagnosis of Alzheimer's disease. The assessment found that, even though FDG-PET is more accurate than a traditional community-based clinical evaluation, it is not likely to provide more clinical benefit because it has significantly higher specificity (increased false negatives) than the alternative [3]. The result of this assessment was reinforced by an expert panel convened by the National Institute on Aging, which found that the evidence for clinical utility of FDG-PET was inconclusive. The panel recommended that a pragmatic trial with real-world patients and outcomes was needed, and the Medicare Coverage Advisory Committee (MCAC) endorsed this recommendation [4, 5].

Along with concerns about the clinical utility, CMS had growing concern that approval of FDG-PET for dementia would result in unnecessary exposure to radiation in patients and might promote overuse. For these reasons, CMS released a noncoverage decision in 2002 [2]. The number of dedicated PET scanning facilities had been growing rapidly in the United States, doubling every year since 2000 [6]. The PET industry initiated a multi-faceted lobbying effort seeking a reversal of the decision.

In 2004, in an effort to balance the sustained pressure with the lack of convincing evidence and concerns about overuse, CMS released a decision to provide full coverage for patients meeting diagnostic criteria for both Alzheimer's disease and FTD and for patients with "suspected mild cognitive impairment or early dementia" who are enrolled in a "practical clinical trial" [2]. This marked the first use of CED in the Medicare program since the coverage decision for lung volume reduction surgery [7].

Study Application

Shortly before the release of the CED decision, CMS held a stakeholder meeting to discuss the design of a pragmatic trial that would provide the most useful evidence for coverage and clinical decision making. Participants included the National Institute on Aging, the FDA, AHRQ, academic researchers, the Alzheimer's Association, and industry. The group decided that the study should use be comparative to other treatments and assess both short-term and long-term outcomes on the patient's health and well-being, as well as on the decisions made by clinicians about use of treatments and the timing of changes in the setting of care [3, 5]. In addition to outcomes, the stakeholders recommended other study design features such as inclusion criteria for the patient population and diversity in the training of participating physicians. They also noted that timeliness was an issue, with CMS having an "immediate interest" in obtaining data to make an informed coverage decision [3]. These recommendations laid the foundation for the study design requirements established in the coverage decision.

A group of nuclear medicine researchers, led by Dr. Daniel Silverman of the University of California, Los Angeles (UCLA), developed a study protocol that met the requirements listed in the NCD. This same group of researchers had requested the 2001 national coverage decision and was part of the stakeholder meeting. UCLA and CMS sought funding from the National Institutes of Health (NIH) to support the trial [4]. However, funding was rejected because NIH had shifted its funding priorities to examine newly-discovered tracers other than FDG, and the grant reviewers were conflicted about the need for the proposed trial. Some reviewers felt that the study proposal showed great potential to significantly improve evidence for an important diagnostic tool, while one felt the study was unlikely to impact clinical practice. In addition, one reviewer felt that the hypothesis was insufficiently supported by existing evidence, while another stated that the supporting evidence was convincing enough that the proposed hypothesis had already been proven [D. Silverman; personal communication].

After this rejection of funding, Silverman and his colleagues sought alternative sources. They asked participating study facilities to use their own resources to cover research costs. This created a financial disincentive for the facilities, and several dropped out of the study. For those that remained, patient recruitment was difficult for a variety of reasons, including financial cuts to research budgets and difficulty coordinating with collaborating neurology groups. While more facilities were recently recruited, only the University of Utah site is currently enrolling subjects. [D. Silverman; personal communication].

Organizations Supporting the Study

No study has been initiated.

Implementation Issues

This case reveals the critical role of timeliness in determining whether a CED policy meets its goal of generating evidence useful for decision making. While the stakeholder meeting produced a comprehensive and consensus-based set of recommendations for study design, delays in developing and approving a study protocol shifted the entire process beyond the window of opportunity during which NIH was interested in funding a study on FDG-PET. Without NIH funding, the study has been significantly and repeatedly delayed due to financing difficulties, among other reasons described in the 'Study Application' section. [6]

Outcome of CED

Nearly six years after the CED policy was enacted, only a very marginal amount of data has been collected. Due to recruitment difficulties, coverage is being provided to only a handful of Medicare beneficiaries for the use of FDG-PET in the diagnosis and treatment of early stage dementia, and the larger question regarding appropriate coverage for which indications has remained unanswered.

Despite these significant implementation problems, this CED decision laid the foundation for future use of CED as a policy tool. The policy principles contained in the NCD created a framework for conditional reimbursement that was also used in the CED decision for implantable cardioverter defibrillators, which was released shortly after the FDG-PET for dementia decision. The use of similar language in both decisions was deliberate in order to reinforce the early statutory foundation for CED.

Evidence of Practitioners' Use of Clinical Information from CED

Not available because the study was never initiated.

References

- [1] Foster NL, Heidebrink JK, Clark CM, Jagust WJ, et al. FDG-PET improves accuracy in distinguishing frontotemporal dementia and Alzheimer's disease. *Brain* 2007 130(10):2616-2635
- [2] Centers for Medicare and Medicaid Services. NCD of PET (FDG) for Dementia and Neurodegenerative Diseases (220.6.13). Available online at http://www.cms.hhs.gov/mcd/viewncd.asp?ncd_id=220.6.13&ncd_version=2 (accessed September 26, 2009).
- [3] Kulasingam SL, Samsa GP, Matchar DB. Linking dementia research to policy: An example using fluorodeoxyglucose positron emission tomography for the diagnosis of Alzheimer's dementia and mild cognitive impairment," *Am J of Alzheimer's Disease and Other Dementias* 2006 (21)2: 73-78
- [4] Tunis SR and Pearson SD. Coverage options for promising technologies: Medicare's 'Coverage With Evidence Development'. *Hlth Aff* 2006 (25)5: 1218-123
- [5] CMS proposes expanded coverage for PET in Alzheimer's disease. *J Nuc Med* 2004 (45)7: 234-37.
- [6] Schiepers C. Positron emission tomography: a coming of age? *Euro J of Int Med* 2004 (15)3: 143-146
2004
- [7] Ramsey SD, Sullivan SD. Evidence, economics, and emphysema: Medicare' long journey with long volume reduction surgery. *Hlth Aff* 2005 (24)1: 55-66

FDG-PET FOR CANCERS (2005)

Service

Fluoro-2-deoxyglucose (FDG) positron emission tomographic (PET) is a nuclear medicine technique that produces three-dimensional images by detecting gamma rays emitted by FDG, a radionuclide tracer molecule introduced into the patient's body. Between 1998 and 2005, CMS approved coverage of FDG-PET scans for cancer diagnosis, staging, restaging, and monitoring in nine cancers (lung, esophageal, colorectal, lymphoma, melanoma, head and neck, breast, thyroid, and soft-tissue sarcoma). The CED policy, issued in 2005, applied to the use of FDG-PET for previously noncovered cancer types and indications. [1]

Rationale for CED

At the time PET for cancer was being considered for coverage, CMS was in the process of considering coverage for FDG-PET for a variety of other diseases. There was growing support within the clinical community for the diagnostic benefit of PET, including wide support among advanced cancer centers, and PET manufacturers had been engaging in discussions about coverage. While support for PET was increasing within the clinical community, the quality of studies on PET's clinical value was not improving, and there was no clear consensus in the medical community as to what level of evidence was reasonable.

For diagnostic tests, in general, direct evidence on their effectiveness is generally lacking, with studies focusing on test performance (sensitivity or specificity) or accuracy (the ability to distinguish between a patient with disease or without) [2]. Studies rarely examine the extent to which information made available changes the way physicians would have managed the disease without the test result, or the ultimate impact on diagnostic information on patient outcomes, such as length of survival. CMS' coverage decision for this case focused on the need to develop a more explicit evidentiary framework for diagnostics. CMS staff felt that CED might provide an opportunity to test their evolving policies on the nature of evidence that might help support future coverage decisions for imaging technologies.

Study Application

CMS presented broad criteria for acceptable prospective clinical studies in its coverage decision, and within a short period of time a study protocol for a prospective registry was developed. CMS officials had difficulty figuring out how to fund and carry out small randomized trials for each cancer type under CED. A registry was chosen because it was easier to identify funding and because it balanced the desire to maximize access to the service with the need to generate evidence of reasonably high quality. [3]

The National Oncologic PET Registry (NOPR) was developed to provide the necessary data for CMS' final coverage determination. The design of the registry was based on a cohort study of cancer-related indications conducted at Virginia Commonwealth University, in which data were prospectively collected on a continuous series of PET scans [6]. The goal of the registry is to test the hypothesis that FDG-PET changed their intended patient management strategies for diagnosis to staging, restaging, suspected recurrence, and treatment monitoring. Physician self-assessments were collected both pre- and post-scan. *(These requirements have changed since the initial decision; See 'Issues' below.)* Although data submission to the registry for PET scanning facilities is required as a condition for Medicare payment for

PET facility claims, patients and physicians were allowed to ‘opt out’ of the registry. Despite the voluntary nature of participation within a facility, the overall consent rate was 88 percent. [7]

Organizations Supporting the Study

A loosely-formed partnership among CMS, the American College of Radiology Imaging Network (ACRIN), and Academy of Molecular Imaging (AMI) was developed to support and maintain the registry. ACRIN is responsible for the day-to-day management of the registry, including data submission and database operations. The NOPR Working Group, which consists of four physician researchers, a statistician, and an epidemiologist, is the governing body of the registry. These individuals were involved in the planning and development of the registry and are now charged with overseeing the general direction and goals of the registry, planning research projects, and giving direction to day-to-day project staff. [3, 8]

The data resides at ACRIN and is owned by AMI. Members of the Working Group, NOPR project staff, and CMS staff all have access to the data for their own analyses. Thus far, the Working Group members have conducted several analyses that have led to peer-reviewed publication [6, 7]. Initial funding to begin the registry came primarily from AMI, in addition to funding from the American Society of Clinical Oncology (ASCO) and the Society of Nuclear Medicine. Ongoing costs are covered by a \$50 fee charged to PET facilities for each case submitted to the registry. [3]

Implementation Issues

The initial data reporting requirements were seen as too burdensome by ACR and members of the NOPR Working Group [B. Siegel, personal communication]. CMS required reporting data on diagnosis, staging, restaging, and monitoring response to treatment, requirements seen as challenging to PET facilities. NOPR researchers and ACR reported to CMS that these requirements were not in line with the cancer community’s current approach to cancer management. In April 2009, their request for a review of the policy led CMS to reduce the reporting requirements through a reconsideration of the NCD. Now, facilities are required to report data on initial treatment strategy (encompassing both ‘diagnosis’ and ‘staging’) and subsequent treatment strategy (encompassing ‘restaging’ and ‘monitoring response’) [5]. *For more on the 2009 reconsideration, see ‘Outcome of CED’.*

There have also been significant issues related to correct data entry. Members of the NOPR Working Group view these issues as one of the major lessons to be learned from their experiences, noting that providers have little incentive to ensure that they are submitting data fully and correctly [B. Siegel, personal communication]. At a very high level in the first months of operation, project staff did checks for internal consistency of reported data. Recognizing systematic inconsistencies and incorrect completion of data fields, they organized educational programs in an attempt to improve accurate submission. Retrospectively, developers now wish they had initiated some sort of mandatory web-based training for those individuals at PET facilities charged with submitting data, and even a similar training for referring physicians [B. Siegel, personal communication]. While this would have likely reduced participation in the registry, the data would have been cleaner and more robust.

One week prior to the launch of the registry, the federal Office of Human Research Protection determined that, because the registry was generating data that would affect patient management, each PET facility and referring physician had to obtain IRB approval and informed consent. However, at the last minute, a decision was reached that required only ACR to receive IRB approval as the operator of the registry, averting any delays to the registry’s launch.

Outcome of CED

During its first year of operation, 80% of PET facilities in the United States signed up to participate in the registry [3]. In August 2008, results from the registry were reviewed by Medicare's Evidence Development and Coverage Advisory Committee (MCAC). While MCAC was impressed with the size of the dataset and the potential significance of reported rate of changes in intended patient management, there were a number of concerns about how much confidence could be placed in the results.

The registry captured data on physician's self-report on the effect of PET on intended patient management, which occurred in 36.5 percent of scans. But there are no data following up on how often physicians actually carried out their intentions [2]. The committee also found that the data did not answer the question of whether PET scanning results led to changes in clinical care that led to improved clinical outcomes. Moreover, it was difficult to estimate the clinical utility of scanning for specific clinical scenarios because the data were aggregated by indication and not by tumor type or stage [4], and physician awareness that the results might influence future reimbursement decisions may have influenced pre- and post-test reporting. Based on the totality of evidence presented at the August 2008 meeting, MCAC members reported low confidence that PET scanning improves clinical outcomes. [3]

However, after continued pressure, CMS issued a decision memorandum in April 2009 stating that there was sufficient evidence to demonstrate that FDG-PET scanning improves patient outcomes when used for initial diagnosis and staging (or 'initial treatment strategy') of previously uncovered cancers. This marked the first time that evidence generated under a CED policy led CMS to reconsider coverage for that service. It also marked one of the rare occasions that observational data had been used to inform a coverage determination. The memo also concluded that evidence on the clinical utility of PET scanning for monitoring response to treatment and restaging ('subsequent treatment strategy') was insufficient for coverage, and CED would continue for these indications in most cancers [5]. While the initial study did not produce the results about clinical outcomes that would have been most useful to CMS, the fact that a national registry was developed as quickly as it was, and that clinicians participated in such high numbers, suggests that future, better designed efforts in this area might be useful to CMS in their decision-making process.

Evidence of Practitioners' Use of Clinical Information from CED

As of October 2009, there is no evidence on how data from the registry has affected clinical practice.

References

[1] Centers for Medicare and Medicaid Services. Decision memo for positron emission tomography (FDG) for brain, cervical, ovarian, pancreatic, small cell lung, and testicular cancers (CAG-00181N). Available online at http://www.cms.hhs.gov/mcd/viewdecisionmemo.asp?from=basket&nca_id=92218 Accessed September 23, 2009.

[2] CMS MCAC Operations and Methodology Subcommittee (Centers for Medicare and Medicaid Services: Medicare Coverage Advisory Committee Operations and Methodology Subcommittee). Process for evaluation of effectiveness and committee operations. <http://www.cms.hhs.gov/FACA/Downloads/recommendations.pdf>. Accessed October 4, 2009.

[3] Tunis SR and Whicher D. The National Oncologic PET Registry: Lessons learned for Coverage with Evidence Development. J Am Coll Radiol 2009;6:360-365.

[4] Levine MN and Julian J. Registries that show efficacy: Good but not that good. J Clin Oncol 2008;26:1-4.

[5] Centers for Medicare and Medicaid Services. Pub 100-03 Medicare national coverage determinations. Available online at <http://www.cms.hhs.gov/transmittals/downloads/R106NCD.pdf> Accessed October 1, 2009.

[6] Hillner BE, Liu D, Coleman RE, Shields AF, et al. The National Oncologic PET Registry (NOPR): Design and analysis plan. J Nucl Med 2007;48:1901-1908.

[7] Hillner BE, Siegel BA, Shields AF, Dawei L, et al. Relationship between cancer type and impact of PET and PET/CT on intended management: Findings of the National Oncologic PET Registry. J Nucl Med 2008;49:1928-1935

[8] The National Oncologic PET Registry (NOPR). Frequently asked questions. <http://www.cancerpetregistry.org/faq.htm> (accessed October 9, 2009)

IMPLANTABLE CARDIOVERTER DEFIBRILLATORS (2005)

Service

An implantable cardioverter defibrillator (ICD) is a small, battery operated electronic device that detects life-threatening tachyarrhythmia and treats it by delivering an electrical impulse. Medicare coverage for ICDs began in 1986 but was limited to patients with a history of cardiac arrest due to ventricular fibrillation. Coverage was expanded in 1999 to include documented spontaneous or induced sustained ventricular tachycardia. In 2003 and 2005, Medicare expanded coverage to include preventive use of ICDs for patients at high risk of sudden cardiac death due to positive results seen in two major multicenter studies on ICDs. The 2005 decision enacted a CED policy for patients with nonischemic dilated cardiomyopathy (NICDM), Class II and III heart failure, and measured left ventricular ejection fraction (LVEF) at or below 35 percent. The CED policy also applies to patients with ischemic dilated cardiomyopathy (ICDM) that meet the above criteria and also have a documented prior myocardial infarction (MI). [1, 2]

Rationale for CED

The second Multicenter Automatic Defibrillator Implantation Trials (MADIT-II) led to a 2003 CMS decision to expand coverage for prophylactic use in patients with a previous MI, low ejection fraction, and wide QRS interval, which is the length of time required for depolarization of the patient's ventricles. CMS reached this decision after conducting a retrospective subgroup analysis using raw MADIT-II data [2]. This analysis showed that, in patients with narrow QRS intervals, there was not a statistically significant difference in four year survival rates between patients with ICDs and those without the device. However, among patients with wide QRS intervals, patients with ICDs had a considerably higher survival rate at four years compared to those in the control group, and this difference was highly statistically significant. This use of subgroup analysis was unusual for CMS and drew criticism from industry and other stakeholders.

In 2005, another major ICD trial prompted CMS to reconsider its policy once again, this time leading to a CED policy. The SCD-HeFT was a prospective, randomized trial that tested the hypothesis that a single-lead ICD would decrease the risk of death from any cause in a broad population of patients with mild-to-moderate heart failure. The results showed the device to be very effective at reducing mortality in that population, including within the subgroups excluded from previous decisions and within patients without coronary disease.

However, both the MADIT-II and the SCD-HeFT trials showed that the devices only fire appropriately in approximately 20 percent of cases and with little indication of what predicted inappropriate firing [2]. As a result, CMS saw a need for risk-stratified studies of ICD implantations that would follow patient progress over a longer period of time. This was a factor in the decision to pursue a CED policy.

Study Application

An observational registry was chosen for this CED policy to provide ICD implantations across the Medicare population and because of the need to accumulate large amounts of data for use in subgroup and other analyses. Also, CMS was interested in identifying patient characteristics that would predict proper firing, rather than conducting a comparative clinical study. An observational study was

considered to be suitable to address this question. The NCD required submission of data from hospitals on all patients undergoing defibrillator implementation for primary prevention as a condition of coverage, and several operational criteria and specific data points for the proposed registry were listed [1].

To meet these requirements, the registry initially collected over 130 data elements at the time of initial ICD implantation, device upgrade, and device replacement. Specific data points included baseline patient characteristics, device type and characteristics, facility and provider characteristics, extent of disease progression, periodic device interrogation for firing data, and long term patient outcomes. Submission of additional data on all patients, regardless of payment source, and additional data points on Medicare patients is voluntary, although 88 percent of hospitals do so. [4]

In an effort to capture long-term outcomes data, the National ICD Registry Working Group developed plans for a longitudinal study of 3,500 Medicare beneficiaries receiving primary prevention ICDs and CMS approved the study design in May 2007. This study design was deemed necessary to fully capture data from various patient groups not previously studied in large randomized controlled trials, as well as to investigate data on device firing [4]. The Yale Center on Outcomes Research and Evaluation (CORE) conducted a feasibility study for incorporating firing data into the longitudinal study through funding from AHRQ, and final plans for doing so are currently being developed. The longitudinal study will follow patients receiving the primary prevention ICD with a primary end point of the first delivery of an appropriate ICD therapy including ICD shock or anti-tachycardia pacing. Secondary endpoints include three and five year survival rates, among other measures. Funding challenges led to delays in initiating the study, but as of October 2009 funding has been secured. [5]

Organizations Supporting the Study

The ICD registry is one of five registries that make up the National Cardiovascular Data Registry (NCDR), which is operated by the American College of Cardiology (ACC). The initial working group charged with launching the registry included the Heart Rhythm Society (HRS), ACC, the Heart Failure Society of America, manufacturers, hospital systems, and the FDA and CMS as observers [5]. Originally, manufacturers had been reluctant to support a registry and CED policy, but were compelled to serve as members of the workgroup once it was clear the CED policy was moving forward.

Start-up funding for the ICD registry came from a \$500,000 grant from Wellpoint. The registry now uses a sustainable funding model based on an annual fee of \$3,000 for participating hospitals. Additionally, the longitudinal study of 3,500 patients is being funded through \$1.5 million from the device industry, \$1 million from America's Health Insurance Plans (AHIP), and \$1.1 million from the National Institutes of Health. [4]

Initially, the ICD registry utilized an existing data submission mechanism used by hospitals to submit data to the Iowa Foundation for Medical Care (IFMC), a Medicare-contracting quality improvement organization (QIO). Data were originally captured using the ICDA (ICD Abstraction Tool) and transmitted via the Quality Network Exchange (QNet) to IFMC. However, hospital participation was low due to the fact that the QNet system required a significant amount of staff resources to report only a few data points. [K. Hewitt, personal communication]

After the registry was in place, NCDR became the data collector and manager of the registry and the Yale CORE was chosen as the data analysis center [4]. NCDR sends regular data reports back to hospitals submitting data for their own quality improvement purposes. In addition to these two groups, CMS also

has ownership of the data and can conduct its own research. Outside researchers may submit a request with NCDR to gain access to the data for their own analyses. As of July 2009, twelve abstracts have been presented, eleven manuscripts are in development, and six have been published [4].

ACC enters into use agreements with researchers seeking access to the data and a participant agreement with each institution submitting. Information that is linked with a particular patient, operator, or institution is confidential and analyzed and reported confidentially to participants for use in their own quality assurance programs. Patient and other identifiers are retained in separate files that are linked via an undecipherable key to the actual patient data records. These identifiers are kept off-line and are frequently scrubbed from the system. [K. Hewitt, personal communication]

In 2009, NCDR plans to unveil notable changes to the design and scope of the registry. The update will correct limitations of the existing data collection system by eliminating under-utilized data elements, better defining existing data elements, and providing for the submission of lead data and data on pediatric patients. These improvements will also allow the registry to function as an FDA post-market approval surveillance tool to assess lead performance. The ICD working group has been working closely with the FDA to ensure robustness of the lead data. [5]

Implementation Issues

The absence of long-term data that captures follow-up and firing data has been a major limitation in assessing outcomes, and the use of chart level data for follow-up information is seen as resource intensive and expensive for hospitals. Subsequently, AHRQ contracted with the Yale Center for Outcomes Research and Evaluation for a feasibility study on the potential to incorporate Medicare administrative claims data for 90 day complications and re-hospitalizations, including firing data. The findings of this study are to be incorporated into final design of the longitudinal study [4].

Another early implementation issue revolved around the original data submission system. The QNet system was seen as overly burdensome for hospitals, requiring a significant amount of resources for the reporting of only a small number of data points on patients. There were problems with incorrect data input at the hospitals, and the submission of data to IMFC also proved problematic. CMS officials felt that the organization simply did not have the resources and expertise to effectively collect and manage the data. [6]

Outcome of CED

As of June 2009, data on over 380,000 implants has been submitted to the registry, encompassing about 90 percent of all annual implantations in the United States [4]. While several studies have been conducted by NCDR and outside researchers on a number of topics, leading to quality improvement and a better understanding of the patient population, no changes have been made to CMS' coverage policy [4].

On the contrary, key CMS staff feel the ICD registry has made it more difficult for CMS to successfully carry out CED, due to the fact that controversy surrounding this registry prompted an opinion from the Department of Health and Human Services Office of General Counsel that CED is not authorized under §1862(a)(1)(A) of the Social Security Act [7]. Medicare's CED policy was developed to address these concerns and cites AHRQ's research authority, 1862(a)(1)(E), which has long been used to support CMS coverage decisions through the conduct of technology assessments and systematic reviews. [8]

There are important lessons learned from the implementation of this registry. It was launched quickly by starting with simple baseline data, and this platform has allowed for further development over time. The funding challenges of the longitudinal study have delayed efforts to address several key questions that were primary CMS goals for the registry, which highlights the need for identifying funding as early as possible, and perhaps even before the coverage policy is released as in the CED policy for home use of oxygen. Moreover, the voluntary submission of an expanded data set and data on non-Medicare patients may have compromised generalizability initially, although this issue has eased as more and more hospitals submit voluntary data.

Evidence of Practitioners' Use of Clinical Information from CED

While seven studies have been published using data from the registry, these studies focus mainly on characteristics of the study population and less on how the registry itself has affected clinical practice. Published studies have found that women are more likely to have mild and severe adverse events [6] and that there is little geographic difference in access to ICD implantation [7]. That study also showed that implantations by non-electrophysiologists were associated with higher complication rates than implantations by electrophysiologists [7]. Other studies have compared implantation rates across ethnic groups and other gender differences. In addition, there is anecdotal evidence that the requirement to document why an implant was required has led to more appropriate use and a decline in the number of unnecessary procedures. The implementation of the longitudinal study is seen as critical to facilitating research into how ICD implantation may affect outcomes and how outcomes may vary across specific subpopulations.

References

- [1] Centers for Medicare and Medicaid Services. NCD for Implantable Cardiac Defibrillators (20.4). Available online at http://www.cms.hhs.gov/mcd/viewncd.asp?ncd_id=20.4&ncd_version=3. Accessed September 30, 2009.
- [2] McClellan MB, Tunis SR. Medicare coverage of ICDs. *N Engl J Med* 2005;3:222-224
- [3] Zwanziger J et al. The cost effectiveness of implantable cardioverter-defibrillators. *J Am Coll Cardiol* 2006;47[11]:2310-2318
- [4] Hammill SC, Kremers MS, Kadish AH, et al. Review of the ICD registry's third year, expansion to include lead data and pediatric ICD procedures, and role for measuring performance. *Heart Rhythm* 2009 6;9:1397-1401.
- [5] Hammill DC, Kremers MS, Stevenson LW, et al. Review of the registry's second year, data collected, and plans to add lead data and pediatric ICD procedures. *Heart Rhythm* 2008;5:1359–1363
- [6] Peterson PN, Daugherty SL, Wang Y, Vidaillet HJ, Heidenreich PA, Curtis JP, Masoudi FA. Gender differences in procedure related adverse events in patients receiving implantable cardioverter defibrillator therapy. *Circulation* 2009;119:

[7] Curtis JP, Luebbert JJ, Wang Y, Rathore SS, Chen J, Heidenreich PA, Hammill SC, Lampert RI, Krumholz HM. Association of physician certification and outcomes among patients receiving an implantable cardioverter defibrillator. *JAMA* 2009;301:1661–1670.

[8] Centers for Medicare and Medicaid Services. National coverage determinations with data collection as a condition of coverage: Coverage with evidence development. 12 July 2006. Available online at http://www.cms.hhs.gov/mcd/ncpc_view_document.asp?id=8. Accessed October 3, 2009.

OFF LABEL USES OF DRUGS APPROVED FOR COLORECTAL CANCER (2005)

Service

A proposed national coverage determination (NCD) was issued in 2003 for oxaliplatin, an antineoplastic agent approved by the Food and Drug Administration (FDA) for use in combination with 5-fluorouracil (5-FU) and leucovorin in patients with colorectal cancer. The FDA approval was only for use in recurring cases and not for patients with new diagnoses, and the proposed NCD was issued to consider the off-label use of oxaliplatin. The proposed NCD was expanded several times over the following year to include off-label use of cytotoxic drug irinotecan and the biologic drugs cetuximab and bevacizumab in other cancers. These drugs were FDA-approved for use in colorectal cancer. This expansion was due to what CMS determined was a lack of available evidence on their clinical utility within drug compendia and other evidence sources for the use of these drugs for non-FDA approved indications. CMS found that no literature existed on the adjuvant use of irinotecan, the adjuvant and first-line uses of cetuximab, and the adjuvant and second-line use of bevacizumab [1]. The final decision memo, released in 2005, calls for the use of CED clinical trials to address the identified evidence gaps and generate evidence that off-label use of these drugs improves net patient outcomes [1].

Rationale for CED

At the time Medicare coverage for oxaliplatin was being considered, there was interest and concern among top CMS policy makers about the emergence of very expensive cancer drugs. This led to internal discussions about off- versus on-label indications and the opening of several new internally-generated coverage determinations. CMS found that the quality of the studies supporting off-label uses varied widely. CMS leaders decided to issue a CED policy in an effort to promote better evidence for off-label use while still providing patient access to these drugs. [2] Another goal of the CED policy was to 'encourage industry to invest in studies that will expand [the] knowledge base for patient and doctor discussions' [1] and increase Medicare enrollment in cancer trials. Because of the potentially large market affected by this policy and the revenue at stake, this policy was one of the most visible uses of CED to date.

Study Application

In January 2005, CMS released a decision to cover the off-label use of the four drugs for beneficiaries enrolling in one of nine NCI clinical trials that were already being planned or initiated. The primary criterion used by CMS and NCI to select these nine trials for CED was the likelihood they would address questions that would lead to important changes in therapy. Appropriate timing of trial activation was also a major criterion. The nine trials were a mix of phase 1, 2, and 3 trials covering a range of different cancers. While all of the studies were comparative, comparing one or more of the drugs covered under the CED policy versus more standard chemotherapy regimens, some of the studies were examining tolerated dose or dose selection, rather than the relative efficacy in improving overall patient survival. The inclusion of Phase 1 and 2 trials is notable, as CMS rarely finds evidence from that phase of drug evaluation adequate for making coverage decisions. The selection of early phase dosing studies is puzzling, as one of CMS' stated objectives for these trials was to determine the extent to which the use of these drugs would contribute to net health outcomes. Such trials cannot address this central question [2].

This CED policy made clear that local Medicare contractors would still retain their authority to provide coverage at their discretion for any of the off-label indications covered under the policy. In general, local Medicare contractors have wide discretion to determine coverage through issuing local coverage determinations. At the outset of the CED policy, several contractors had broad coverage for uses of the four drugs. As a result, enrollment in these trials was not a condition of coverage if a beneficiary lived in a jurisdiction that already had determined the use met their local criteria for being 'reasonable' and 'necessary'. [2]

Organizations Supporting the Study

The nine clinical trials were designed and are managed by a host of cancer trial cooperative research organizations, which are NCI-sponsored groups of physician-researchers representing various institutions. NCI provides funding directly to the oncology cooperatives to carry out the studies. The Eastern Cooperative Oncology is involved in five of the trials and the Southwest Oncology Group is involved in four. Other small cooperatives, such as the North Central Cancer Treatment Group and the Cancer and Leukemia Group B, have been involved in one or two trials each. CMS was not involved in the design of these trials, and has no better access to the research findings than the general public. [3]

Implementation Issues

Because the clinical trials were already in the development stages, this CED project was relatively easy to implement. Staff involved from NCI was supportive and cooperative in the process, and payment issues were easy to resolve due to CMS' ability to use existing payment codes. However, there were serious, fundamental issues related to the design and timing of these particular studies for use in generating evidence for coverage.

When the NCD was released, there was concern that the approach would not yield the evidence needed to make further coverage decisions. The choice of the nine NCI trials was opportunistic, as they were not designed to address the central question about whether the drugs are effective and safe for first line or adjunct therapy in treating off-label indications [1, 7]. In addition, the inclusion criteria for the studies, which spanned a wide age group, would likely prevent meaningful generalizability to the entire Medicare population. The generalizability of data collected in cancer trials is a broader issue that is not specific to the studies covered under this policy. Others have noted that less than 5 percent of eligible patients enter clinical trials for cancer care [5].

As is true with most oncology trials, there were delays in becoming operational due to difficulties accruing patients [3]. A 2005 study showed that Medicare reimbursement has little if any impact in increasing cancer clinical trial enrollment among the elderly [4]. In keeping with these findings, according to NCI the highest percentage of Medicare patients in any of the nine NCI trials is 37 percent, and one trial has accrued only 16 percent Medicare beneficiaries as part of its total patient cohort [3]. At least four trials have ended enrollment either permanently or temporarily due to inadequate accrual [3, 7].

The timeliness of the data for informing a coverage determination was also a major concern. In addition to a long accrual phase, several of the trials had four to five year patient follow up. The expected completion dates were five to seven years after the initiation of the CED policy, with published data not likely to be available for another one to two years beyond that. Study length is an issue for many cancer trials, particularly those that measure overall survival as a primary endpoint. This poses a dilemma

about the length of time a CED policy needs to remain in effect before a final coverage determination can be made. By the time data are made available, new, more effective therapies may already be in widespread use. [2]

Finally, the use of randomized clinical trials for CED has raised at least two ethical issues by observers. [10] First, the use of clinical trials for CED will necessarily limit coverage for the service to a selection of Medicare beneficiaries in limited geographic areas near trial sites, raising the issue of equity in access to the service. Second, the use of a randomized trial means that some beneficiaries will be randomized to a treatment arm that receives placebo or standard treatment instead of the treatment under evaluation. CMS addressed the latter issue in its 2006 CED guidance document by creating two tracks for services being considered for CED. [11] The Coverage with Study Participation (CSP) track is used for technologies deemed “promising” but in need of more evidence, a category under which this CED policy would now fall. In these cases, the “item or service is only reasonable and necessary when it is provided within a research setting where there are added safety, patient protections, monitoring, and clinical expertise. [11]”

Outcome of CED

As of September 2009, three of the nine trials are open for enrollment, four are permanently closed, and two have temporarily suspended accrual. [7] Patient accrual issues led to the closure of these studies before they were initiated.

Significantly, the selected trials were not designed to assess the overarching goal of judging the extent to which the use of these drugs would affect net patient outcomes. (*See ‘Study Application’*) In addition, the CED policy is now largely moot due for some of these drugs due to the fact that off-label indications are now listed in the compendia. Section 1861(t)(2)B(ii)(I) and (II) of the Social Security Act requires Medicare coverage for off-label uses of anticancer drugs and biologics if they are listed in compendia [9]. Moreover, now that they are mandated for coverage under the law requiring coverage after compendia listing, reconsideration based on data from the trials is not possible. [6, 9]

Evidence of Practitioners’ Use of Clinical Information from CED

For several off-label indications in these drugs, clinical practice has surpassed the desired evidence from the CED because coverage is now provided. (*See ‘Outcome of CED’*). [9]

References

[1] Centers for Medicare and Medicaid Services. Decision Memo for Anticancer Chemotherapy for Colorectal Cancer. January 2005. <http://www.cms.hhs.gov/mcd/viewdecisionmemo.asp?id=90> (accessed October 5, 2009).

[2] Carino T, Williams RD, Colbert AM and Bridger P. Medicare’s coverage of colorectal cancer drugs: A case study in evidence development and policy. *HLth Aff* 2006;25(5):1231-1239.

[3] Denicoff AM. CMS-NCI Oncology Pilot Project. July 2009. Available online at <http://www.asco.org/ASCOv2/Department%20Content/Cancer%20Policy%20and%20Clinical%20Affairs/>

Downloads/CAC%20Network%20Meeting/Denicoff_CMS-NCI_ASCOmtg_July2009.pdf. Accessed September 24, 2009.

[4] Gross CP, et al. Enrollment of older persons in cancer trials after the Medicare reimbursement policy change. *Arch Int Med* 2005;165:1514-1520.

[5] Roan S. Clinical research lacks for patients. *Los Angeles Times*, March 14, 2009. Available online at <http://8.12.42.31/2009/mar/14/science/sci-clinical-trials14>. Accessed October 11, 2009.

[6] Butcher L. Newly final CMS policy may help plans when evidence for coverage is lacking. *Biotechnology Healthcare*. December 2006.

[7] National Cancer Institute. Clinical trials covered under the Medicare anti-cancer drugs national coverage decision. January 9, 2006. Available online at <http://www.cancer.gov/clinicaltrials/developments/NCD179N>. Accessed September 30, 2009.

[8] Miller FG and Pearson SD. Coverage with evidence development ethical issues and policy implications. *Med Care* 2008;46(7):746-51

[9] Abernethy AP, Raman G, Balk EM, Hammond JM, et al. Reliability of compendia methods for off-label oncology indications. *Ann Intern Med* 2009;150(8):571-584

[10] Miller FG and Pearson SD. Coverage with evidence development ethical issues and policy implications. *Med Care* 2008;46(7):746-51

[11] Centers for Medicare & Medicaid Services. National coverage determinations with data collection as a condition of coverage: Coverage with evidence development. July 12, 2006. Available online at http://www.cms.gov/mcd/ncpc_view_document.asp?id=8. Accessed June 1, 2010.

HOME USE OF OXYGEN (2006)

Service

Long-term oxygen treatment (LTOT) is used by patients with chronic hypoxemia, or low blood oxygen, as a result of cardiac disease or chronic obstructive pulmonary disease (COPD). Oxygen saturation of hemoglobin in arterial blood and oxygen partial pressure measurements are used to determine a patient's need for supplemental oxygen, which is typically supplied via a stationary or portable oxygen tank. Since 1993, Medicare coverage had been provided for patients with severe COPD, or partial pressure measurements at or below 55 millimeters per hemoglobin (mm Hg) or oxygen saturation at or below 88 percent. The 2006 CED policy applies to patients with moderately low blood oxygen, defined as partial pressure at or above 56 mm Hg or saturation at or above 89. [1, 2]

Rationale for CED

Use of LTOT substantially increased after the 1993 coverage decision. According to CMS data, about 1 million Medicare beneficiaries were prescribed home LTOT for in 2005 at a cost of \$2.6 billion [3], with spending increasing by about 12 percent each year. The only available evidence on the effectiveness of LTOT is from two small studies conducted in the 1970s that focused primarily on patients with severe COPD. [4]

In May 2004, the National Heart, Lung, and Blood Institute (NHLBI) convened a working group of clinical researchers and staff from the CMS and AHRQ to identify and discuss evidence gaps related to LTOT, generate a list research questions that needed to be answered, and develop recommendations for the design of a randomized clinical trial [1]. The working group identified several areas in which more evidence is needed, including efficacy of LTOT in patients with certain complications, clinical and biochemical predictors of responsiveness to LTOT, and methods for enhancing adherence [2, 4]. The group recommended four randomized control trial designs to answer these research questions [2]. After this meeting, CMS, AHRQ and NHLBI collaborated to begin planning for one NHLBI-sponsored trial that would incorporate the elements from the four separate suggested trials [M. Ulrich, personal communication]. A CED policy was released in 2006 and covers patients with moderately low blood oxygen that are enrolled in the NHLBI-sponsored clinical trial.

Study Application

CMS and NHLBI worked together to develop a randomized control trial design with the objective of identifying the effectiveness of 24-hour oxygen therapy for people with COPD who have moderately low blood oxygen levels (89 to 93 percent saturation) while at rest. The design incorporated the primary recommendations from the 2004 meeting. The primary outcome of interest is four month survival, with additional secondary outcomes that include disease impact, quality-adjusted survival, quality-of-life, maintenance on nutrition, and health care utilization. Patients are randomized into either an experimental group receiving 24-hour supplemental oxygen therapy or a control group receiving no oxygen, unless the patient becomes severely hypoxemic at rest. [6]

After the release of the NCD, NHLBI sought to award contracts for study sites and a data coordinating center. Fourteen study sites received contracts for the randomized control trial, termed the Long-Term Oxygen Treatment Trial (LOTT) [5]. Several of the primary investigators awarded contracts were part of

the NHLBI working group that met in 2004. The recruitment of patients began in late 2007 and is ongoing, as of October 2009.

Organizations Supporting the Study

NHLBI is providing approximately \$28 million in funding for the research costs. Johns Hopkins University is the data coordinating center for the trial, and is charged with collecting data, managing the trial, liaising with the study sites, and analyzing the data. [5, 6] As sponsors, CMS and NHLBI will both have access to the data for their own analyses.

Implementation Issues

A pre-arrangement between CMS and NHLBI resulted in the study getting underway more quickly than in previous CED decisions and in a time frame in which the evidence is still critical, although the trial is facing patient recruitment challenges common in many clinical trials. The results of the NHLBI-initiated stakeholder meeting played a major role in the decision by CMS to pursue CED, and the study protocol and funding were guaranteed by NHLBI before the NCD was released [M. Ulrich, personal communication]. Moreover, potential principal investigators participated in the meeting and were aware of planning far ahead of NHLBI's request for applications. This is in contrast to the PET for dementia CED study, in which study design elements had been discussed but not finalized and funding from NHLBI had not been approved before the NCD's release. By the time funding was sought for that study, NHLBI was no longer interested in the research question.

Outcome of CED

As of October 2009, the trial is still recruiting patients but is on target to meet its predicted completion date in February 2013. [6] The long period of time between when the CED policy was issued and when data might be available to inform a coverage policy raises one of the concerns with using controlled clinical trials for obtaining the data necessary for CED. Clinical trials are complicated to design, and recruiting patients can be a slow and difficult process. When long-term outcomes are a primary focus, they require lengthy follow up periods. While this trial examines relatively short term (4 month) outcomes, the lengthy patient recruitment period will still result in findings being available seven years after the policy was issued.

Evidence of Practitioners' Use of Clinical Information from CED

Not available because the study is still recruiting participants.

References

[1] Centers for Medicare and Medicaid Services. NCD for home use of oxygen in approved trials. Available online at http://www.cms.hhs.gov/mcd/viewncd.asp?ncd_id=240.2.1. Accessed October 4, 2009.

[2] National Heart, Lung and Blood Institute. Long-term oxygen treatment in COPD, working group executive summary. Available online at <http://www.nhlbi.nih.gov/meetings/workshops/oxygen-rx.htm>. Accessed October 4, 2009.

[3] Lewarski J. Current Issues in Home Long Term Oxygen Therapy. American Thoracic Society, May 15, 2007. Available online at <http://www.thoracic.org/sections/chapters/thoracic-society-chapters/ca/current-news/resources/home-longterm-oxygen.pdf>. Accessed October 5, 2009.

[4] Drummond MB, Wise BA. Oxygen therapy in COPD: What do we know? *Am J Respiratory and Crit Care Med* 2006;176:321-322,

[5] National Institutes of Health. NHLBI and CMS launch large study of home oxygen therapy for COPD. Available online at <http://www.nhlbi.nih.gov/new/press/06-11-20.htm>. Accessed October 2, 2009.

[6] Clinicaltrials.gov. Effectiveness of long-term oxygen therapy in treating people with chronic obstructive pulmonary disease (The Long-term Oxygen Treatment Trial [LOTT]). Available online at <http://clinicaltrials.gov/ct2/show/NCT00692198?term=nct00692198&rank=1>. Accessed October 8, 2009.

ARTIFICIAL HEART (2008)

Service

The artificial heart is an implantable device that entirely replaces a damaged or weakened heart. The device may be used temporarily in the period following open heart surgery (post-cardiotomy) as a temporary bridge to transplant, or as destination therapy for patients requiring permanent mechanical cardiac support. Candidates for a bridge to transplant are patients approved for and awaiting heart transplantation at a heart transplant center. Destination therapy candidates are patients in need of permanent mechanical cardiac support. [1]

There are currently two FDA-approved artificial heart devices on the market. The CardioWest C-70 Total Artificial Heart, developed by SynCardia, is an implantable, pneumatic, biventricular support device that serves as a total replacement for both ventricles of the failing heart. It requires the use of external pneumatic driver equipment and was FDA-approved in 2004 for bridge to transplant use. Abiomed's AbioCor Implantable Replacement Heart is an implantable prosthetic device that performs all of the functions of the biological heart for advanced-stage heart failure (HF) patients. It is the first totally implantable artificial heart that does not require percutaneous access. The device was FDA approved for destination therapy in 2006 under the humanitarian device exemption. The 2008 CED policy provides coverage for each device for their respective FDA approved uses. [1, 4, 5]

Rationale for CED

Citing expense and lack of clinical evidence on effectiveness, CMS released a noncoverage decision in 1986 for artificial heart both as a destination therapy and as a bridge to transplant. In 1996, Medicare began providing bridge to transplant coverage for ventricular assist devices (VAD), which are implants similar to artificial hearts except that they work in tandem with a damaged heart instead of serving as a total replacement. In the years following that decision, evidence showed the device improved patient survival. Medicare coverage likely spurred further investment and technological advancement in the devices. Subsequently, in 2003 Medicare began covering VAD for destination therapy. [1]

After FDA approval and the release of positive evidence on clinical effectiveness, two artificial heart manufacturers made a formal request to CMS in 2007 to consider coverage of artificial hearts. Due to the expense of the devices and the limited evidence regarding their clinical effectiveness, diffusion of artificial heart technologies had been minimal. But given its experience with VAD, CMS saw the potential that coverage might induce further scientific advancement on implantable artificial hearts. The manufacturers were required by the FDA to conduct post-approval studies, and there was some feeling that the studies would never be completed without major additional support. CMS decided to use a CED policy to pay for the small patient populations in the post-approval studies in an effort to catalyze further development of the technology.

Study Application

It was understood when the CED policy was released that the two post-approval, market surveillance studies sponsored by the manufacturers would be the only studies included in the policy. In an effort to ensure that CMS' specific, real-world questions were answered in the trials, the decision memo includes required study questions, study design requirements, and qualifications for participating hospitals and

providers. The required study questions address patient mortality, time to device failure, effect of co-morbidities on outcomes, and the effect of the expertise within the facility on outcomes. [1]

Identification of appropriate providers to run the trial was a major consideration of CMS as the CED policy was being developed. Officials in the Coverage and Analysis Group (CAG) developed guidelines for selecting appropriate study teams and facilities for the study sites. The guidelines state that the clinical sites must be hospitals staffed with experienced cardiac teams with the capability of providing pre-operative and post-operative support and long-term care. [1]

In line with their regulatory approval, the Abiomed trial is for the use of that device as a destination therapy and the SynCardia trial is for bridge to transplant. Each met the required study design and questions laid out in the decision memo and neither uses any comparators. Both trials are quite small; the AbioCor trial enrolls fewer than 100 patients at four sites and the CardioWest trial has 81 enrollees at five clinical sites [2, 3].

Organizations Supporting the Study

The manufacturers provide funding for the research costs associated with the trials and they retain ownership of the data. In addition, each trial site uploads a smaller data set to the Interagency Registry for Mechanically Assisted Circulatory Support (InterMACS), a previously existing registry based at the University of Alabama, Birmingham that aggregates data on a range of various mechanical support devices at 98 clinical sites. This registry receives funding support from the FDA, CMS, and the National Heart, Lung, and Blood Institute (NHLBI). [4]

Implementation Issues

The use of small clinical studies for CED raises the issue of equity of access among the Medicare population [5]. These CED trials are operational at only nine hospitals nationwide, providing access to a very small percentage of Medicare beneficiaries. Because the clinical trial guidelines require ongoing care in one hospital, there is little opportunity for beneficiaries to travel from long distances to the clinical sites. However, there may be a quality benefit to beneficiaries by only allowing the service to be provided at top-tier facilities by well-trained and experienced clinicians and staff, as has been documented in other procedures. [6]

Outcome of CED

As of October 2009, both clinical trials are ongoing. Data collection is almost complete in the SynCardia bridge to transplant trial. On the other hand, the Abiomed trial for destination therapy has been slow to enroll and is behind schedule.

Evidence of Practitioners' Use of Clinical Information from CED

Not applicable.

References

[1] Centers for Medicare and Medicaid Services. Decision Memo for Artificial Hearts (CAG-00322N) <http://www.cms.hhs.gov/mcd/viewdecisionmemo.asp?from2=viewdecisionmemo.asp&id=211&> (accessed September 28, 2009).

[2] Clinicaltrials.gov. AbioCor implantable replacement heart study. <http://www.clinicaltrials.gov/ct2/show/NCT00669357?term=NCT00669357&rank=1>. Accessed September 29, 2009).

[3] Clinicaltrials.gov. SynCardia CardioWest TAH-t postmarket surveillance study. <http://www.clinicaltrials.gov/ct2/show/NCT00614510?term=NCT00614510&rank=1>. Accessed September 29, 2009.

[4] Interagency Registry for Mechanically Assisted Circulatory Support. Available online at <http://www.intermacs.org/> Accessed October 6, 2009.

[5] Miller FG and Pearson SD. Coverage with evidence development ethical issues and policy implications. *Med Care* 2008;46(7):746-51

[6] Birkmeyer JD, Siewers AE, Finlayson EV, et al. Hospital volume and surgical mortality in the United States. *NEJM* 2002;346(15): 1128-37.