Development of a Model for the Valuation of Work Relative Value Units

Objective Service Time Task Status Report

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EXECUTIVE SUMMARY

This pilot project is part of the Centers for Medicare & Medicaid Services's (CMS) efforts to address potentially misvalued services in the Medicare Physician Fee Schedule, as identified in the Affordable Care Act. It aims to develop a validation process for the relative value units (RVUs) used in the fee schedule for both new and existing services to establish payment for the work of the physician or nonphysician practitioner. One of the key elements of the project is the development of objective time estimates based on data from several physician practices, health systems, or other appropriate entities. We are attempting to collect two types of data: administrative data from electronic health records and other sources, and direct observation, in which project staff will observe and document the time it takes to provide specific services to individual patients. This status report describes that task in detail, including selection of services to be studied, identification and engagement of sites for data collection, and development of data collection protocols and tools.

The research team worked closely with CMS to identify about 100 services for the study. We considered factors in three categories:

- *Potentially misvalued services.* The Affordable Care Act identifies several categories of services that are thought to be at risk for being misvalued[1];

- *Importance to Medicare.* In addition to total spending level, services are important to Medicare for other policy reasons, including those with global periods and those serving as multiple points of comparison; and

- *Project considerations.* We need to select a mix of services that will allow us to test methods in a variety of settings, but need to limit the number of specialties that they involve because of the clinical panels that will examine the data later in the project.

Balancing these considerations, we developed a list of over 100 codes for the study. Collectively, they account for roughly 18 percent of total Medicare physician fee schedule spending. They include 29 services from CMS's list of potentially misvalued services, 71 services with global periods of 0, 10, or 90 days, and 12 services that have been used as multiple points of comparison in the development and refinement of work relative values.

For the purpose of documenting the time associated with pre-service, intra-service, and post-service elements of care, we are using the definitions of these elements that are used by the American Medical Association/Specialty Society Relative Update Committee (RUC) in creating the current service time estimates. There are some potential challenges with these definitions, however, that may affect our measures. First, they differ with regard to the amount of detail about the specific tasks included in the service. Some services have very vague descriptions while others are quite detailed. As a result, observers may not consistently attribute tasks to the

[1] The recently passed Protecting Access to Medicare Act of 2014 includes an expanded list of categories of services that may be misvalued.

pre, intra, or post period. The descriptions are also inconsistent about whether or not tasks performed by nonphysicians are included. As a result of this inconsistency, CMS has asked us to document tasks performed by both the physician and other personnel directly involved in providing the service. As a result, we have developed a data collection tool that allows observers to indicate which service elements from the RUC definitions are performed and by whom. It also allows observers to indicate that other tasks are performed as part of the service, even if they are not included in the RUC description. This approach will allow us to examine the specific elements provided and who provides them, which will help CMS understand how closely the RUC definitions relate to current service provision.

We also worked with CMS staff to develop a list of potential sites for data collection. In developing this list, we considered leaders' interest in participating in studies like this, HIT capabilities, experience with direct observation, and the mix and volume of clinical services each site provides. The process of identifying, recruiting, assessing, and engaging sites has been much more complicated than originally anticipated. We have three sites currently involved, after having approached nearly 20 potential sites. As we prepare to do onsite observation at three sites, we will continue to try to recruit additional sites.

A number of unexpected issues have been raised by potential and participating sites, from concerns over union work rules and IRB requirements to low service volumes for study services and data system limitations. In response to the specific issues at the three sites currently involved, we have modified our data collection approach. For some services in some sites, our project staff will not actually perform the direct observation in patient care areas but instead will train site staff to do the observation, and will be onsite to oversee their work. We anticipate developing site-specific data collection plans for each site to reflect both IRB and other concerns as well as each site's specific data systems and clinical organization. One issue that has come up is that the likely service volume for many of the services selected for this study appears to be lower at each study site than might have been expected based on the Medicare volume data used in the selection process.

We have developed data collection protocols for both direct observation and electronic time data. These protocols will serve both for training and for field reference. We have also developed an Access®-based data collection tool for direct observation and have developed a strategy for sites that prefer a pencil and paper approach.

At this point we are preparing for data collection at three sites, and we continue to try to engage additional sites. After we develop new objective time measures from participating sites, we will then move to the other project tasks: analyzing these new time estimates to develop alternative models of their implications for service work values; and reviewing the time data and work models with panels of physicians.

SECTION 1
BACKGROUND

This pilot project is part of CMS's efforts to address potentially misvalued services in the Medicare Physician Fee Schedule.[2] It aims to develop a validation process for the work relative value units (RVUs) used in the fee schedule for both new and existing services. It is designed to provide CMS with a process for reviewing proposed work RVUs, assessing how reasonable they are relative to external data, and assuring that the relativities within the fee schedule are internally consistent within families of services and specialties as well as across families.

Work RVUs reflect both the time it takes the clinician to provide a service and the intensity of the service (i.e., technical skill, physical effort, mental effort and judgment, and stress due to patient risk). Time is the component of the work RVU most amenable to objective measurement. Service time estimates are currently based on surveys conducted by specialty societies for the RUC. This project is focused on developing new sources of time data as a central element in our model to comprehensively validate the work RVUs for a selected set of services.

The project was designed with three key elements:

1. Obtain objective time estimates for a group of services from several physician practices or health care systems
2. Compare these objective time estimates with current fee schedule time data and develop alternative models of work values
3. Review objective time estimates and alternative work models with a series of clinical panels.

The approach to collecting objective time data was designed based on previous studies that, as summarized below, describe the types of administrative data that are available for some types of services, such as operating room logs, and the need for direct observation for other services. By acquiring administrative data and conducting direct observation at several sites, we aim to develop time estimates for each of the services selected for study. These estimates will then be compared to existing time values and work RVUs, and then provided to clinical panels for assessment. The object time data task is central to the project, and this status report describes our progress to date on this part of the project.

1.1 Developing Objective Service Time Data

The goal of the time collection task is to develop independent, objective measures of service-level times for fee schedule services. In the context of Medicare payment policy, service-level time estimates are used in two distinct ways:

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[2] A detailed description of the fee schedule's background and related policies can be found in "Medicare Program; Revisions to Payment Policies Under the Physician Fee Schedule, Clinical Laboratory Fee Schedule & Other Revisions to Part B for CY 2014" , Centers for Medicare and Medicaid Services, Federal Register, Vol. 78, No. 237, Tuesday, December 10, 2013

- They are a key input into estimating work relative value units (RVUs). Work values, defined as the time, stress, expertise, and skill required to provide a service, are highly correlated with time, which explains between 75% and 90% of RVU variation within service families.[3]

- They are used in the practice expense relative value algorithm, with specialty-specific hourly cost data.

Prior research has shown that some of the Medicare fee schedule's estimates of service time based upon surveys of physicians by specialty societies are considerably higher than estimates obtained from other data sources, such as operating room logs.[4] That is, the survey times on which both the work and practice expense relative value units are based may diverge from objective measures of service time collected through administrative systems or direct observation.

These differences may be due in part to changes that have occurred since the physician fee schedule was introduced over 20 years ago. Through the substitution of new technologies, such as mastering one-time innovative new techniques such as endoscopy, the time for a particular service may be much less than what the fee schedule work relative value units reflect. Many such services have never been restudied or validated, other than by the RUC, which uses estimates of time obtained from surveys of physicians conducted by specialty societies as part of their request for changes in work RVUs. The differences may also indicate discrepancies in the time data for other reasons.

Because of the concerns that have been raised about the time estimates in the fee schedule, several years ago MedPAC funded a study assess the feasibility of using objective time data to establish or update work RUVs.[5] The study had two key elements:

1. evaluate existing secondary databases to determine their usefulness for producing objective time estimates and
2. assess the feasibility of primary data collection.

The evaluation of secondary sources determined that none of the databases -- the Society of Thoracic Surgeons (STS), the National Surgical Quality Improvement Program (NSQIP), and four National Ambulatory Medical Care Survey (NAMCS) databases -- span all types of services or places of service. Intra-service time was most readily available for major surgical procedures

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3 Medicare Payment Advisory Commission (MedPAC), "Report to the Congress: Medicare and the Health Care Delivery System ," June 2011, p.15

4 McCall, N., Cromwell, J., Braun, P. Validation of physician survey estimates of surgical time using operating room logs. Medical Care Research and Review. 63: No. 6, 1-14, 2006

5 Braun, P. and McCall, N. Improving the Accuracy of Time in the Medical Physician Fee Schedule: Feasibility of Using Extant Data and of Collecting Primary Data. For MedPAC: 2011.

from the STS and NSQIP databases but only the NSQIP explicitly links service time to individual Current Procedural Terminology (CPT®) codes.[6] NAMCS Office provides an estimate of intra-service time for E&M services, but is not linked to CPT® codes. This review of the secondary databases suggested that primary data collection would be required for most types of services, especially office-based procedures and diagnostic tests.

To assess the feasibility of primary data collection, the study team conducted key informant interviews with five organizations that represent a broad cross-section of sites and made site visits to two large multi-specialty group practices. The primary purpose of the interviews and site visits was to determine the feasibility of obtaining objective time data from their electronic data systems and conducting parallel direct observation studies to validate the electronic data. In the key informant interviews, the following challenges were noted as was the potential for overcoming them:

- A number of organizations had gathered extensive objective data on time, most notably for major surgical procedures by extracting data from electronic or paper operating room logs, or through direct observation. However, none of the interviewed organizations collected clinical service times at the CPT® code level. There was limited concern about their ability to link clinical service times to CPT® codes regardless of data collection method.

- Clinical time is best captured for major surgical procedures with most organizations capturing intra-service time electronically, if they are affiliated with a hospital setting. Pre- and post-service times are not well captured in electronic data.

- Most of the organizations were uncertain if their electronic data systems captured specific aspects of surgical time for ambulatory surgical centers or other types of procedures such as endoscopy, radiology, cardiac catheterization laboratory. Time stamps from EHRs, scheduled appointments, or provider work schedules were offered as potential anchors for clinical time.

- None of the organizations believed they capture clinical service time for office-based procedures, such as removal of lesions.

- Total work time of a clinician and total number of clinical services provided during that time is widely available although not necessarily linked with detailed information on the specific services to allow for direct calculation of time at the CPT® code level.

Interviewees noted the potential to overcome these challenges. In addition, they believed that the potential to use electronic data systems may be far greater than their organization had used to date and warranted further evaluation. Some seemed to have little direct knowledge of

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[6] CPT® codes and descriptions are copyright 2013 American Medical Association (AMA). All rights reserved. CPT is a registered trademark of the AMA.

the full capability of their electronic systems to capture clinical service time, and in many cases not all elements of their electronic data systems had been fully implemented.

The organizations that were interviewed had varying degrees of sophistication and experience with primary data collection of clinical service time through direct observation. Top policy leadership and principal researchers within the organizations were broadly supportive of the research objectives. One system had used direct observation to collect data on office-based services for the past ten years, with direct observation ingrained in their culture. Other organizations had varying degrees of direct observation experience with varying degrees of likely acceptance from their clinical staff. These organizations often conducted direct observation within the context of system redesign to improve the flow of care for their patients and providers. Although no organization had collected time for the purpose of payment under the fee schedule, all organizations felt that primary data collection of clinical service time through direct observation was feasible given their prior experience with collection clinical service time for other purposes.

The project team concluded that it is feasible to obtain objective measures of service time using multiple methods of data collection, and that in-depth interviews were needed to more fully understand the potential capabilities of electronic data systems and the method of direct observation for a fuller assessment of the feasibility of prospective primary data collection from a cohort of practices.

Our plan builds on this previous work by trying to develop time values from both administrative data and direct observation. Time estimates from direct observation will be used to both validate and augment estimates from administrative data. We will work with study sites to determine what types of administrative data are available to develop service time estimates and to develop a plan for direct observation.

1.2 Report Overview

This report presents the details of the objective service time task, including:

- Study service selection and descriptions;
- Study site identification, recruitment, and assessment; and
- Data collection.

The next three sections address each topic in turn, describing our original approach, issues and challenges that have arisen, and how we've modified our approach to address these challenges. A final section summarizes the key issues we have encountered and the next steps for this task. The other parts of the project – analyzing the time data and conducting clinical panels – are not discussed here but, as mentioned below, the plans for those components of the project have shaped the design of the data collection task.

SECTION 2
STUDY SERVICES: SELECTION AND DESCRIPTION

Although CMS is interested in ultimately validating all work values in the Medicare fee schedule, this pilot study was designed to focus on about 100 services. This section describes the factors we considered as we developed a list of study services and how we adapted the RUC's detailed service element descriptions for use in the data collection process.

2.1 Selecting Services for Inclusion

A key decision for the project was the choice of services to be studied. This section describes the criteria that we used in selecting services and the final set of codes included in the study. Based on conversations with CMS staff, the project team went through a process of refining lists of candidate services based on three categories of criteria: potentially misvalued codes, importance to Medicare spending, and feasibility and appropriateness in the context of this project.

2.1.1 Potentially Misvalued Codes

As required by Sec. 3134 of the Affordable Care Act, HHS must periodically identify, review, and adjust values for potentially misvalued codes. The ACA specifies categories of codes that it recommends HHS focus on:

- codes (and families of codes, as appropriate) for which there has been the fastest growth;
- codes (and families of codes, as appropriate) that have experienced substantial changes in practice expenses;
- codes for new technologies or services within an appropriate period (such as 3 years) after the relative values are initially established for such codes;
- multiple codes that are frequently billed in conjunction with furnishing a single service;
- codes with low relative values, particularly those that are often billed multiple times for a single treatment;
- codes that have not been subject to review since the implementation of the RBRVS (the so-called 'Harvard-valued codes'); and
- such other codes determined to be appropriate by the Secretary of HHS.[7]

[7] U.S. Congress. Patient Protection and Affordable Care Act, H.R. 3590. Public Law 111–148. 111th Cong. (March 23, 2010). See Sec. 3134

CMS uses these categories to identify potentially misvalued codes for the RUC to review and has consolidated the misvalued codes initiative and the five-year review into an annual process.[8] This project is a direct result of Sec. 3134's requirement that CMS establish a formal process to validate RVUs.[9] We flagged as potentially misvalued those codes that were included in the list CMS developed from these ACA criteria.[10] The recently-passed Protecting Access to Medicare Act of 2014 expanded the list of categories to be considered as potentially misvalued.

In addition to these groups of codes, we discussed other groups of potentially misvalued codes with CMS, including those that have had potential changes in service time due to computerization and automation, those with relatively recent shifts in the typical site of service, services with recent changes in personnel as suggested in the direct practice expense data, and recently adopted services whose work RVUs may not yet exemplify "learning curve" efficiencies.

2.1.2 Importance to Medicare Payment Policy

We considered several Medicare-specific aspects of services while identifying study services: their importance to program spending; role of the service in the work valuation process; and services that are covered by a global period. CMS uses the fee schedule to determine payment for covered services provided by physicians and non-physician practitioners, such as podiatrists, who can bill Medicare directly. Therefore, program spending includes payments to both physicians and non-physician practitioners.[11]

First, we calculated total Medicare spending for each service and focused on those that account for significant levels of spending, either because of high volume or high expenditures. CMS data categorize services through the Healthcare Common Procedure Coding System (HCPCS), Level 1 of which is comprised of CPT® codes. We used 2011 volumes mapped to 2013 codes and RVUs to calculate each code's total work and total spending rank. For the most part, studied services are among the top 400 services when ranked by total work.

Second, services can reflect specific aspects of payment policy development that are important in the context of a project like this that aims to model work values based on new time data. Some of these considerations, like codes that retain "Harvard values", are already included

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8 Department of Health and Human Services, Centers for Medicare and Medicaid Services. 2011. "Medicare Physician Fee Schedule: Payment System Fact Sheet Series." (https://www.cms.gov/MLNProducts/downloads/MedcrePhysFeeSchedfctsht.pdf)

9 Department of Health and Human Services, Centers for Medicare and Medicaid Services, "Medicare Program; Five-Year Review of Work Relative Value Units Under the Physician Fee Schedule; Proposed Rule," 42 CFR Part 414, Federal Register vol. 76, no. 108, June 6, 2011.

10 *Federal Register*, Vol. 76, no. 228, page 73066-73067, November 28, 2011

11 Throughout the report, "provider" and "clinician" are used to refer to physicians and non-physician providers who can bill Medicare directly.

in the potentially misvalued categories. We flagged codes that were used as multiple points of comparison in the process used to establish work values, since any errors in their time (and work) values may have a cascade effect on other services' values.

Finally, as mentioned earlier, some services have a global period defined, during which additional evaluation and management (E&M) services are provided, either on the same day as the procedure or in a defined post-operative period of time. These services' work values reflect both the index service as well as these included E&M services. We recorded whether services were part of a global period and made sure that the final study service universe included a number of these codes.

2.1.3 Project Considerations

The project itself raises a number of factors that needed to be taken into consideration when selecting services. For example, we wanted to select services that would provide a range of clinical contexts in which to test our administrative and direct observation data acquisition approaches. At the same time, we needed to limit the number of specialties encompassed by the universe of study services, so that we can cover them with a manageable number of clinical panels later in the project. We will rely on single-specialty panels, reflecting the specialty most likely to provide these services, to validate and begin work on extrapolation to other services within the same family. As a result, we did not include some services that met several of the other criteria but were provided by a specialty that does not provide other candidate study services. We also included some services that are commonly provided by more than one specialty, permitting us to examine inter-specialty variation in time estimates.

Project constraints also led us to exclude certain services that may merit study in a subsequent project. Most importantly, we have not included E&M services in this pilot study of methods for collecting time data, even though collection of time data on E&M services is important for several reasons. Stand-alone E&M services comprise more than 40 percent of the spending under the MPFS Although studies suggest that there may be time errors in E&M services, the issues associated with determining empirically derived times for E&M services are different and, in some ways, more complex than those posed by obtaining objective time data for procedures, imaging, and tests. E&M services are unique, complex, and important enough to justify a separate and detailed examination of the time issues associated with these services.

We also excluded services that are performed primarily by nonphysician practitioners and those that present unique data acquisition problems, such as Moh's surgery, radiation therapy, and chemotherapy. In the case of Moh's surgery, for example, the fact that the patient waits for a pathologist's report between surgical steps makes direct observation infeasible.

2.1.4 Final Study Services

The final group of study services that we arrived at represents a broad range of non-E&M services that vary across the characteristics listed above. These services permit a broad test of the ability to use administrative data systems efficiently to contribute reliable time data and of the ability to determine service time by direct observation. As a group, they represent spending of nearly $15 billion, or about 17 percent of total Medicare fee schedule spending in 2011.

As shown in Table 1, the study services represent a broad range of work RVU and service time values, with a median of 2.87 work RVUs and 30 minutes of intra-service time. They include 29 services from CMS's list of potentially misvalued services, 71 services with global periods of 0, 10, or 90 days, and 12 services that have been used as multiple points of comparison. Table 2 below summarizes the services; see Appendix A for list of all study services with description and Appendix B for work RVU, current time values, and other characteristics of each service.

Table 1
Distribution of Study Services' Work RVUs and Service Times

Distributional Properties	Work RVUs	Intra Time (mins)	Total Time (mins)
Minimum Value	0.07	2	2
1st Quartile	0.87	15	25
Median	2.87	30	65
3rd Quartile	12.56	90	236
Maximum Value	50.93	259	913

Table 2
Study Service Types, with Number of Individual Codes

Type of Service	Number study codes
CPT® 10000-19999	
Debridement	1
Paring or cutting lesions	2
Biopsy skin	2
Destruction, benign or premalignant lesions	4
Destruction, malignant lesions	3
CPT® 20000-29999	
Injection tendons, trigger points	1
Arthrocentesis	2
Arthrodesis	4
Spinal Instrumentation	4
Repair rotator cuff, open	1
Shoulder joint reconstruction	1
Hip reconstruction	2
Treat hip fracture	3
Knee arthroplasty	1
Arthroplasty shoulder	1

(continued)

Table 2 (continued)
Study Service Types, with Number of Individual Codes

Type of Service	Number study codes
CPT® 30000-39999	
Pacemaker insertions	2
Cardiac valve procedures	2
Coronary artery surgery	4
Thromboendarterectomy	1
CPT® 40000-49999	
UGI endoscopy (excluding ERCP)	2
Resection small bowel	1
Colectomy	4
Laparoscopy, small and large bowl surgery	3
Colonoscopy	5
Laparoscopic liver and gall bladder procedures	2
Repair inguinal hernia	1
Lithotripsy	1
CPT® 50000-59999	
Cystourethroscopy procedures of urethra and bladder	3
Cystourethroscopy prostate	1
Biopsy prostate	1
Laparoscopic radical prostatectomy	1
CPT® 60000-69999	1
Decompression lumbar spine	
Injection epidural lumbar or sacral	1
Discission membranous cataract by laser	1
Lens procedures	2
Intravitreal eye injection	1
Destruction retina or choroid	2
CPT® 70000-79999	1
CT head	
CT face	1
MRI brain	2
Chest, thorax plain x-rays	2
CT thorax	2
CT angiography non-coronary	1
MRI spine	4
CT abdomen and pelvis	3

(continued)

Table 2 (continued)
Study Service Types, with Number of Individual Codes

Type of Service	Number study codes
DXA bone density	1
Myocardial perfusion imaging	1
Surgical pathology	3
CPT® 80000-89999 Special stains	1
Pathology consultation during surgery	1
Immunohistochemistry	1
CPT® 90000-99999 Opthalmic computerized scanning	2
Audiometry	1
Coronary revascularization	3
Electrocardiogram	2
Cardiovascular stress test	3
Transthoracic echocardiography	1
Cardiac catheterization	3
Cerebrovascular arterial studies	1
Injection, SQ or IM	1
HCPCS "G Codes" Mammography	3

2.2 Describing Service Elements for Data Collection

The goal of the time collection task is to develop independent, objective measures of service-level times. Services are considered to have three distinct parts – pre-service, intra-service, and post-service. In general, the intensity of intra-service tasks is higher than that of pre-service and post-service tasks. As a result, the data collection task was designed to allow for collecting time associated with each of the three parts separately.

2.2.1 Pre-service, Intra-service, and Post-Service Definitions for Individual Services

The RUC maintains a database for each CPT® code that includes detailed descriptions of the elements of the pre-service, intra-service, and post-service parts of each service. This information is used as part of the work valuation process. For comparability with current values and to take advantage of these existing definitions, we intend to use them as the basis for our analysis of administrative time data and for direct observation. This section describes these data and how they were adapted for use in this project.

The RUC descriptions of pre, intra, and post service elements have some inconsistencies that present potential challenges for the project: level of detail, inclusion (or not) of non-practitioner tasks, and in which part of the service (pre, intra, or post) specific tasks are placed. While we discuss the implications of these factors for the direct observation task, all three are also likely to affect practitioners who respond to the RUC surveys.

With regard to level of detail, some definitions include many very specific details in the description of intra-service work while others are fairly general. This difference in specificity may have two different implications on time measurement. First, the chance that time for a specific task is included in estimates of either pre-, intra-, or post-time by some observers and in a different part by another observer may be higher for those services with relatively vague, broad descriptions. To the extent that the descriptions reflect a clear, discernable delineation between the three parts, this may not be a problem. As mentioned, work intensity is thought to vary across the three different parts, so attributing tasks to the correct part of the service is important and could affect work values. The second issue is that, from a cognitive processing perspective, observers may assume that codes with more tasks detailed in the description take longer than those with fewer tasks. As a result, the differing level of detail may be a source of bias. If two codes have roughly similar key elements and take the same amount of time, the code with the longer, detailed list of elements could be perceived as taking longer. This is likely a bigger problem for the current survey data than this project's direct observation, where objective measurement should help insulate from potential cognitive bias.

Another inconsistency is the inclusion (or not) of tasks performed by non-practitioner providers in the definition of pre-service, intra-service, and post-service elements, and lack of clarity of who performs what tasks. For example, Audiometry (CPT® 92557) has the following intra-service description:

> The patient is seated in the booth, headphones placed and the test explained. The ear canals are checked for obstruction. Each ear is tested at 250Hz, 500Hz, 1000Hz, 2000Hz, 4000Hz and 8000Hz for air conduction and bone conduction with masking as indicated. Speech reception threshold and speech discrimination is then determined for each ear using a forty word list.

The tasks described are all usually performed by a technician, not a clinician, and the one task – test interpretation – that is done by the clinician is not mentioned. There is no mention in the description of who is performing each task.

The service has intra-service time of 20 minutes recorded in the fee schedule time file, raising the question of whether there are other tasks involved that are not listed here.

Conversely, the intra-service description of Ophthalmic Computerized Scanning (CPT® 92133) includes detail about both the technologist's and practitioner's tasks:

> The scanning head is aligned with the eye to be examined and the other eye instructed to follow a fixation light in order to bring the optic nerve of the eye being examined into position. Focus and brightness are then properly adjusted. Three scans are obtained. Once the images have been processed by the computer, and examined for quality by the

> physician, they are stored to the hard disc cache. A mean image is displayed and the operator uses the computer pointing device to mark the edge of the optic nerve allowing determination of nerve fiber layer parameters and comparison of the age-corrected normative database. The mean image is then stored to the disc. A printout is then obtained. The physician then evaluates the printouts for the quality of the study, interpretation of the printed data looking for areas of nerve fiber layer loss, significance of differences form the normal database and the clinical correlation with the patient's other data. If the current study is a follow-up of a previous one, evaluation and change over time and correlation with the new clinical course is done. A report is dictated.

At the other extreme, the intra-service description of Therapeutic, Prophylactic, or Diagnostic Injection (CPT® 96372) says in its entirety:

> Physician provides direct supervision and is immediately available in office. Physician assesses patient's response to treatment.

Like the level of detail discussed above, the inclusion of many tasks not provided by the physician may lead physicians to overstate time in a survey, but this effect should be minimized with objective measurement. However, general or vague descriptions raise the possibility that tasks are misallocated among the three parts of the service during direct observation.

The lack of clarity about who does what led the research team to include technician and other personnel time, as feasible, in the direct observation exercise, in addition to practitioner time. This time is presumably included in the clinical labor measures in the Direct Practice Expense Input (DPEI) database, used to calculate practice expense relative values. As a result, we modified our data collection to allow us to capture all time aspects of the service, regardless of who performs them.

A final inconsistency across services is in which part of the service specific tasks are included. For example, chart and history review is typically included as pre-service work, but for pathology tissue exam (CPT® 88309) this review is included as intra-service elements. Similarly, report preparation or dictation is typically included as an intra-service element but several services (e.g., ECG Complete (CPT® 93000) and ECG Report (CPT® 93010), among others) include this as post-service. This may be substantively appropriate or it may reflect different decisions made by different specialty societies when they develop these data elements to survey their members. In either case, this may be confusing to service observers, since there's a strong norm that they have to remember to 'override' for these exceptions. We will emphasize this in our training to try to minimize this potential problem. While maintaining these exceptions for this study will allow us to develop time estimates that are directly comparable to those currently in use, it means that we cannot develop new estimates if it is subsequently determined that these elements should always be in the same part of the service. Since we are not recording times for each individual element of each part of the pre-, intra-, and post- service time, it will not be feasible to examine the effect of 'moving' an element, such as report preparation for ECG Report (CPT® 93010), from post-service to intra-service.

2.2.2 Adapting the Definitions for this Project

When available, we will use the pre-service, intra-service, and post-service definitions from the RUC database for planning and training purposes and to aid in direct observation. For 23 study services (including "G codes") without available descriptions of pre, intra, and post elements, we adapted them from closely related services, e.g., with biopsy descriptions adapted from closely related biopsy services, CT descriptions from closely related CT services, and so forth. There are four services with no definitions available or adapted from related services and so have no elements listed in the data collection tool.

The RUC definitions will be used for planning and training, Onsite direct observation, however, will require a data collection tool, but these definitions are too long for inclusion in the project's data collection tool. As a result, we developed short versions of the descriptions primarily by stripping unnecessary adjectives and adverbs and using consistent abbreviations for common words (e.g., 'phy' for 'physician'). Table 3 shows the original and short descriptions for the elements of CT of the Head/Brain (CPT® 70450). The shortened descriptions are included in the electronic data collection tool but observers will be trained with the original RUC descriptions and will rely on the short ones simply as prompts during data collection. The short definitions developed for services to be observed in the first several sites are included in Appendix C.

Table 3
Original and Short Descriptions of Service Elements of CT of the Head/Brain (CPT® 70450)

Component of Time	Original RUC Description	Short Description for Data Collection Tool
Pre-Service	Review the reason for the exam and any pertinent clinical history. Review any prior imaging studies. Determine the appropriate CT protocol for the examination, confirm that non-contrast only images are indicated and determine the need for prone imaging and additional 2D reconstructions. Communicate protocol to the CT technologists.	1. Review reason for exam. 2. Review clinical history. 3. Review prior studies. 4. Determine CT protocol. 5. Confirm non-contrast only indicated. 6. Determine need for additional views. 7. Communicate protocol to technologists.

(continued)

Table 3 (continued)
Original and Short Descriptions of Service Elements of CT of the Head/Brain
(CPT® 70450)

Component of Time	Original RUC Description	Short Description for Data Collection Tool
Intra-Service	Supervise acquisition of scout views, prescribe area of coverage and supervise acquisition of axial source image sections. Review initial and subsequent series of CT image data to assure adequacy of anatomic coverage and assess need for repeat sections or reconstruction of thin sections in specific locations. Supervise reconstruction of coronal and/or sagittal 2D multiplanar reformatted (MPR) images; assess need for oblique or other 2D images. Evaluate and interpret findings related to head/brain. Compare current findings to previous studies. Dictate report for medical record.	1. Supervise acquisition of scout views. 2. Prescribe coverage area. 3. Supervise acq of axial image. 4. Review adequacy of coverage. 5. Assess need for repeat sections. 6. Supervise reconstruction of MPR images. 7. Assess need for other 2D images. 8. Interpret findings. 9. Compare to previous studies. 10. Dictate report.
Post-Service	Review, edit, and sign report for medical record. Discuss findings with referring physicians.	1. Review, edit, sign report. 2. Discuss findings with referring phys.

One issue we cannot address is whether or not the RUC definitions apply to current practice. During preliminary site visits, the project team observed multiple non-practitioner staff performing work tasks as defined by the RUC, most notably in the pre-service component. In discussions with clinical leaders, all three sites voiced the perception that the clinical processes of care have changed over time and that now most staff work at the top of their license. For example, during Skin Biopsy (CPT® 11100), the technician or nurse may perform certain elements of pre-service work, such as preparing instruments and taking vital signs, while the physician or physician assistant (PA) will administer anesthesia. The physician then performs all intra-service work tasks, i.e., debridement, but a PA applies the dressing. In the post-service period, the nurse may perform elements of post-service work, such as providing instructions on wound or home care, and discussion of follow-up activities, while the physician will complete the medical record and communicate with the primary physician if necessary.

Thus, there may be substantial work performed by medical assistants, LPNs or RNs that are included by the RUC as work in these descriptions. In fact, some clinical leaders at sites we visited stated that for some services, physician activities listed by the RUC are not performed by

physicians. Since we are recording, to the extent feasible, who is performing what tasks within a service, we may be able to analyze the extent to which this occurs. This information may be helpful to the practice expense relative value process, which accounts for the non-practitioner clinical labor costs of each service.

2.2.3 Implications for Data Collection and Analysis

As a result of variability in the RUC descriptions of pre, intra, and post service elements, we have developed a data collection tool that allows the observer to indicate what elements are being performed during the recorded period and who is doing them. The RUC descriptions are included in the training materials for observers so they are aware of the elements that they are likely to observe, and the data collection tool includes a list of these elements – shortened – for each service. By allowing the observer to verify expected items and add additional items, we will be able to analyze the extent to which the RUC definitions – both what elements are performed and who performs them -- conform to service delivery in practices where direct observation data are collected.

We will compare the pre-service, intra-service, and post-service time values from the direct observation and, as feasible, from administrative data, with current time values, and we will examine the mix of tasks included in each to see whether there are elements in the RUC definition not performed or elements performed not included in the definition. It may also be feasible to test the hypothesis suggested above that detailed descriptions affect time values, particularly when obtained by survey.

SECTION 3
STUDY SITES: IDENTIFICATION, RECRUITMENT, ASSESSMENT, AND ENGAGEMENT

Identifying and securing practices to serve as data collection sites has proved to be more complicated and challenging than anticipated based on prior research. This section describes each step in that process.

3.1 Identifying Potential Sites

To produce objective time estimates in a timely manner necessitated that we take a purposive sampling approach with the intention of identifying sites broadly representative of physician practices. We developed important attributes for our study partners and evaluated more than two dozen potential candidates based on these criteria:

- Leadership: Known to be interested in participating in projects of this type or otherwise accessible to project staff
- HIT system: Has strong system that is well integrated with clinical practice
- Direct observation: Experienced with observation; has facilities amenable to observation
- Clinical services: Include specialties represented by study services; sufficient volumes for observation over a several day period

Project staff initially compiled a list of possible entities based on these various factors. To promote participation by a broad cross-section of practice, project leadership also contacted the a professional association for their input on possible study sites. The association circulated a brief description of the study to its membership generating additional entities for consideration. When identifying possible study participants, the project team also aimed for diversity in geography, primary insurance payment arrangement (capitation versus fee-for-service (FFS)), dominant provider compensation models (salary versus productivity), and setting type (community v. academic). Six entities were initially selected jointly by project staff and CMS to be contacted regarding participation in the study. Subsequently, we expanded the potential list with the desire to identify up to eight study partners and sought recommendations for study participation from the National Association of Accountable Care Organizations.

3.2 Recruiting Sites

Concurrent with initial site selection, the project team developed recruitment materials that included a summary document providing background information on physician time, a brief overview of the study, and a list of the targeted services for which the team sought physician time. (Appendix D) Senior team leaders contacted potential sites by phone or email, and forwarded recruitment documents by email. If the site wished further information or expressed a willingness to proceed, the team scheduled a call to review eligibility criteria and discuss the project in more detail. For the initial call(s), we sought participation from both clinical leadership and health information leadership.

Sites interested in proceeding after this initial call were then sent a second set of recruitment materials: a detailed health information technology (HIT) worksheet and a set of HIT questions to assist the team in collecting more detailed information on the volume of services provided by the system as well as to better understand the sources of electronic data and the components of time that may be captured electronically.

Our goal was to recruit up to eight sites participate in the study. At this point, the project team has made an initial recruitment contact with nearly 20 potential sites. Three are moving forward as study participants. Recruitment for additional study partners continues. This rest of this section describes some of the key recruitment challenges encountered by the project team.

Of the entities that have not moved forward to study participation, a number of themes emerged for non-participation:

- **Non-response.** After initial expression of interest, a number of organizations did not respond to follow-up email or telephone contact. It seems as though, in these cases, the original contact who wanted to participate in the study was unable to generate internal interest.

- **Pre-existing HIT staff commitments.** In a number of sites, clinical leadership were very supportive of participating in the study but subsequent engagement of the Chief Information Officer or other senior leaders with responsibility for implementing and maintaining internal health information systems revealed pre-existing demands of HIT staff that precluded participation. Several potential sites cited meeting Meaningful Use requirements and ICD-9 to ICD-10 conversion as major ongoing activities that make it impossible for them to commit to this project. These two activities were in addition to other internal projects, such as an enterprise-wide electronic medical record upgrade or moving clinical departments from paper records to the system's electronic systems.

- **Obtaining physician buy-in**. Several organizations expressed initial interest but, after learning more about the study and in particular the need to gain support across many clinical departments, declined to participate. Most notable were organizations that do not employ physicians. Senior clinical leaders felt that gaining support of private-practice physicians would be an enormous logistical and potential political challenge. Organizations with employed physicians were in a better position to garner broad clinical support.

- **Other reasons**. A number of sites had unique reasons for non-participation. For example, one organization declined participation at the request of their legal department because of institutional risk in light of an ongoing legal review. And, although we promised anonymity, another expressed concern about being publically associated with the project and the potential negative reaction of clinical staff to a project that could be perceived as leading to fee reductions.

3.3 Assessing Sites

As we worked to gain site participation, we needed to ensure the site's appropriateness for the study. Our first focus was to evaluate information on volumes for the selected set of codes, HIT currently used by the site, and capabilities and experience with direct observation of clinical services. However, the process of obtaining volumes was difficult and lengthy for several of the sites. One challenge is that their data systems do not include a CPT® code among the captured fields, so it's difficult for them to determine volumes for study codes. Thus, these sites had to extract volume counts from their systems based on narrative descriptions or their own internal small procedure classification system.

For direct observation capabilities, we asked the sites to briefly explain their direct observation methods and describe any direct observation studies previously conducted for any of the selected study services or closely related services. We also discussed with them their willingness to participate in a joint site/research direct observation data collection effort involving both clinical and HIT direct observation activities. Practically, direct observation hinges on space, work flow, and clinical staff engagement.

Since time data from HIT systems is such a critical component of this study and because we know from prior work that administrative and clinical functionality in HIT systems have typically not been developed with the intent of collecting time data for clinical services, the project team had planned to conduct a one-day exploratory meeting with HIT staff at each of the potential sites, either in person or remotely. We had planned for a project team HIT expert to attend the meetings with the sites' HIT staff, which were designed to build relationships with the CIO and HIT staff, explain in more detail the intent of the HIT component of the study, and document the capabilities of each study partner's HIT system(s) related to capturing time estimates for targeted services. This information serves as the basis for the development of a site-specific HIT data collection protocol for each study partner.

Based on preliminary discussions with a number of the sites, we decided that a more in-depth review of each site's electronic data systems in conjunction with clinical leaders was necessary to better understand the processes of care within their system and the linkages between the provision of a service and the time data that would be captured within their electronic data systems. As a result, for each of the three current participating sites, we have conducted 2-day site visits with a full complement of senior project staff and site staff that included senior leadership, heads of clinical departments, operations directors of clinical departments, and health information specialists.

Although the format differed across the three sites, the general approach was consistent. We systematically reviewed each of the service areas with clinical and HIT staff to confirm typical volumes of services, what time data would be collected by what system, and strengths and limitations of the electronic time data to reflect actual clinical service time. We also discussed the flow of care within each site and the degree to which non-physician staff provided care that had previously been defined by the RUC as work. Clinical leadership shared their perceptions of how accurate the electronic data would be within their clinical service and how well would their electronic time records capture the three individual components of time (i.e., pre-, intra- and post-service) and interruptions within each of the components. The sites

confirmed that it was feasible to capture time data for the codes of interest from the sites' HIT system(s), for those services for which the site had electronic data. Each site visit concluded with an in-depth discussion of organizational requirements for the conduct of the study at that site and logistical next steps.

3.4 Engaging Sites

From identifying candidate sites through planning site visits, the process of engaging sites has been much more time consuming and challenging than anticipated. Even after a site has fully committed to participating, we have had to go through a number of additional steps to fully engage each site. These may reflect the likely challenges that will be faced with other potential study partners given the nature of this study, which requires considerable buy-in from a large number of departments within the organization or across a distributed network of providers and the desire to conduct research in the clinical areas with direct observation of patient care. Some of the key challenges to engaging sites include:

- **Timing for effective engagement of a large number of key stakeholders.** It took a considerable amount of time for the sites (both participating and ultimately non-participating organizations) to identify and communicate with key stakeholders in their organizations. Staff vacations during the months of July and August when recruitment activities were at a peak at a number of the sites were a factor. Not unexpectedly, schedule demands of busy key contacts (chief medical officer, chief information officer, chief finance officer, department chairs, etc.) were also a factor; however, it was only necessary to have the primary point of contact be a very senior member of the organizational leadership team until sufficiently broad buy-in had occurred. At that point, it became possible to identify a less senior person to be the primary contact who would have the time for ongoing communication with the project team as well as time to devote to efforts in moving the project forward (such as identify applicable IRB requirements and processes), coordinate data gathering, plan pilot visits, ongoing communication, etc.

- **Competing organizational priorities.** Not unexpectedly**,** there are many competing demands of staff that are required to be active participants in this study. In addition to the issues noted above, preparation for provisions of the Affordable Care Act's implementation, such as the new insurance marketplaces, presented challenges that limited active engagement of the HIT department at the outset for one organization in particular.

- **Completion of the HIT worksheet proved challenging.** As originally envisioned, potential study partners were asked to complete the HIT spreadsheet which was designed to collect estimates of the typical number of services provided per week for each of the study codes as well as to better understand the sources of electronic data and the components of time that may be captured electronically. For most sites, this request proved to be challenging because our main points of contact were typically clinical staff. We found that if volume estimates were obtained from clinical systems, in contrast to billing systems, the services were often not defined by CPT® code but by narrative descriptions or internally developed service codes. Thus, there was not

always a good crosswalk between the institution's definition and the CPT® code definition. This led to very low reported volume for the targeted codes, and hindered primary data collection planning. In addition, the organizations had to do considerable work to provide the volume estimates. Future efforts to obtain service-level volumes for specific services should involve the billing offices at a much earlier stage.

We also encountered difficulties in obtaining detailed information on the sources of electronic time data and elements of time captured by electronic data systems within the organizations. Although efforts were made to provide the information, often the information provided was too generic, such as the name of the EMR. This led us to conclude that we needed to make in-person site visits to each potential study partner to meet in person with the cadre of staff that has responsibility for and a deep understanding of the capabilities and limitations of their electronic data systems to provide the necessary elements of time. Further, we found that it was also necessary to jointly review the electronic data systems with clinical staff from each site to fully understand how the processes of care would be captured electronically and what limitations might exist from a clinical service perspective.

- **Organizational requirements for conducting the study in patient care areas.** Although RTI's IRB found that this study is exempt [45CFR46.101(b)] from IRB review based upon a category 5 reason[12], all study partners needed to go through their own IRB process. In many cases, these were lengthy and time-consuming, requiring substantial input from the project team (responding to questions, reviewing multiple drafts) and numerous revisions by staff at the site in response to questions from their respective IRBs. One study partner has completed the IRB process and a second is complete pending the signature of the IRB Chairman. Both processes took approximately five months. The third site is seeking an expedited IRB review and the process is ongoing. During the IRB process at one organization, it was determined that both patient and physician consent would be required thereby necessitating the development of a more elaborate primary data collection plan for that organization to ensure compliance with the IRB.

  Throughout the recruitment and engagement processes, we encountered a number of additional requirements at each site that had to be dealt with before project staff would be able to conduct onsite direct observation. One organization required Collaborative Institutional Training Initiative (CITI) training *prior to* IRB approval. Another organization's IRB ruled that project staff could not directly observe patient care, which led us to redesign direct observation data collection plan limiting the

[12] Specifically, Category 5 includes: "Research and demonstration projects which are conducted by or subject to the approval of Department or Agency heads, and which are designed to study, evaluate, or otherwise examine: (i) Public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs."

project team's role to observing services such interpretation of radiology services and clinical pathology services and training site staff to observe other services. One site also required negotiations with the nurses union to allow direct observers on site. Other organizations have fitness for duty requirements that include evidence of immunizations, criminal background checks, attending a 40-hour new employee training, credentialing for staff that have professional licenses, (e.g., M.D., R.N.), and other requirements. We have been able to develop strategies to address these various requirements. For example, limiting on-site hours to less than 40 reduced some of the requirements and limiting the direct observation staff to non-medical professionals negated the need to go through the lengthy credentialing process without compromising the integrity of the data collection process

SECTION 4
DATA COLLECTION

Once all necessary paperwork (IRB, contracts, etc.) is in place, we will either do direct observation on site or train staff to do the observation. This section describes the actual data collection process.

4.1 Data Collection Overview

We will do direct observation for services that have no electronic data available and for services that do. The primary purpose for parallel HIT and direct observation for some services is to determine if the HIT times are validated or need to be modified to account for interruptions. As necessary, we will calculate an allocation algorithm across a group of services to reconcile electronic measures to those obtained through direct observation. Our intent is to develop a ratio for other services in the same small clinical family based those services that we do observe. So, for example, if we observe colonoscopy with polyp removal and we do not observe colonoscopy without polyp removal but sites provide electronic time for both, then we would use the ratio of HIT time to direct observation time for the first service to adjust the HIT time for the second service to develop a measure comparable to those obtained through direct observation. We will perform fewer direct observations for services with electronic data than for the services for which no HIT time is available, to leverage project resources as effectively as possible across study services.

We are finalizing the data collection plans for the current three study sites. Based upon volume statistics provided by the three sites, it is likely that the number of services for which we can conduct direct observation during a one-week timeframe may be very small. In general, the volumes of study services at sites we will observe are lower than we had originally anticipated. These lower-than-expected volumes may result in small samples of time observations that could make some of the study's time estimates less robust than intended. As noted above, in some sites we will have to rely on site staff to do the direct observation for many services. In these instances, project staff will train the data collectors and then observe them at work, where feasible.

The general approach to finalizing the data collection plan is to (1) identify the one-week data collection period, (2) review upcoming appointments for the selected study procedures through the site's scheduling software, (3) determine the services for which direct observation only will be conducted versus direct observation validation of electronic data, (4) assign project staff or site staff for the direct observation of services, and (5) coordinate the receipt of the electronic time data for the observed services. For radiology and pathology services that do not involve direct patient care, project staff will be assigned a window of time to observe the selected services in each of those departments, rather than specific patient appointments.

4.2 Development of Study Protocols

We have developed two data collection protocols reflecting lessons learned from the first three site visits: one for direct observation data collection (Appendix E) and one for the collection of HIT data (Appendix F). Each data collection protocol is being modified to reflect the individual features of electronic data or care processes within the participating sites. To the

extent possible, we will seek to have consistency in collection of data across the sites recognizing that there are unique aspects within each. The detailed information gathered from the pre-implementation conference calls and site visits is being used to tailor the general HIT protocol to each system and will allow us to understand where differences in collected time may arise due to system differences. The HIT protocol specifies the administrative, clinical or EHR systems that store time data and the components of time that we will capture (i.e., intra-service, pre- and post-time, total time). The HIT protocol will also detail what will take place during the HIT observation component of the primary data collection phase. The draft protocols are being shared with each of the sites and a one-on-one conference call will be held with appropriate HIT staff to review and finalize.

A second data collection protocol has been developed to conduct the direct observation studies. We have held numerous conversations with the study partners to discuss how the organization will gain participation from each of the necessary clinical services, the number of direct observations that will be required for each service, logistical considerations, and their procedures for conducting direct observations. Using this information, draft data collection protocols have been developed incorporating, to the extent possible, validated direct observation methods from each of the systems or building a "best practices" approach to direct observation should a site have limited experience. We are working with the sites to identify and minimize in the protocol potential observer (Hawthorne effect), clinical (clinician's number of years in practice), or environment (service volume or day of week) confounding factors that may influence the observed time. Lastly, the protocols will specify the procedures that will be used to obtain permission from all clinicians and patients that will be observed, if required by a site's IRB. The draft clinical protocols will be shared with each of the sites and a one-on-one conference call will be held with appropriate clinical staff to review and finalize.

As part of the direct observation protocol development, we developed a uniform data collection Microsoft Access® database. As originally envisioned the team planned to start with the publicly available Time and Motion Study Tool: Ambulatory Practice (TMS-AP), Version 1.0 database that was developed by Partners Healthcare System with a grant from the Agency for Healthcare Research and Quality (AHRQ). The AHRQ/Partners tool can be run on a laptop and had been used successfully in a prior collection of physician work time.[13] However, as development of the protocol proceeded, it became apparent that the AHRQ/Partners tool was unsuited to project needs. For example, it was not designed to capture pre-, intra- and post-service time, interruptions, and note special circumstances expediently.

The project team then evaluated Excel® and Access®-based tools that were more closely suited project needs. Advantages of these tools included:

- Recording of pre-, intra- and post-service time
- Documentation of interruptions

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[13] Pizziferri L, Kittler AF, Volk LA, Honour MM, Gupta S, Wang S, Wang T, Lippincott M, Li Q, Bates DW. Primary care physician time utilization before and after implementation of an electronic health record: A time-motion study. J Biomed Inform. 2005 Jun;38(3):176-88. Epub 2004 Dec 14.

- Documentation of non-physician providers
- Automatically computes duration of time components and total time
- Permits immediate correction of input errors

There were drawbacks to the Excel®-based tool, including time delays in moving from one section of the tool to another in order to record interruptions and notes. Another was that the tool could not be used for paper data collection, a requirement of some study partner's staff who felt they were not facile enough to use an electronic data collection tool. The most significant drawback of the Excel®-based tool was the inability to capture the performance of specific elements involved in each component of time, as well as the provider type performing the task.

After initial pilot visits to two sites, the project team agreed that we needed a tool that could also capture the performance of those elements that differ by CPT® code, as well as the provider type performing the element/task as discussed above in Section 2. The final Access®-based tool we created is similar in concept to the AHRQ/Partners tool but has the capability to capture this level of detail and has the following features:

- Electronic or paper recording of observation
- Edit or delete observation
- Manual entry for paper recordings
- Capture time and description of interruptions
- Record time for multiple providers and provider description (physician, nurse practitioner, physician assistant, registered nurse, technician, licensed practical nurse, medical assistant, other), as well as the elements/tasks specific to the components (pre-, intra- and post-service), of each service.

Additionally, the tool permits output of the data in Excel® or tab delimited flat file, all data, by date or session, and prints quality assurance (QA) reports. The tool is described in Appendix E.

4.3 Direct Observation Approach

As described above, all data sites have or are in the process of attaining IRB approval. Once IRB and other administrative steps are complete, we will schedule a week for data collection at each site. This section describes the data collection process.

During primary data collection, clinical time data will be directly inputted into laptops that will be both encrypted and password protected, or directly entered at the end of day if paper and pencil time data were obtained. No personal identifying information of either the clinician or patient will be maintained in the time database; rather an encrypted identifier will be used for patient and service identification and a log will be maintained by each of the sites to ensure

correct linking of electronic time to the observed time. Each night an upload of the data will be made to RTI's secure data system. Once data for the observed service are available in the site's database, transfer of the electronic HIT data will be made to RTI's secure data system based upon the agreed transfer procedures in the HIT protocol.

In our original project plan, we assumed 1 HIT and 2 clinical observers from the project team would be on-site at each practice for three days observing both clinical and HIT activities. The direct clinical observation would be done in collaboration with staff from each of the sites. We have since expanded the time to 5 days that the project clinical observers will be onsite and increased the number of clinical observers to 3. Based on what we have learned during the site visits to the three sites and additional requirements imposed by the sites' IRB or leadership, we have modified our original plan for data collection as follows:

- Site 1: Given the study site's restrictions on non-employees in clinical rooms, site 2 will provide four staff persons to perform the direct observation of clinical services. Project staff will assist in direct observation data collection for services where the procedure can be observed without being present in the clinical room (e.g., reading of radiology services) and will be available to answer any questions that may arise during the direct observation activities.

- Site 2: We will follow our plan of having three project clinical observers on-site for up to 39 hours observing clinical services. Project staff will restrict their on-site time to less than 40 hours per person during the one-week data collection period due to the study site's fit-for-duty requirements that apply to study personnel on-site for 40 hours or more.

- Site 3: The project team is currently developing plans for direct observation of clinical services. Originally, the training requirements shared by site 3 for any outside researchers were onerous and the project team was planning to use personnel from the site to perform direct observation data collection activities. However, during the pilot visit we received revised training requirements for outside researchers that were much more manageable. The project team is continuing to work with site 3 to formulate plans for direct observation data collection.

After contracts with the sites have been finalized, primary data collection will occur at each site. Prior to any study staff engaging in direct observation activities, project staff will provide training on: (i) the study's direct observation protocol, and (ii) the electronic and paper data collection forms designed to capture activity and time data for observed services.

Because of the extensive pilot activities that have been conducted at each of the sites, the project HIT staff person will not make another in-person visit to the site. Rather, the project HIT staff person will work with each of the sites to finalize the HIT data collection protocol and to coordinate the extraction of historical time data for study services. We will request each site to extract, in an agreed upon data format, relevant time data for observed clinical services. In addition, we will request each site to extract, in an agreed upon data format, historical time data for previously performed targeted services. The time period covered (e.g., 6 months, 1 year) and volume of cases for the historical data extraction will be jointly determined with each site.

4.4 Other Site Data

It is difficult to know if the data we collect will be representative of physician practices nationwide. Throughout the project, we will keep track of site characteristics that will help us understand any potential bias. Some factors that might introduce bias include:

- **Use of Residents.** The presence of residents is generally thought to increase service time, but the effect is likely to differ depending on whether the senior, billing physician has to be present throughout the service or not. The effect of residents may also depend on their year of training. For example, one surgical leader suggested that residents in their first two years may add to service time while those in their final year may have little or no effect on time. The effect may also depend on whether residents are regularly onsite working with site physicians or if they rotate through intermittently or work with a teaching professor who does not regularly practice on site. These nuanced differences suggest that the effect of residents could vary across specialties within the same site. We will document the role of residents, if any, at all direct observation sites.

- **Team-based Care.** As the result of a number of factors, many practices have adopted strong team-based models of care, in which many traditional physician functions are now done by others. This is likely most relevant for evaluation and management services, which are NOT being studied. We will document the mix of clinical staff involved at direct observation sites.

- **Cultural Differences.** Factors such as payment arrangement (FFS v. salaried) and setting type (community v. academic/referral) may affect the complexity and acuity of cases. For instance, one clinical leader suggested that her radiology department in a referral center had a much higher share of patients with positive findings than she had experienced in a previous community setting so that the average time for a specific service would likely be higher. FFS settings and community settings may have a larger share of simpler cases with more "normal" test results. Similarly, FFS may inherently lead to lower acuity levels, since it is thought to generate more volume, with the marginal volume including cases less likely to have "abnormal" results. There may be offsetting effects, so that the higher acuity cases in settings where they are the more typical cases leads to systems and experience that reduce the effect of acuity on service time. We will document the compensation model and type of setting for each site.

We will document these characteristics, and others that might help understanding how the service times at each site are likely to compare to other practices.

4.5 Implementation Challenges

Over the course of recruiting sites to participate in the study, we encountered a number of challenges moving forward on our original project plan. These considerations have affected details in how we will collect the data at the three sites and may inform future efforts to do this

type of data collection. Some of these challenges could affect the reliability of the study findings as they relate to the time measures for specific CPT codes.

- **Low volumes of services for many codes at participating sites.** As discussed earlier, one criterion used to select the study codes was high frequency among Medicare FFS beneficiaries. A review of typical weekly volumes of services for our selected codes across the three sites shows lower than expected volumes requiring us to adjust the frequency of direct observation events per code:

  Site 1: Using retrospective and prospective scheduling data, we estimated that 15 of the study codes will have a weekly volume of 10 or more; 31 codes will have a weekly volume of 3 or more. The 31 codes are in 22 of the service groups in Table 2 (Section 2 above), reflecting the following broad clinical families: dermatology, gastroenterology, orthopedics, urology, ophthalmology, radiology, podiatry, and vascular lab services. Eighteen minor procedures and 13 diagnostic services are represented among these services. Determination of availability of electronic data is still ongoing but we have confirmation that surgical procedures performed in an ambulatory surgical center have electronic data. There are also electronic data available for technicians for most radiology procedures as well.

  Site 2: Using billing data, we estimate that 56 of the targeted study services have a weekly volume of 10 or more; 72 codes have a volume of at least 3 per week. We believe that this site can provide electronic data for 53 of the study services. These 53 services reflect the following 7 broad clinical service categories: orthopedics, general surgery, cardiac surgery, back and neck surgery, gastroenterology (including colonoscopy and colorectal screening), cardiac catheterization, and urology. Twenty-two minor procedures, 4 major procedures, and 30 diagnostic services are represented among these services.

  Site 3: Using data obtained from clinical departments that we believe are significantly lower than volume estimates we would obtain from billing data (which has been requested), we estimated that 6 of the targeted codes have a weekly volume of 10 and another 13 of the targeted codes have a typical weekly volume of 3 or more. These volume estimates are from three service sites within this project site, and include predominantly diagnostic and minor procedures/services. Minor procedures/ services showing volumes of 3 or more include GI procedures (i.e., colonoscopies and upper GI endoscopies), surgical pathology services, and therapeutic/prophylactic/ diagnostic injections. Diagnostic procedures/services showing volumes of 3 or more include radiology/imaging (including CT), vascular lab and audiometry services. It is likely that this site can provide electronic time data for major surgical procedures, other procedures (with implementation of an outpatient package specifically for this project), and radiology.

  Based upon the planned 1-week direct observation period and likely volumes of services, our primary data collection plan is focusing upon the collection of at least 3 observations for services for which there is electronic data and between 3 and 10

observations for which there is no electronic data. Thus, we would not be observing services for which the typical weekly volume is less than 3.

- **Identifying specific CPT® codes for scheduled procedures presents a significant challenge for direct observation.** Discussion with clinical leaders within each of the study sites confirmed that for some services, the scheduled procedure description will likely be the final performed procedure, e.g., total hip replacement. However, for other services such as screening colonoscopy it is likely that there will a degree of uncertainty as to whether or not the colonoscopy will include removal of a polyp(s). Thus, we may not always be conducting direct observation for one of the targeted services reducing the number of direct observations for the study. For validation of the electronic time data, we do not believe this presents a problem within small clinical families. Discussion with clinical leaders at the participating sites yielded a collective belief that within small clinical families the ratio of observed time to electronic time is likely to be invariant to individual procedure codes.

- **Select high volume procedures are heterogeneous.** During pilot site visits, clinical leaders expressed concern to the project team that median time estimates derived for a few of the selected codes is not representative of time necessary to perform all services within the service due to extreme clinical heterogeneity. Two examples were cited: Cystourethroscopy (CPT® 52000) could be a short uncomplicated follow-up procedure after treatment for cancer taking very few minutes, or a lengthy initial diagnostic procedure for a newly diagnosed cancer patient; Level IV surgical pathology (CPT® 88305) can be performed on one or multiple tissue samples, and the elements can differ depending on the nature of the request and tissue source(s).

- **The site visits provided additional insight into the likely availability of electronic data across a broad range of sites.** In more detailed discussions with HIT staff at the three sites, we received confirmation that the strongest electronic data are for surgical procedures. This finding is consistent with that of the MedPAC report[14] that service time, in particular intra-service time, is most available for major surgical services. And, we received confirmation that pre- and post-service times for most of the services are not well captured in electronic data. Electronic time data are often not available, most notably for office-based procedures and dermatology services. While time data is generally available for radiology services, there are substantial interruptions during the intra-service period of interpretation and reporting which reflect pre- and post-service work for other services to other patients, i.e., consulting with a technician on set-up or consulting with the ordering physician on the interpretation. These confirmatory findings have led to modification of the direct observation data collection protocol and tool.

[14] Braun, P. and McCall, N. Improving the Accuracy of Time in the Medical Physician Fee Schedule: Feasibility of Using Extant Data and of Collecting Primary Data. For MedPAC, 2011.

4.6 Preliminary Data Validation

At the completion of data collection at each site, we will perform basic data validity checks and construct an analytic file of direct observation and HIT times. We will produce distributional properties of time (median, mean, standard error) for each service and by type of data collection method (i.e., direct observation, HIT data, or both). As noted above, the number of observations for which we will have time measurements will vary by service and method and will depend upon the volume performed by the participating sites during the data collection period. For some service codes, the likely volume available for direct observation may be low. We will send the time estimates to the sites and request that they review their respective data for reasonableness, noting any areas of concern with potential outlier time measurements. Final determinations will be made jointly with the sites and CMS on how to handle potential outlier data, if necessary.

After they are incorporated into the materials being prepared by the analysis team, these time estimates will be submitted to the clinical panel for review. For services for which only direct observation time was collected, the median or typical time and the distributional properties of the time estimate will be sent to the clinical panels for review. For services with direct observation and HIT times, we will calculate median times for each method and develop a ratio of observed to electronic data.

SECTION 5
SUMMARY AND NEXT STEPS

As described above, our experience identifying services, recruiting sites, and developing data collection protocols has led us to modify our original project plan in a number of ways. While the service selection and site recruitment steps both took much longer than anticipated and we are still trying to recruit additional sites, the three developments that most affected our approach are the pre-, intra-, and post-service element descriptions, low expected service volumes for many of the selected study services, and some of the various site rules that limited our ability to have project staff conduct direct observation. These developments have added complexity and time to the project.

As discussed, we also have concerns about the completeness, comparability, and relevance to current practice of the RUC service element descriptions. As a result, we developed an Access® data collection tool that allows the service observers to indicate which elements are included in the measured time and who is doing them.

The various issues that were raised about having project staff conduct direct observation led us to develop a second approach to direct observation. Whether for IRB or other considerations, in these instances we have developed an approach that has project staff train site staff to conduct the observations under project staff supervision.

At this point, we are preparing to conduct direct observation and acquire other data from two sites, with the third site pending IRB and other clearances. At the same time, we continue to try to recruit and engage additional partners that are willing to participate in the data collection process. As we go through the site engagement process with new prospective entities, we are using our experiences to date to make the process smoother and quicker. From encouraging involvement of key internal leaders to learning about IRB requirements and processes, we have become more adept at working this this process with potential sites.

After we develop new objective time measures from participating sites, we will then move to the other project tasks, namely analyzing these new time estimates to develop alternative models of their implications for service work values and then reviewing the time data and work models with panels of physicians.

APPENDIX A
STUDY SERVICES, WITH NARRATIVE DESCRIPTION

Healthcare Common Procedure Coding System (HCPCS) Code	Narrative Description
11042	Debridement, subcutaneous tissue (includes epidermis and dermis, if performed); first 20 square centimeters or less
11056	Paring or cutting of benign hyperkeratotic lesion (e.g., corn or callus); two to four lesions
11057	Paring or cutting of benign hyperkeratotic lesion (e.g., corn or callus); more than four lesions
11100	Biopsy of skin, subcutaneous tissue and/or mucous membrane (including simple closure), unless otherwise listed (separate procedure); single lesion
11101	Biopsy of skin, subcutaneous tissue and/or mucous membrane (including simple closure), unless otherwise listed (separate procedure); each separate/additional lesion (list separately in additional to code for primary procedure)
17000	Destruction (e.g., laser surgery, electrosurgery, cryosurgery, chemosurgery, surgical curettement), premalignant lesion(e.g., actinic keratoses); first lesion
17003	Destruction (e.g., laser surgery, electrosurgery, cryosurgery, chemosurgery, surgical curettement), premalignant lesion(e.g., actinic keratoses); 2nd through 14 lesions, each (list separately in additional to code for first lesion)
17004	Destruction, (e.g., laser surgery, electrosurgery, cryosurgery, chemosurgery, surgical curettement), premalignant lesions(e.g., actinic keratoses), 15 or more lesions
17110	Destruction, (e.g., laser surgery, electrosurgery, cryosurgery, chemosurgery, surgical curettement), of benign lesions other than skin tags or cutaneous vascular proliferative lesions; up to 14 lesions
17262	Destruction, (e.g., laser surgery, electrosurgery, cryosurgery, chemosurgery, surgical curettement), trunk, arms or legs; lesion diameter 0.5 cm or less
17281	Destruction, (e.g., laser surgery, electrosurgery, cryosurgery, chemosurgery, surgical curettement), face, ears, eyelids, nose, lips, mucous membrane; lesion diameter 0.6 cm to 1.0 cm
17282	Destruction, (e.g., laser surgery, electrosurgery, cryosurgery, chemosurgery, surgical curettement), face, ears, eyelids, nose, lips, mucous membrane; lesion diameter 1.1 cm to 2.0 cm

(continued)

Healthcare Common Procedure Coding System (HCPCS) Code	Narrative Description
20550	Injection(s); tendon sheath, or ligament, aponeurosis (e.g., plantar "fascia")
20605	Arthrocentesis, aspiration and/or injection; intermediate joint or bursa (e.g., temporomandibular, acromioclavicular, wrist, elbow or ankle, olecranon bursa)
20610	Arthrocentesis, aspiration and/or injection; major joint or bursa (e.g., shoulder, hip, knee joint, subacromial bursa)
22551	Arthrodesis, anterior interbody, including disc space preparation, discectomy, osteophytectomy and decompression of spinal cord and/o nerve roots; cervical below c2
22612	Arthrodesis, posterior or posterolateral technique, single level; lumbar (with lateral transverse technique, when performed)
22614	Arthrodesis, posterior or posterolateral technique, single level; each additional vertebral segment (list separately in addition to code for primary procedure)
22633	Arthrodesis, combined posterior or posterolateral technique with posterior interbody technique including laminectomy and/or discectomy sufficient to prepare interspace (other than for decompression), single interspace and segment; lumbar
22840	Posterior non-segmental instrumentation (e.g. harrington rod technique, pedicle fixation across 1 interspace, atlantoaxial transarticular screw fixation) (list separately in addition to code for primary procedure)
22842	Posterior segmental instrumentation (e.g., pedicle fixation, dual rods with multiple hooks and sublaminal wires); 3 to 6 vertebral segments (list separately in addition to code for primary procedure)
22845	Anterior instrumentation; 2 to 3 vertebral segments (list separately in addition to code for primary procedure)
22851	Application of intervertebral biomechanical device(s) (e.g., synthetic cage(s), threaded bone dowel(s), methylmethacrylate) to vertebral defect or interspace (list separately in addition to code for primary procedure)
23412	Repair of ruptured musculotendinous cuff (e.g., rotator cuff) open; chronic
23472	Arthroplasty, glenohumeral joint; total shoulder (glenoid and proximal humeral replacement (e.g., total shoulder))
27130	Arthroplasty, acetabular and proximal femoral prosthetic replacement, with or without autograft or allograft

(continued)

Healthcare Common Procedure Coding System (HCPCS) Code	Narrative Description
27134	Revision of total hip arthroplasty; both components, with or without autograft or allograft
27236	Open treatment of femoral fracture, proximal end, neck, internal fixation or prosthetic replacement
27244	Treatment of intertrochanteric, pertrochanteric, or subtrochanteric femoral fracture; with plate/screw type implant, with or without cerclage
27245	Treatment of intertrochanteric, pertrochanteric, or subtrochanteric femoral fracture; with intramedullary implant, with or without interlocking screws and/or cerclage
27447	Arthroplasty, knee, condyle and plateau; medial and lateral compartments with or without patella resurfacing (total knee arthroplasty)
29827	Arthroscopy, shoulder, surgical; with rotator cuff repair
33208	Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial and ventricular
33249	Insertion or replacement of permanent pacemaker with transvenous lead(s); single or dual chamber
33405	Replacement, aortic valve, with cardiopulmonary bypass; with prosthetic valve other than homograft or stentless valve
33430	Replacement, mitral valve, with cardiopulmonary bypass
33518	Coronary artery bypass, using venous graft(s) and arterial graft(s); two venous grafts (list separately in addition to code for primary procedure)
33519	Coronary artery bypass, using venous graft(s) and arterial graft(s); three venous grafts (list separately in addition to code for primary procedure)
33533	Coronary artery bypass, using arterial graft(s); single arterial graft
33536	Coronary artery bypass, using arterial graft(s); four or more coronary arterial grafts
35301	Thromboendarterectomy, including patch graft if performed; carotid, vertebral, subclavian, by neck incision
43235	Upper gastrointestinal endoscopy including esophagus, stomach, and either the duodenum and/or jejunum as appropriate; diagnostic, with or without collection of specimen(s) by brushing or washing (separate procedure)
43239	Upper gastrointestinal endoscopy including esophagus, stomach, and either the duodenum and/or jejunum as appropriate; with biopsy, single or multiple

(continued)

Healthcare Common Procedure Coding System (HCPCS) Code	Narrative Description
44120	Enterectomy, resection of small intestine; single resection and anastomosis
44140	Colectomy, partial; with anastomosis
44143	Colectomy, partial; with end colostomy and closure of distal segment (hartmann type procedure)
44145	Colectomy, partial; with coloproctostomy (low pelvic anastomosis)
44160	Colectomy, partial, with removal of terminal ileum with ileocolostomy
44204	Laparoscopy, surgical; colectomy, partial, with anastomosis
44205	Laparoscopy, surgical; colectomy, partial, with removal of terminal ileum with ileocolostomy
44207	Laparoscopy, surgical; colectomy, partial, with anastomosis, with coloproctostomy (low pelvic anastomosis)
45378	Colonoscopy, flexible, proximal to splenic flexure; diagnostic, with or without collection of specimen(s) by brushing or washing, with or without colon decompression (separate procedure)
45380	Colonoscopy, flexible, proximal to splenic flexure; with biopsy, single or multiple
45384	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by hot biopsy forceps or bipolar cautery
45385	Colonoscopy, flexible, proximal to splenic flexure; with removal of tumor(s), polyp(s), or other lesion(s) by snare technique
G0105	Colorectal cancer screening; colonoscopy on individual at high risk
47562	Laparoscopy, surgical; cholecystectomy
47563	Laparoscopy, surgical; cholecystectomy with cholangiography
49505	Repair initial inguinal hernia, age 5 years or over; reducible
50590	Lithotripsy, extracorporeal shock wave
52000	Cystourethroscopy (separate procedure)
52224	Cystourethroscopy, with fulguration (including cryosurgery or laser surgery) or treatment of minor (less than 0.5 cm) lesion(s) with or without biopsy
52281	Cystourethroscopy, with calibration and/or dilation of urethral stricture or stenosis, with or without meatotomy, with or without injection procedure for cystography, male or female

(continued)

Healthcare Common Procedure Coding System (HCPCS) Code	Narrative Description
52601	Transurethral electrosurgical resection prostate, including control of postoperative bleeding, complete (vasectomy, meatotomy, cystourethroscopy, urethral calibration and/or dilation, and internal urtherotomy are included)
55700	Biopsy, prostate; needle or punch, single or multiple, any approach
55866	Laparoscopy, surgical prostatectomy, retropubic radical, including nerve sparing, includes robotic assistance, when performed
63047	Laminectomy, facetectomy and foraminotomy (unilateral or bilateral with decompression of spinal cord, cauda equina and/or nerve root(s), (e.g., spinal or lateral recess stenosis), single vertebral segment; lumbar
64483	Injection, anesthetic agent and/or steroid, transforaminal epidural with imaging guidance (fluroscopy or computed tomography); lumbar or sacral, single level
66821	Discussion of secondary membranous cataract (opacified posterior lens capsule and/or anterior hyaloid); laser surgery (e.g., yag laser) (one or more stages)
66982	Extracapsular cataract removal w insertion of intraocular lens prosthesis (1 stage procedure), manual or mechanical technique (complex, requiring devices or techniques not generally used in routine cataract surgery (e.g. iris expansion device, suture support for intraocular lens, or primary posterior capsulorhexis) or performed on patients in the amblyogenic developmental stage)
66984	Extracapsular cataract removal with insertion of intraocular lens prosthesis (one stage procedure), manual or mechanical technique (e.g., irrigation or aspiration or phacoemulsification)
67028	Intravitreal injection of a pharmacologic agent (separate procedure)
67210	Destruction of localized lesion of retina (e.g., macular edema, tumors), one or more sessions; photocoagulation
67228	Treatment of extensive or progressive retinopathy, 1 or more sessions; (e.g., diabetic retinopathy), photocoagulation
70450	Computed tomography, head or brain; without contrast material
70486	Computed tomography, maxillofacial area; without contrast material
70551	Magnetic resonance (e.g., proton) imaging, brain (including brain stem); without contrast material

(continued)

Healthcare Common Procedure Coding System (HCPCS) Code	Narrative Description
70553	Magnetic resonance (e.g., proton) imaging, brain (including brain stem); without contrast material, followed by contrast material(s) and further sequences
71010	Radiologic examination, chest; single view, frontal
71020	Radiologic examination, chest, two views, frontal and lateral;
71250	Computed tomography, thorax; without contrast material
71260	Computed tomography, thorax; with contrast material(s)
71275	Computed tomographic angiography, chest (noncoronary), without contrast material(s), followed by contrast material(s) and further sections, including image post processing
72125	Computed tomography, cervical spine; without contrast material
72141	Magnetic resonance (e.g., proton) imaging, spinal canal and contents, cervical; without contrast material
72148	Magnetic resonance (e.g., proton) imaging, spinal canal and contents, lumbar; without contrast material
72158	Magnetic resonance (e.g., proton) imaging, spinal canal and contents, without contrast material, followed by contrast material(s) and further sequences; lumbar
74176	Computed tomography, abdomen and pelvis; without contrast material
74177	Computed tomography, abdomen and pelvis; with contrast material
74178	Computed tomography, abdomen and pelvis; without contrast material in one or both body regions, followed by contrast material(s) and further sections in one or both body regions
77080	Dual-energy x-ray absorptiometry (DXA), bone density study, 1 or more sties; axial skeleton (e.g., hips, pelvis, spine)
78452	Myocardial perfusion imaging, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection
88305	Level iv-surgical pathology, gross and microscopic examination
88307	Level v - surgical pathology, gross and microscopic examination
88309	Level vi - surgical pathology, gross and microscopic examination bone resection breast, mastectomy - with regional lymph nodes colon, segmental resection for tumor

(continued)

Healthcare Common Procedure Coding System (HCPCS) Code	Narrative Description
88312	Special stain including interpretation and report; group I for microorganisms (e.g. acid fast, methananmine silver)
88331	Pathology consultation during surgery; first tissue block, with frozen section(s), single specimen
92133	Scanning computerized ophthalmic diagnostic imaging, posterior segment, with interpretation and report, unilateral or bilateral; optic nerve
92134	Scanning computerized ophthalmic diagnostic imaging, posterior segment, with interpretation and report, unilateral or bilateral; retina
92557	Comprehensive audiometry threshold evaluation and speech recognition (92553 and 92556 combined)
92920	Percutaneous transluminal coronary angioplasty; single major coronary artery or branch
92928	Percutaneous transcatheter placement of intracoronary stent(s), with coronary angioplasty when performed; single major coronary artery or branch
92941	Percutaneous transluminal revascularization of acute total/subtotal occlusion during acute myocardical infarction, coronary artery or coronary artery bypass graft, any combination of intracoronary stent, atherectomy and angioplasty, including aspiration thrombectomy when performed, single vessel.
93000	Electrocardiogram, routine ECG with at least 12 leads; with interpretation and report
93010	Electrocardiogram, routine ECG with at least 12 leads; interpretation and report only
93015	Cardiovascular stress test using maximal or submaximal treadmill or bicycle exercise, continuous electrocardiographic monitoring, and/or pharmacologic; with physician supervision only, with interpretation and report
93016	Cardiovascular stress test using maximal or submaximal treadmill or bicycle exercise, continuous electrocardiographic monitoring, and/or pharmacologic; with physician supervision only, without interpretation and report
93018	Cardiovascular stress test using maximal or submaximal treadmill or bicycle exercise, continuous electrocardiographic monitoring, and/or pharmacologic; interpretation and report only.

(continued)

Healthcare Common Procedure Coding System (HCPCS) Code	Narrative Description
93306	Echocardiography, transthoracic, real-time with image documentation (2d), includes m-mode recording, when performed, complete, with spectral doppler echocardiography, and with color flow doppler echocardiography
93458	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injections(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
93459	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injections(s) for coronary angiography, imaging supervision and interpretation; with left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed catheter placement(s) in bypass graft(s) (internal mammary, free arterial, venous graft(s) with bypass graft angiography
93460	Catheter placement in coronary artery(s) for coronary angiography, including intraprocedural injections(s) for coronary angiography, imaging supervision and interpretation; with right and left heart catheterization including intraprocedural injection(s) for left ventriculography, when performed
93880	Duplex scan of extracranial arteries; complete bilateral study
96372	Therapeutic, prophylactic, or diagnostic injection (specify substance or drug); subcutaneous or intramuscular
G0202	Screening mammography, producing direct digital image, bilateral, all views
G0204	Diagnostic mammography, producing direct digital image, bilateral, all views
G0206	Diagnostic mammography, producing direct digital image, unilateral, all views

Note: The short descriptions are based on those usually used by the Centers for Medicare & Medicaid Services. However, for clarity, words are spelled out completely in the version shown here.

APPENDIX B
STUDY SERVICES WITH WORK RELATIVE VALUE UNITS (RVU), TIME VALUES, MEDICARE SPENDING, GLOBAL PERIOD, CENTER FOR MEDICARE & MEDICAID SERVICES AFFORDABLE CARE ACT (ACA) LIST, AND MULTIPLE POINTS OF COMPARISON (MPC) STATUS

HCPCS	Work RVU	Service Time		Medicare Spending ($1,000)	Global Period	CMS ACA List	MPC
		Intra Service	Total Service				
11042	1.01	15	36	112	000	—	*
11056	0.50	10	19	104	000	—	—
11057	0.65	15	24	23	000	—	—
11100	0.81	12	22	267	000	—	*
11101	0.41	10	10	39	ZZZ	—	—
17000	0.65	3	25	335	010	—	*
17003	0.07	2	2	103	ZZZ	—	—
17004	1.85	20	46	129	010	*	—
17110	0.70	7	29	167	010	—	—
17262	1.63	20	50	32	010	—	—
17281	1.77	17	47	20	010	—	—
17282	2.09	25	55	20	010	—	—
20550	0.75	5	20	41	000	—	—
20605	0.98	5	21	30	000	—	—
20610	0.79	5	21	343	000	*	—
22551	25.00	120	395	50	090	—	—
22612	23.53	150	482	73	090	*	—
22614	6.43	40	40	39	ZZZ	—	—
22633	27.75	200	565	74	090	—	—
22840	12.52	60	60	26	ZZZ	—	—
22842	12.56	105	105	34	ZZZ	—	—
22845	11.94	90	90	26	ZZZ	—	—
22851	6.70	90	90	44	ZZZ	*	—
23412	11.93	100	287	19	090	—	—
23472	22.13	140	448	42	090	—	—
27130	21.79	135	478	180	090	*	—
27134	30.28	240	617	23	090	—	—

(continued)

HCPCS	Work RVU	Service Time		Medicare Spending ($1,000)	Global Period	CMS ACA List	MPC
		Intra Service	Total Service				
27236	17.61	90	433	81	090	*	—
27244	18.18	75	438	25	090	—	—
27245	18.18	80	443	94	090	—	—
27447	23.25	124	469	429	090	*	—
29827	15.59	120	334	78	090	—	—
33208	8.77	60	236	59	090	—	—
33249	15.17	120	249	47	090	—	*
33405	41.32	197	768	72	090	*	—
33430	50.93	232	913	24	090	*	—
33518	7.93	50	112.6	13	ZZZ	—	—
33519	10.49	70	139.8	11	ZZZ	—	—
33533	33.75	158	682	131	090	*	*
33536	48.43	259	783	1	090	—	—
35301	19.61	144	431	61	090	*	—
43235	2.39	20	63	52	000	*	—
43239	2.87	34	84.5	217	000	—	—
44120	20.82	134	611	32	090	—	—
44140	22.59	150	480	32	090	—	—
44143	27.79	150	607	22	090	—	—
44145	28.58	180	615	15	090	—	—
44160	20.89	120	551	20	090	—	—
44204	26.42	180	455	19	090	—	—
44205	22.95	165	428.5	14	090	—	—
44207	31.92	195	560	13	090	—	—
45378	3.69	30	75	156	000	*	—
45380	4.43	51.5	118.5	209	000	—	—
45384	4.69	42	73	42	000	—	—
45385	5.30	43	74	211	000	—	—
47562	10.47	80	228	77	090	*	—
47563	11.47	90	238	43	090	*	—
49505	7.96	70	198	40	090	*	—

(continued)

HCPCS	Work RVU	Service Time		Medicare Spending ($1,000)	Global Period	CMS ACA List	MPC
		Intra Service	Total Service				
50590	9.77	60	207	32	090	*	—
52000	2.23	15	42	166	000	—	*
52224	4.05	30	79	26	000	—	—
52281	2.75	20	46	24	000	—	—
52601	15.26	75	355	39	090	—	—
55700	2.58	15	65	36	000	—	—
55866	32.06	210	512	27	090	—	—
63047	15.37	90	362	76	090	*	—
64483	1.90	15	49	130	000	—	*
66821	3.42	11	82	183	090	—	—
66982	11.08	33	165	125	090	*	—
66984	8.52	21	147	1,080	090	—	—
67028	1.44	5	22	206	000	*	—
67210	6.36	15	106	56	090	—	—
67228	13.82	60	208	86	090	—	—
70450	0.85	17	17	231	XXX	*	—
70486	1.14	22	22	48	XXX	—	—
70551	1.48	25	45	140	XXX	*	—
70553	2.36	43	43	233	XXX	*	—
71010	0.18	3	5	184	XXX	—	*
71020	0.22	3	5	213	XXX	—	*
71250	1.02	15	25	121	XXX	—	—
71260	1.24	15	23	163	XXX	—	—
71275	1.92	30	49.5	74	XXX	—	—
72125	1.07	15	25	42	XXX	—	—
72141	1.60	30	30	115	XXX	*	—
72148	1.48	28	28	266	XXX	*	—
72158	2.36	43	43	75	XXX	—	—
74176	1.74	22	32	192	XXX	—	—
74177	1.82	25	35	265	XXX	—	—
74178	2.01	30	40	139	XXX	—	—

(continued)

HCPCS	Work RVU	Service Time		Medicare Spending ($1,000)	Global Period	CMS ACA List	MPC
		Intra Service	Total Service				
77080	0.20	5	9	88	XXX	—	—
78452	1.62	20	40	800	XXX	—	—
88305	0.75	25	25	973	XXX	—	*
88307	1.59	47	47	93	XXX	—	—
88309	2.8	90	90	28	XXX	—	—
88312	0.54	24	24	89	XXX	*	—
88331	1.19	25	25	40	XXX	—	—
92133	0.50	10	13	89	XXX	—	—
92134	0.50	10	17	168	XXX	—	—
92557	0.60	20	28	41	XXX	—	—
92920	10.1	68	137	14	000	—	—
92928	11.21	76	145	129	000	—	—
92941	12.56	70	149	52	000	—	—
93000	0.17	5	7	214	XXX	*	—
93010	0.17	4	5	161	XXX	—	*
93015	0.75	20	26	121	XXX	*	*
93016	0.45	15	19	25	XXX	—	—
93018	0.30	5	11	19	XXX	—	—
93306	1.30	20	31.5	812	XXX	—	—
93458	5.85	45	123	172	000	—	—
93459	6.60	50	133	46	000	—	—
93460	7.35	50	128	39	000	—	—
93880	0.60	18	18	421	XXX	*	—
96372	0.17	3	7	234	XXX	—	—
G0105	3.69	30	75	49	000	—	—
G0202	0.70	5	12	375	XXX	—	—
G0204	0.87	10	23	54	XXX	—	—
G0206	0.70	7	19.5	55	XXX	—	—

APPENDIX C
SHORTENED DESCRIPTION OF PRE-SERVICE, INTRA-SERVICE, AND POST-SERVICE ELEMENTS OF STUDY SERVICES

These shortened descriptions of service elements are based on the full descriptions in the Relative Value Update Committee (RUC) database. They have been developed for use in the data collection tool that will be used for direct observation. In the data collection tool, common words are truncated – e.g. "phys" for "physician" – but they are written out in table below for clarity

Pre-Service	Intra-Service	Post-Service
11042		
BIOPSY SKIN		
Review chart	Inspect ulcer	Instruct on post-procedure care
Relevant physical examination	Debride ulcer	Discuss future management
Review treatment options	Ensure hemostasis	Discuss appropriate footwear
Consult referring physician, if needed	Measure, record size	Discuss concomitant conditions
Explain procedure	Medicate and dress	Complete medical record
Other	Choose and apply padding	Communication to primary physician
	Other	Other
11056		
PARING OR CUTTING LESIONS		
Review chart	Inspect and palpate lesion	Instruct on post-procedure care
Update history	Pare lesion	Discuss condition
Perform physician exam	Apply antiseptic	Instruct on footwear
Discuss procedure with patient	Determine type of padding	Discuss concomitant conditions
Verify supplies are available	Cut pad to fit toe	Complete medical record
Position patient	Remove pressure point	Communication to primary physician
Prep foot	Other	Other
Other		

(continued)

Pre-Service	Intra-Service	Post-Service
11057		
PARING OR CUTTING LESIONS		
Pre-service evaluation	Inspect and palpate lesion	Instruct on post-procedure care
Review medical records	Pare lesion	Discuss condition
Update medical records	Apply antiseptic	Instruct on footwear
Review treatment options	Determine type of padding	Discuss concomitant conditions
Discuss procedure with patient	Cut pad to fit toe	Complete medical record
Discuss possible complications	Remove pressure point	Communication to primary physician
Prepare instruments	Other	Other
Communicate with family		
Other		
11100		
BIOPSY SKIN		
Review chart	Debride infected skin	Fit surgical shoe, if indicated
Evaluate patient status	Flush with saline	Instruct re: wound care
Dermatologic exam	Apply dressing	Instruct re: home care
Explain treatment	Other	Prescribe antibiotics
Prepare instruments		Discuss follow-up activities
Take vital signs		Complete medical record
Prepare patient		Communication with referring physician
Administer anesthesia		Other
Other		
11101		
BIOPSY SKIN ADD-ON		
N/A	Debride infected skin	N/A
Other	Flush with saline	Other
	Apply dressing	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
17000 **DESTRUCTION OF BENIGN OR PREMALIGNANT LESIONS**		
Review medical records	Inspect lesion	Apply antibiotic
Review treatment options	Administer anesthetic	Apply dressing
Review medical risks	Destroy lesion	Instruct re: wound care
Obtain consent	Apply curette	Instruct re: risks, follow-up
Instruct patient and staff	Control bleeding	Schedule follow-up
Prepare equipment	Additional destruction, as needed	Complete medical record
Communication with patient family	Other	Communication with referring physician
Prep liquid nitrogen		Other
Obtain shield		
Perform clean preparation		
Other		
17003 **DESTRUCTION OF BENIGN OR PREMALIGNANT LESIONS 2-14 ADD-ON**		
N/A		
Other	Inspect lesion	N/A
	Administer anesthetic	Other
	Destroy lesion	
	Control bleeding	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
17004 **DESTRUCTION OF BENIGN OR PREMALIGNANT LESIONS**		
Pre-operative evaluation	Inspect and palpate lesion	Apply antibiotic
Review medical records	Administer local anesthetic	Apply dressing
Discuss choice of treatment	Destroy lesions	Instruct patient and staff
Review risks	Freeze/thaw cycles	Schedule follow-up
Obtain consent	Control bleeding	Communication with patient and family
Instruct patient and staff	Other	Complete medical record
Prepare for procedure		Dictate report
Transfer liquid nitrogen		Communication with referring physician
Obtain protective shields		Other
Perform clean preparation		
Other		
17110 **DESTRUCTION OF BENIGN OR PREMALIGNANT LESIONS 15/> ADD-ON**		
Review medical records		
Review treatment options	Inspect lesion	Apply antibiotic
Review medical risks	Administer anesthetic	Apply dressing
Obtain consent	Destroy lesion	Instruct re: wound care
Instruct patient and staff	Apply curette	Instruct re: risks, follow-up
Prepare equipment	Control bleeding	Schedule follow-up
Communication with patient family	Additional destruction, as needed	Complete medical record
Prep liquid nitrogen	Other	Communication with referring physician
Obtain shield		Other
Perform clean preparation		
Other		

(continued)

Pre-Service	Intra-Service	Post-Service
17262 **DESTRUCTION OF MALIGNANT LESIONS**		
Pre-operative evaluation	Apply dermal curette	Apply antibiotic
Review medical records	Spot hemostasis	Instruct patient and staff
Discuss choice of treatment	Apply additional curette(s)	Instruct staff
Review risks	Apply cautery	Schedule follow-up
Obtain consent	Electrosurgical fulgration	Communication with patient and family
Instruct patient and staff	Electrosurgical coagulation	Complete medical record
Prepare for procedure	Inject anesthetic	Dictate report
Prepare equipment	Repeat curettements	Communication with referring physician
Communicate with family	Repeat electrosurgery	Other
Inspect and palpate lesion	Repeat anesthesia	
Mark clinical margins	Control bleeding	
Administer local anesthetic	Other	
Wait for anesthesia		
Other		
17281 **DESTRUCTION OF MALIGNANT LESIONS**		
Pre-operative evaluation	Apply curette	Apply antibiotic
Review medical record	Spot hemostasis	Apply dressing
Discuss treatment options	Apply smaller curette	Instruct patient and staff
Discuss risks	Apply true cautery	Communication with patient and family
Obtain consent	Inject anesthetic, as needed	Complete medical record
Instruct patient and staff	Repeat curettements	Dictate report
Perform procedural preparation	Repeat electrosurgery	Communication with referring physician
Prepare equipment	Repeat anesthesia	Other
Communicate with family	Control bleeding, as needed	
Inspect and palpate lesion	Other	
Mark clinical margins		
Administer anesthetic		
Wait for anesthesia		
Other		

(continued)

Pre-Service	Intra-Service	Post-Service
17282 **DESTRUCTION OF MALIGNANT LESIONS**		
Pre-operative evaluation	Apply curette	Apply antibiotic
Review medical record	Spot hemostasis	Apply dressing
Discuss treatment options	Apply smaller curette	Instruct patient and staff
Discuss risks	Apply true cautery	Communication with patient and family
Obtain consent	Inject anesthetic, as needed	Complete medical record
Instruct patient and staff	Repeat curettements	Dictate report
Perform procedural preparation	Repeat electrosurgery	Communication with referring physician
Prepare equipment	Repeat anesthesia	Other
Communicate with family	Control bleeding, as needed	
Inspect and palpate lesion	Other	
Mark clinical margins		
Administer anesthetic		
Wait for anesthesia		
Other		
20550 **INJECTION TENDONS AND TRIGGER POINTS**		
Communicate with other professionals	Locate injection site	Cleanse area
Review options	Give injection	Apply bandage
Review x-rays	Other	Monitor patient
Discuss procedure with patient		Instruct re: home care
Discuss complications		Discuss condition
Obtain consent		Complete medical record
Communicate with family		Other
Prepare injection		
Place patient on barrier		
Physician gloves		
Other		

(continued)

Pre-Service	Intra-Service	Post-Service
20605		
ARTHROCENTESIS		
Explain procedure	Administer anesthetic	Cleanse area
Discuss complications	Insert needle	Apply bandage
Obtain consent	Inject medication	Monitor complications
Verify instruments	Note joint distension	Move joint, verify pharmacy location
Position patient	Remove needle	Instruct patient
Mark injection site	Other	Complete medical record
Prepare injection site		Communication to primary physician
Other		Communicate to insurance
		Other
20610		
ARTHROCENTESIS		
Explain procedure	Insert needle	Cleanse area
Discuss complications	Inject medication	Apply bandage
Obtain consent	Remove needle	Monitor complications
Verify instruments	Other	Move joint, verify pharmacy location
Position patient		Instruct patient
Mark injection site		Complete medical record
Prepare injection site		Communication to primary physician
Other		Communicate to insurance
		Other

(continued)

Pre-Service	Intra-Service	Post-Service
23412		
REPAIR ROTATOR CUFF, OPEN		
Order antibiotics	Make incision over shoulder	Apply dressing and sling
Confirm selections and timing	Place retractors	Monitor patient
Write preadmission orders	Excise bursa	Assist in patient transfer
Review test results	Expose rotator cuff	Monitor transport
Perform History and Physical	Avulse supraspinatus	Discuss post-op with staff
Meet with patient and family	Avulse infraspinatus	Communication with patient and family
Review procedure with patient and family	Attend to tear	Write operative note
Review post-op care	Resect tendon	Place note in chart
Review consent	Apply sutures	Dictate report
Verify supplies are available	Abrade bone	Communication with referring physician
Monitor patient positioning	Place sutures	Assess operated extremity
Pad bony prominences	Place bone anchors	Discuss post-op with patient
Apply drapes	Re-approximate tendon	Write prescriptions
Assess patient position	Inspect security of tendon	Complete medical record
Position shoulder on surgery table	Apply additional anchors	Examine patient
Place bolster	Repair deltoid fascia	Answer questions
Mark incisions	Inspect wound	Remove dressing and sling
Prep skin	Irrigate wound	Assess wound
Prep and drape shoulder	Close wound	Remove sutures
Scrub and gown	Other	Assess extremity
Take "time out"		Redress wound
Other		Order therapy
		Supervise rehabilitation
		Discuss progress with Primary care physician
		Write prescriptions
		Dictate notes
		Other

(continued)

Pre-Service	Intra-Service	Post-Service
27130		
HIP RECONSTRUCTION		
Review imaging, pathology, studies	Incise skin and fascia	Splint
Review radiographs, if necessary	Take glutei off femur	Monitor stabilization
Review preoperative lab test	Complete leg length assessment	Communicate with family
Consult with referring physician	Dislocate femoral head	Communication with other professionals
Communication with patient and family	Perform femoral neck osteotomy	Hospital visits and services
Explain risks and benefits	Find femoral canal	Monitor lab reports
Obtain consent	Perform sequential raspings	Remove of drains and dressings
Template the case	Achieve rotation and stability	Supervise therapy
Measure leg	Use calcar planer	Order and review x-rays
Assess center of rotation	Perform dissection and releases	Other
Assess proper height for cut	Expose socket	Perform medication management
Assess sizing of components	Place retractors	Arrange discharge
Scrub	Remove excess tissue and bone	Instruct re: continuing care
Arrange intraoperative cell saver	Find base of acetabulum	Prepare discharge records
Position patient	Place reamers	Post-discharge office-visits, 90 days
Assess leg length	Seat trial implants	Remove sutures
Mark incision	Measure stability and length	Evaluate imaging and lab reports
Supervise prep and draping the pat	Place drill and insert screws	Review lab values
Ensure instruments available	Place central hole sealer	Adjust medication
Other	Clean soft tissue	Attend to hip dislocation
	Place and tap lining	Supervise care
	Irrigate copiously	Direct physical therapy
	Assess leg length	Other
	Place head/neck	
	Reduce hip	
	Take x-ray	
	Verify position of components	
	Count sponges and needles	
	Place deep drain	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
27447		
KNEE ARTHROPLASTY		
Review imaging, pathology studies	Elevate tourniquet	Apply dressing
Review preoperative test	Use incision to expose joint	Apply splint or CPM
Consult with referring physician	Evert patella	Monitor patient stabilization
Communication with patient and family	Elevate and remove soft tissue	Communicate with family
Explain risks and benefits	Expose and visualize joint	Communication with other professionals
Obtain consent	Evaluate ligament balance	Perform hospital visits
Template the case	Perform soft tissue releases	Monitor lab reports
Scrub	Remove tissue and osteophytes	Remove of drains and dressings
Arrange intraoperative cell saver	Release cruciate ligaments	Supervise therapy
Position patient	Measure patella	Order and review x-rays
Mark incision	Resect surface	Manage medication
Supervise prepping and draping	Select component size	Surgeon performs examination
Ensure instruments available	Drill fixation holes and canal	Instruct re: continuing care
Other	Apply cutting block	Prepare discharge records
	Confirm alignment	Remove sutures
	Evaluate femur	Evaluate imaging and lab reports
	Select implant size	Review lab values
	Excuse cruciate ligament	Adjust medication
	Resect tissue	Supervise recovery
	Sublux tibia	Oversee therapy
	Apply tibia cutting guide, cut	Other
	Size tibia and prepare bone	
	Insert trial components	
	Perform trial reduction	
	Assess alignment and balance	
	Refine alignment and balance	
	Place polyethylene insert	
	Confirm stability, alignment	
	Release tourniquet	
	Place deep drain and close wound	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
29827		
ARTHROPLASTY SHOULDER		
Review imaging studies	Make incision	Apply dressing and sling
Review lab studies	Insert arthroscope	Monitor stabilization
Consult with referring physician	Identify surfaces and structures	Consult with patient and family
Consult with other professionals	Create anterior portal	Discuss post-op regimen
Apprise patient and family	Insert probe	Communication with other professionals
Discuss risks	Confirm pathology	Complete reports and orders
Obtain consent	Note tendons	Coordinate care
Go to operating room	Mark tendons	Check vital signs
Verify equipment available	Resect tendons, if necessary	Assess extremity
Bring patient to operating room	Address retraction	Evaluate and review medications
Position patient	Perform repairs	Review procedure with patient
Pad bony prominences	Move arthroscope	Review restrictions with patient
Place axillary roll	Evaluate tear	Assess extremity
Apply drapes	Create lateral portal	Remove sling
Check patient position	Ensure adequate release	Evaluate range of motion
Perform exam under anesthesia	Create shallow trough	Assess wound
Prep and drape arm	Place sutures	Redress wound
Place sterile sleeve	Place bone anchors	Order therapy
Place shoulder holder	Pass and tie sutures	Clarify restrictions
Palpate and mark landmarks	Reinspect cuff	Supervise rehabilitation
	Remove arthroscope	Order and review radiographs
	Close portals	Manage antibiotics
	Inject Marcaine	Manage pain medication
	Apply dressing	Remove sutures
	Transfer patient	Evaluate lab reports
		Communication with other professionals
		Communication with patient and family
		Monitor patient follow-ups

(continued)

Pre-Service	Intra-Service	Post-Service
33208		
PACEMAKER INSERTION		
Review history	Ensure ECG and monitor function	Ensure blood pressure and heart rate are stable
Review prior studies	Administer sedation	Write postoperative orders
Review physical exam	Position patches	Communicate with family
Determine prior procedures	Prep and drape patient	Communication with referring physician
Note medications	Perform under flouroscopic guidance	Review results with patient
Review pre-op tests	Direct technical personnel	Dictate note
Consider renal insufficiency	Infiltrate skin with anesthetic	Interpret lead, pulse, rhythm
Ensure renal protection and hydration	Incise and dissect skin	Review and sign report
Estimate equipment range	Produce a pocket	Send report to primary care physician and referring physician
Ensure equipment available	Use electrocautery	Review post-op PA and x-ray
Review procedure with patient and family	Obtain vein access	Review telemetry or holter monitor
Obtain consent	Avoid punctures / complications	Test pacemaker function
Assess airway	Position J-wire	Check incision and pocket
Assess respiratory status	Repeat for second venous access	Communication with patient and family
Evaluate required sedation	Introduce ventricular lead	Discuss follow-up
Arrange anesthesia, if necessary	Shape lead stylet	Discuss post-op care
Check interventional suite	Position lead	Other
Check equipment function	Exchange stylet	
Ensure safety compliance	Assess lead position	
Ensure personnel familiarity	Position suture tie down sleeve	
Supervise equipment selection	Suture sleeve to lead and fascia	
Assure equipment available	Repeat for atrial lead	
Review prior studies	Test stimulation of leads	
Don protection	Inspect and irrigate pocket	
Position patient	Interrogate and program pacemaker	
Other	Place leads and tighten screws	
	Wrap leads	
	Place generator in pocket	
	Close pocket and apply dressing	
	Reinterrogate pacemaker	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
33249		
PACEMAKER INSERTION		
Perform history	Perform procedure under monitoring	Monitor vital signs
Perform physical exam	Prep patient	Review x-ray and ECG
Review lab tests	Give antibiotic prophylaxis	Assess characteristics of leads
Discuss risks with patient	Place under sedation / anesthesia	Determine final settings
Obtain consent	Inject anesthetic	Assess wound
Document history and exam	Make incision	Instruct re: post-operative care
Consult primary physician	Perform dissection	Determine pacemaker settings
Decide to proceed with surgery	Insert leads	Interrogate ICD
	Position leads	Exercise patient
	Confirm characteristics	Assess settings
	Reposition leads	Assess wound
	Attach pacemaker/generator	Remove dressing
	Place generator and leads in pocket	Prescribe medications
	Assess characteristics of leads	
	Induce fibrillation	
	Determine defibrillation threshold	
	Reposition leads, if necessary	
	Close incision	
	Dress wound	
	Document services	
	Generate report	
	Communication with patient and family	
	Communication with referring physician	

(continued)

Pre-Service	Intra-Service	Post-Service
33405		
CARDIAC VALVE PROCEDURE		
Perform history	Make incision, divide sternum	Apply dressings
Perform physician exam	Cauterize edges	Remove drapes
Identify contraindications	Place wax or paste	Move to ICU
Assess patient	Inspect aorta	Monitor patient
Write preoperative orders	Give heparin	Observe drainage
Review preoperative work-up	Place sutures	Sign OR forms
Review reports	Insert cannulas	Indicate diagnosis and procedure
Assess cardiology, pulmonary	Initiate bypass	Obtain x-ray
Review plan	Place vent, initiate cooling	Write postoperative orders
Other	Place cannulas	Write operative note
Review procedure with patient and family	Clamp aorta	Establish short term goals
Review expected outcome	Administer cardioplegia	Review procedure with patient and family
Discuss risks	Administer hypothermia	Dictate report
Obtain consent	Open aorta	Communication with referring physician
Confirm start time	Remove native aortic valve	Communicate to insurance
Notify patient and family	Debride calcium	Coordinate care
Arrange for surgical assist	Measure annulus	Evaluate neurological state
Change into scrubs	Select prosthesis	Monitor anesthesia
Identify patient	Other	Other
Other		

(continued)

Pre-Service	Intra-Service	Post-Service
33405 (continued)		
CARDIAC VALVE PROCEDURE		
Mark incision	Place sutures	Administer sedatives as needed
Answer concerns	Remove clamp	Repeat neurological evaluation
Check with lab	Resuscitate heart	Assess hemodynamic condition
Review anesthesia	Remove air monitoring	Evaluate cardiac rhythm
Plan monitoring	Place pacing wires	Consider pacemaker
Review positioning	Remove vent	Assess arrhythmias
Verify drug administration	Discontinue bypass	Correlate pressures
Review ECG	Remove cannulas	Administer fluids
Place catheter	Repair site	Adjust agents
Other	Other	Other
Position patient	Irrigate wound	Evaluate perfusion
Scrub, gown, glove	Place drains	Monitor bleeding
Prep and drape patient	Re-approximate sternum	Assess drainage
Other	Close incision	Other
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
33518		
CORONARY ARTERY SURGERY		
Discuss grafts	Identify target vessels	Intensive care
Discuss incisions	Open artery	Ventilator hours
Discuss potential problems	Tailor vein end	Hospital stay
Other	Construct anastomoses	Additional office work
	Probe anastomoses	Other
	Ensure patency	
	Perform aortotomy	
	Tailor vein ends	
	Ensure graft lengths	
	Construct anastomoses	
	Inspect anastomoses	
	Assess inflowithoutflow	
	Terminate bypass	
	Conclude operation	
	Close incisions	
	Suture/drain as needed	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
43235		
UGI ENDOSCOPY DIAGNOSTIC		
Review symptoms	Start IV access	Transfer patient to recovery
Review history	Administer sedation	Assess vital signs
Assess need for antibiotics	Insert endoscope	Dictate report
Review allergies	Examine duodenal mucosa	Review findings, when stable
Note medications	Withdraw endoscope to stomach	Other
Assess airway	Retroflex endoscope	
Perform cardiopulmonary evaluation	Examine gastric fundus	
Review lab studies	Straighten endoscope	
Review x-rays	Examine gastric mucosa	
Review procedure with patient	Withdraw endoscope to esophagus	
Obtain consent	Measure gastro-esophageal junction	
Other	Assess presence of hernia	
	Examine esophageal mucosa	
	Withdraw endoscope	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
43239		
UGI ENDOSCOPY BIOPSY		
Review symptoms	Start IV access	Transfer patient to recovery
Review history	Administer sedation	Assess vital signs
Assess need for antibiotics	Insert endoscope	Dictate report
Review allergies	Examine duodenal mucosa	Review findings, when stable
Note medications	Withdraw endoscope to stomach	Other
Assess airway	Retroflex endoscope	
Perform cardiopulmonary evaluation	Examine gastric fundus	
Review lab studies	Straighten endoscope	
Review x-rays	Examine gastric mucosa	
Review procedure with patient	Perform biopsy(ies)	
Obtain consent	Withdraw endoscope to esophagus	
Other	Measure gastro-esophageal junction	
	Assess presence of hernia	
	Examine esophageal mucosa	
	Withdraw endoscope	
	Other	
45378		
DIAGNOSTIC COLONOSCOPY		
Review symptoms	Start IV access	Transfer patient to recovery
Review history	Administer sedation	Assess vital signs
Assess need for antibiotics	Insert colonoscope	Dictate report
Note medications	Identify ileo-cecal valve	Review findings, when stable
Assess airway	Intubate terminal ileum	Other
Perform cardiopulmonary evaluation	Withdraw through colon	
Review lab studies	Examine colon mucosa	
Review x-rays	Retroflex colonoscope	
Review procedure with patient	Examine rectal mucosa	
Obtain consent	Straighten colonoscope	
Other	Withdraw colonoscope	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
45380		
COLONOSCOPY AND BIOPSY		
Review symptoms	Start IV access	Transfer patient to recovery
Review history	Administer sedation	Assess vital signs
Assess need for antibiotics	Insert colonoscope	Dictate report
Note medications	Identify ileo-cecal valve	Review findings, when stable
Assess airway	Intubate terminal ileum	Other
Perform cardiopulmonary evaluation	Perform biopsy(ies)	
Review lab studies	Withdraw through colon	
Review x-rays	Examine colon mucosa	
Review procedure with patient	Retroflex colonoscope	
Obtain consent	Examine rectal mucosa	
Other	Straighten colonoscope	
	Withdraw colonoscope	
	Other	
45384		
COLONOSCOPY		
Review symptoms	Start IV access	Transfer patient
Review history	Administer sedation	Assess vital signs
Assess needs	Insert colonoscope	Dictate report
Review allergies	ID ileo-cecal valve	Review findings
Review medications	Intubate ileum	Other
Pre-anesthetic exam	Remove tumors	
Assess airway	Remove polyps	
Cardiopulmonary evaluation	Remove lesions	
Review lab studies	Retroflex colonoscope	
Review x-rays	Straighten colonoscope	
Review risks and benefits	Withdraw colonoscope	
Obtain consent	Other	
Other		

(continued)

Pre-Service	Intra-Service	Post-Service
45385		
LESION REMOVAL COLONOSCOPY		
Review symptoms	Start IV access	Transfer patient to recovery
Review history	Administer sedation	Assess vital signs
Assess need for antibiotics	Insert colonoscope	Dictate report
Note medications	Identify ileo-cecal valve	Review findings, when stable
Assess airway	Intubate terminal ileum	Other
Perform cardiopulmonary evaluation	Remove tumor, polyp, or lesion	
Review lab studies	Withdraw through colon	
Review x-rays	Examine colon mucosa	
Review risks and benefits	Retroflex colonoscope	
Obtain consent	Examine rectal mucosa	
Other	Straighten colonoscope	
	Withdraw colonoscope	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
47562 **LAPAROSCOPIC LIVER OR GALL BLADDER PROCEDURE**		
Select and order antibiotics	Make incision	Apply Steristrips and dressings
Confirm timing and administration	Expose and incise fascia	Protect wound
Assure appropriate DVT prophylaxis	Incise midline	Transfer patient
Assess need for beta-blockers	Place sutures	Discuss care with staff
Order beta-blockers as required	Open peritoneum	Review post-operative labs
Review work-up	Place trocar	Communicate with family
Reexamine patient	Attach sutures	Write operative note
Update history and physical	Insufflate abdomen	Write post-operative note
Review test results	Monitor changes	Dictate report
Review procedure with patient and family	Insert camera	Communication with referring physician
Mark incision	Instruct assistant	Discharge patient from recovery
Confirm with patient	Explore abdominal cavity	Write orders
Obtain consent, including witness	Inject anesthesia	Auscultate patient
Review anesthesia	Place trocar	Manage dressing
Verify equipment available	Place ports	Continue prophylaxis
Transfer patient	Retract liver	Order beta-blockers as required
Position patient	Perform laparoscopy	Order antibiotics as required
Install Foley catheter	Lyse adhesions	Chart progress and assess pain
Assist anesthesia team	Grasp gall bladder	Manage drain
Place line	Fix gall bladder in place	Write prescriptions and orders
Induct anesthesia	Dissect cystic duct	Discuss home care
Intubate	Dissect triangle of Calot	Discharge patient
Prep skin	Identify anomalies	Complete medical records
Mark incisions	Place clips	Remove staples or sutures
Scrub and gown	Reconfirm cystic artery	Monitor healing
Take "time out"	Dissect cystic artery	Communication with patient and family
Other	Dissect gallbladder free	Write prescriptions
	Place gallbladder over liver	Review labs and films
	Achieve hemostasis	Communication with referring physician
	Other	Other

(continued)

Pre-Service	Intra-Service	Post-Service
47563 **LAPAROSCOPIC LIVER OR GALL BLADDER PROCEDURE**		
Order antibiotics	Induce pneumoperitoneum	Apply dressing
Confirm timing	Monitor changes	Monitor patient
Administer DVT prophylaxis	Insert camera	Protect wound
Assess beta-blocker need	Ensure adequate image	Transfer patient
Review work-up	Explore abdominal cavity	Discuss post-op care
Review results	Retrace liver	Write operative note
Meet with patient and family	View organs	Write post-operative note
Review procedure with patient and family	Lyse adhesions	Dictate report
Review post-op care	Decompress gallbladder	Call referring physician
Re-examine patient	Dissect cystic duct	Discharge patient
Update H&P	Identify junction with gallbladder	Write orders
Mark incision	Expose triangle of Calot	Examine patient
Confirm with patient	Occlude systic duct	Auscultate
Obtain consent	Position patient	Manage dressings
Review anesthesia	Maneuver equipment	Continue prophylaxis
Verify supplies are available	Perform cholangiography	Assess beta-blocker need
Transfer patient	Inject contrast	Assess antibiotic need
Position patient	Interpret images	Document progress
Scrub and gown	Free gallbladder	Other
Take "time out"	Store gallbladder	Assess pain scores
Other	Irrigate field	Monitor renal function
	Aspirate debris	Review notes
	Inspect fossa	Write orders
	Achieve hemostasis	Chart progress
	Inspect arteries and stumps	Answer questions
	Place drain	Advance diet
	Ensure no bleeding	Manage drain
	Other	Write prescriptions
		Other

(continued)

Pre-Service	Intra-Service	Post-Service
47563 (continued) **LAPAROSCOPIC LIVER OR GALL BLADDER PROCEDURE**		
	Aspirate carbon dioxide	Review post-op care
	Close defects	Remove staples
	Confirm supply count	Dictate notes
	Other	Other
49505 **REPAIR IGUINAL HERNIA**		
Administer prophylaxis	Make incision	Apply dressings
Write orders	Divide tissues	Monitor anesthesia
Administer antibiotics	Secure hemostasis	Transfer patient
Review work-up	Identify fascia	Transport patient
Re-examine patient	Incise and grasp fascia	Discuss post-op care
Review results	Extend incision	Write operative note
Meet with patient and family	Develop flaps	Write post-operative note
Review procedure with patient and family	Expose canal	Dictate report
Review post-op care	Insert retractor	Call referring physician
Mark incision	Mobilize nerve	Discuss procedure with family
Confirm with patient	Employ vessel loop	Answer questions
Obtain consent	Dissect spermatic cord	Write orders
Review anesthesia	Explore for hernial sac	Write prescriptions
Verify supplies are available	Dissect hernial sac	Discuss restrictions
Transfer patient	Inspect hernial sac	Discharge patient
Assist anesthesia	Transfix with suture	Complete medical record
Install Foley catheter	Approximate fascia	Examine patient
Prep skin	ID conjoint tendon	Remove sutures
Clip hair	Place mesh	Review activity
Scrub and gown	Assess internal ring	Review restrictions
	Ensure hemostasis	Monitor healing

(continued)

Pre-Service	Intra-Service	Post-Service
49505 (continued)		
REPAIR IGUINAL HERNIA		
Take "time out"	Return ilioinguinal nerve	Answer questions
Other	Infiltrate with anesthetic	Write prescriptions
	Close fascia	Order labs/films
	Evaluate external ring	Discuss progress
	Re-approximate fascia	Dictate notes
	Examine operative site	Other
	Irrigate with antibiotic	
	Conduct supply count	
	Place sutures	
	Re-approximate skin	
	Other	
50590		
LITHOTRIPSY		
Review prior studies	Check stone position	Post-operative care
Communication with other professionals	Adjust anesthesia	Stabilize patient
Communicate w patient	Determine treatment energy	Write postoperative orders
Explain risks	Commence treatment	Communicate with family
Obtain consent	Monitor treatment	Communication with referring physician
Dress for surgery	Fragmentation occurs	Discharge day management
Wait for anesthesia	Other	Post-operative hospital visits
Position patient		Post-discharge office visits
Prep patient		Post-operative care
Drape patient		Other
Scrub and gown		
Prepare equipment		
Other		

(continued)

Pre-Service	Intra-Service	Post-Service
52000		
CYSTOSCOPY		
Check video equipment	Inject anesthetic	Transfer patient from table
Check schedule	Apply penile clamp	Transfer patient to recovery
Ensure instruments available	Assemble equipment	Conduct pain assessment
Ensure personnel available	Connect video system	Write orders and prescriptions
Notify patient	Apply defogger	Discuss procedure and findings
Make images available	Connect irrigation source	Call referring physician
Change into scrubs	Connect life source	Diagram bladder
Discuss with anesthesiologist	Insert endoscope	Dictate narrative
Review procedure with patient and family	Inspect patient	Schedule appointment
Review post-op care	Identify and assess	Other
Answer questions	Other	
Obtain consent		
Evaluate need for antibiotics		
Identify patient		
Position patient		
Prep patient		
Other		

(continued)

Pre-Service	Intra-Service	Post-Service
52224 **CYSTOURETHROSCOPY PROCEDURES OF URETHRA AND BLADDER**		
Check video equipment		
Check schedule	Inject anesthetic	Transfer patient
Ensure instruments available	Assemble equipment	Conduct pain assessment
Ensure personnel available	Connect video	Write orders
Patient notification	Apply defogger	Write prescriptions
Change into scrubs	Connect irrigation source	Discuss procedure
Discuss anesthesia	Connect light source	Discuss findings with patient
Review procedure with patient and family	Insert endoscope	Call referring physician
Answer questions	Inspect patient	Complete mapping diagram
Obtain consent	Assess bladder neck	Dictate narrative
Take "time out"	Inspect trigone	Schedule follow-up
Position patient	Identify urethral orifices	Other
Prep and drape	Check for efflux of urine	
Other	Inspect bladder mucosa	
	Assess bladder	
	Treat lesions	
	Retroflex scope	
	Inspect dome of bladder	
	Drain bladder	
	Disconnect equipment	
	Remove endoscope	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
52281 **CYSTOURETHROSCOPY PROCEDURES OF URETHRA AND BLADDER**		
Review records	Position patient	All post-op care
Communicate with other professionals	Prep perineum	Stabilize patient
Communicate w patient	Drape perineum	Post-op orders
Explain procedure	Perform meatotomy	Communicate with patient
Obtain consent	Insert cystoscope	Call referring physician
Dress for surgery	Insert guidewire	Other follow-up care
Prep and drape	Remove cystoscope	Write prescriptions
Scrub	Pass dilator over guidewire	Other
Prep equipment	Utilize Heyman dilators	
Other	Pass cystoscope	
	Inspect prostatic channel	
	Inspect bladder neck	
	Inspect bladder	
	Remove cystoscope	
	Remove guidewire	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
52601		
CYSTOURETHROSCOPY		
Review lab results	Position patient	Awaken patient
Review medical record	Prepare genitalia	Attach irrigation
Write pre-op orders	Apply drapes	Irrigate Foley catheter
Change into scrub clothes	Place lubricating jelly	Transfer patient
Communication with patient and family	Assemble equipment	Review care with staff
Answer questions	Connect irrigation source	Communicate with family
Obtain consent	Connect light	Communication with patient
Communication with anesthesiologist	Insert endoscope	Discuss procedure with patient
Position patient	Inspect patient anatomy	Conduct pain assessment
Verify equipment available	Check for efflux of urine	Write orders
Take "time out"	Inspect bladder mucosa	Dictate report
Wait for anesthetic	Assess bladder	Communication with referring physician
Other	Inspect dome of bladder	Examine patient
	Drain bladder	Chart progress and assess pain
	Disconnect equipment	Irrigate clots
	Remove endoscope	Review medical record
	Dilate urethra	Communication with patient and family
	Perform meatomy, if necessary	Answer questions
	Perform urethrotomy, if necessary	Write orders
	Introduce resectoscope	Write note
	Remove obturator	Check lab values
	Drain bladder	Write prescriptions
	Place working element	Dictate discharge summary
	Assemble equipment	Remove Foley catheter
	Resect tissue	Assess voiding pattern
	Coagulate bleeders	Reinsert catheter, if necessary
	Irrigate bladder	Schedule office visit
	Remove equipment	Dictate notes
	Insert catheter	Communication with referring physician
	Inflate catheter	Other
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
55700		
BIOPSY OF PROSTATE		
Check schedule	Take "time out"	Transfer patient
Ensure equipment available	Position patient	Review care
Check with staff	Repeat rectal exam	Review medications
Notify patient	Dilate anus	Meet with patient
Review lab studies	Introduce probe	Discuss procedure
Ensure studies available	Infiltrate with anesthetic	Discuss outcome
Change into scrubs	Take biopsies	Discuss post-op care
Review procedure with patient and family	Remove biopsy gun	Conduct pain assessment
Review post-op care	Remove specimens	Discuss pathologist
Answer questions	Recock and insert gun	Call referring physician
Obtain consent	Repeat biopsy	Dictate report
Check pre-op procedures	Place samples	Other
Check patient	Remove probe	
Position patient	Apply pressure	
Other	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
55866 **LAPAROSCOPIC RADIAL PROSTATECTOMY**		
Review lab results	Position patient	Examine patient
Review medical records	Prep lower abdomen	Check wound(s)
Write orders	Drape lower abdomen	Check progress
Change into scrubs	Achieve pneumoperitoneum	Review medical records
Review procedure with patient and family	Place four trocars	Answer questions
Review post-op care	Other	Write orders
Answer questions		Write note
Speak to anesthesiologist		Write prescriptions
Position patient		Discuss post-op care
Verify instruments available		Dictate discharge summary
Other		Review bladder exercises
		Remove sutures
		Schedule follow-up
		Mark diagnosis
		Dictate notes
		Dictate letter to referrer
		Other

(continued)

Pre-Service	Intra-Service	Post-Service
63047		
DECOMPRESSION LUMBAR SPINE	Make incision	Turn patient
Review work-up	Expose spinous process	Reverse anesthesia
Write orders	Expose lamina	Transfer patient
Locate imaging studies	Remove process/lamina	Write note
Place imaging studies	Remove flavum	Examine patient
Review planned incision	Expose thecal sac	Check wound(s)
Review procedure with patient and family	Expose nerve roots	Check progress
Greet patient	Remove facets	Monitor patient
Review procedure	Expose nerve roots	Sign forms
Review outcomes	Perform foraminotomy	Discuss outcome
Mark operative site	Perform discectomy	Dictate report
Obtain consent	Irrigate wound	Communication with referring physician
Verify instruments available	Close wound	Dictate outcome
Review anesthesia	Apply dressings	Order and review films
Position patient	Other	Write orders
Induce anesthesia		Examine patient
Reposition patient		Chart progress
Pad patient		Discuss progress
Scrub and gown		Answer questions
Mark incisions		Review post-op care
Supervise prepping and draping		Write prescriptions
Other		Order films
		Review films
		Perform exams
		Monitor wounds
		Remove sutures
		Review brace
		Review progress
		Dictate notes
		Communication with referring physician
		Other

(continued)

Pre-Service	Intra-Service	Post-Service
64483 **TRANSFORMINAL LUMBAR INJECTIONS**		
Review records and studies	Identify affected foramen	Take patient to recovery
Communicate with other professionals	Infiltrate skin with anesthetic	Observe for neurological deficits
Communication with patient and family	Direct needle	Review procedure with patient
Obtain consent	Obtain necessary views	Review procedure with professionals
Dress and scrub	Perform contrast injection	Evaluate neurological condition
Prepare patient	Confirm needle tip location	Discharge from recovery area
Prepare equipment	Inject anesthetic	Other
Position patient	Inject steroid	
Drape injection site	Remove needle	
Other	Apply dressing	
	Other	
66821 **DISCISSION MEMBRANOUS CATARACT BY LASER**		
Complete ophthalmological exam	Seat patient	Monitor patient
Note visual acuity	Apply contact lens	Treat pressure
Note opacification	Deliver laser energy	Follow-up in 1-2 weeks
Examine macula	Apply test burns	Follow-up in 1-3 months
Rule out diseases	Confirm adequacy of energy	Other
Obtain consent	Adjust laser	
Review chart, history, exams	Other	
Instill medications, anesthetic		
Other		

(continued)

Pre-Service	Intra-Service	Post-Service
66982		
LENS PROCEDURE		
Review history	Prep and drape	See patient
Review exam	Place microscope	Give instructions
Review pre-op tests	Perform flap	Arrange follow-up
Counsel family	Make groove	See patient periodically
Document patient record	Make incision	Ensure wound stability
Other	Fix pupil	Obtain visual rehab
	Make incisions	Commence therapy
	Insert hooks	Other
	Retract iris	
	Photoemulsification	
	Remove hooks	
	Check wound(s)	
	Dress eye	
	Alternative: capsulotomy	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
66984		
LENS PROCEDURE		
Prepare patient	Transport patient to suite	Speak with patient and family
Ascertain correct eye	Position patient	Give instructions
Examine eye	Prep and drape operative site	Address questions
Rule out changes since last exam	Check adequacy of anesthetic	Give prognosis
Check adequacy of dilation	Apply anesthetic	Ascertain pat ability to leave
Administer antibiotics	Perform scrub, gown	See patient next day
Greet patient	Check devices	Follow-up exam
Address questions and concerns	Enter parameters	Take history of post-op course
Check chart and patient data	Check machine operation	Examine eye
Perform history and physical	Position microscope	Instruct re: medication use
Perform anesthetic block	Assure adequate reflex	Instruct re: activity
Give anesthesia	Communication with anesthesiologist	Instruct re: follow-up
Monitor vital signs	Place speculum and bridle-suture	Perform keratometry, topography
Guard against emergency	Raise conjunctiva	Ascertain stigmatism
Place compressive device	Make side-port incision	Perform spectacle examination
Other	Insufflate anterior chamber	Address complications
	Enter anterior chamber	Other
	Fashion opening in capsule	
	Loosen lens	
	Perform hydrodissection	
	Check handpiece function	
	Carry out phacofragmentation	
	Rotate and disassemble lens	
	Remove cataractous material	
	Remove phacoemulsification tip	
	Introduce irrigation-aspiration tip	
	Clean residual material	
	Vacuum and polish lens	
	Open larger incision	
	Deliver intraocular lens	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
67028		
INTRAVITREAL EYE INJECTION		
Review visual acuity	Apply anesthetic	Instruct re: post-operative care
Review intraocular pressure	Apply antisepsis solution	Review potential complications
Confirm eye to be treated	Draw drug into syringe	Complete operative note
Obtain consent	Place lid speculum	Other
Answer questions	Measure injection location	
Review studies	Instruct pat to position eye	
Re-confirm eye to be treated	Pass needle through pars plana	
Examine eye	Confirm needle position	
Position patient	Inject drug	
Other	Remove needle	
	Control bleeding	
	Confirm nerve perfusion	
	Measure intraocular pressure	
	Irrigate eye	
	Remove residual iodine	
	Other	
67210		
DESTRUCTION RETINA OR CHOROID	Perform photocoagulation	Assess treatment adequacy
Measure vision	Use angiogram as guide	Check for complications
Dilate pupils	Close microaneurysms	Counsel patient
Apply anesthesia	Attend to capillary dropout	Review post-op care
Review angiograms	Attend to diffuse leakage	Schedule follow-up
Place in monitoring position	Assess patient response	Administer laser therapy
Other	Assess tissue reaction	Other
	Assess opacity	
	Assess lesion	
	Pause frequently	
	Ensure steadiness	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
67228 **TREATMENT OF RETINAL LESION**		
Review medical records	Measure visual acuity	Irrigate eye
Obtain history	Dilate pupil	Apprise progress
Review testing	Examine fundus	Instruct re: complications
Discuss procedure	Ensure laser appropriateness	Instruct re: post-op
Obtain consent	Apply anesthetic	Write orders
Other	Administer laser	Prepare operative note
	Apply contact lens or anesthetic	Schedule follow-up
	Other	Notify referring physician
		Other
70450 **CT HEAD OR BRAIN WITHOUT CONTRAST**		
Review reason for exam	Supervise scout views	Review, edit, sign report
Review history	Prescribe area of coverage	Discuss findings with referring physician
Review previous studies	Supervise acquisition of source images	Other
Determine CT protocol	Review image data	
Confirm non-contrast needed	Assure adequacy of coverage	
Deter need for Additional images	Assess need, repeats or reconstruction	
Communicate protocol	Supervise reconstruction of images	
Other	Assess need for Additional images	
	Interpret findings	
	Compare to previous studies	
	Dictate report	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
70486		
CT FACE WITHOUT CONTRAST		
Review reason for exam	Interpret scout topograms	Review, edit, sign report
Review history	Review image data	Discuss findings with referring physician
Review previous studies	Assure adequacy of coverage	Other
Determine CT protocol	Assess need for repeat sections	
Confirm non-contrast needed	Review axial images	
Communicate protocol	Assess maxillofacial area	
Other	Review area for injury or process	
	Interpret examination	
	Compare to previous studies	
	Dictate report	
	Other	
70551		
MRI BRAIN WITHOUT CONTRAST		
Discuss exam	Review images	Review and sign report
Review history	Determine if additional sequences	Direct copies to referring physician
Set protocol	Inform technician, if necessary	Talk to referring physician
Select pulse sequences	Interpret study	Other
Review prior studies	Prepare report	
Other	Other	
70553		
MRI BRAIN WITHOUT CONTRAST		
Discuss exam	Review unenhanced exam	Review and sign report
Review history	Acquire pre-contrast sequences	Direct copies to referring physician
Set protocol	Review enhanced portion of exam	Talk to referring physician
Select pulse sequences	Assure needed sequences obtained	Other
Review prior studies	Interpret exam	
Other	Compare unenhanced and enhanced	
	Deter pathologic enhancement	
	Compare to prior exams	
	Interpret study	
	Prepare report	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
71010		
CHEST X-RAY, SINGLE VIEW		
Review reason for exam	Supervise technician performing exam	Review and sign report
Review history	Interpret exam	Discuss findings with referring physician
Review prior studies	Compare to previous studies	Other
Other	Dictate report	
	Other	
71020		
CHEST X-RAY, TWO VIEWS		
Review reason for exam	Supervise technician performing exam	Review and sign report
Review history	Interpret exam	Discuss findings with referring physician
Review prior studies	Compare to previous studies	Other
Other	Dictate report	
	Other	
71250		
CT THORAX WITHOUT CONTRAST		
Review reason for exam	Supervise acquisition of scout views	Review and sign report
Review history	Prescribe area of coverage	Discuss findings with referring physician
Review prior studies	Supervise acquisition of source images	Other
Determine appropriate protocol	Review image data	
Confirm non-contrast needed	Assure adequacy of coverage	
Deter need for Additional images	Assess need, repeats or reconstruction	
Communication protocol to techs	Supervise reconstruction of images	
Other	Assess need for other images	
	Interpret findings	
	Compare to previous studies	
	Dictate report	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
71260		
CT THORAX WITH CONTRAST		
Review reason for exam	Review scout radiographs	Review and sign report
Review history	Supervise admin of contrast	Discuss findings with referring physician
Review prior studies	Review CT image data	Other
Determine appropriate protocol	Assure adequacy of coverage	
Communication protocol to techs	Assess need for repeat sections	
Other	Interpret exam	
	Compare to previous studies	
	Dictate report	
	Other	
71275		
CT ANGIOGRAPHY, NONCORONARY		
Review reason for exam	Review scout topograms	Review and sign report
Review history	Review image data	Discuss findings with referring physician
Review prior studies	Assure adequacy of coverage	Other
Determine appropriate protocol	Review and assess images	
Confirm non-contrast needed	Review and assess reconstruction	
Communication protocol to techs	Assess relevant anatomy	
Other	Review soft tissues	
	Review course and contours	
	Review skull and mandible	
	Review mastoid and middle ear	
	Review posterior fossa	
	Review superior mediastinum	
	Review lung apices	
	Interpret exam	
	Compare to previous studies	
	Dictate report	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
72125 **CT SPINE** Review reason for exam Review history Review prior studies Determine exam protocol Confirm non-contrast needed Communication with technologists Other	Review topograms Review CT image data Assure coverage Assure adequacy of coverage Review axial images Review reconstructions Review soft tissues Review vascular structures Review skull and mandible Review mastoid and ear Review posterior fossa Review superior mediastinum Review lung apices Interpret exam Compare to previous studies Dictate report Other	Review and sign report Communication with referring physician Other
72141 **MRI SPINE** Discuss exam Review history Set protocol Select pulse sequences Review prior studies Other	Review images Determine if additional sequences are needed Inform tech, if necessary Interpret study Prepare report Other	Review and sign report Direct copies to referring physician Direct verbal report to referring physician Other

(continued)

Pre-Service	Intra-Service	Post-Service
72148 **MRI SPINE AND LUMBAR WITHOUT CONTRAST**		
Discuss exam Review history Set protocol Select pulse sequences Review prior studies Other	Review images Determine if additional sequences are needed Inform tech, if necessary Interpret study Prepare report Other	Review and sign report Direct copies to referring physician Talk to referring physician Other
72158 **MRI SPINE AND LUMBAR WITH AND WITHOUT CONTRAST**		
Discuss exam Review history Set protocol Select pulse sequences Review prior studies Other	Review unenhanced exam Acquire pre-contrast sequences Review enhanced portion of exam Assure needed sequences obtained Interpret exam Compare enhanced and unenhanced Deter pathologic enhancement Compare to prior exams Interpret study Prepare report Other	Review and sign report Direct copies to referring physician Talk to referring physician Other
72171 **MRI SPINE WITHOUT CONTRAST**		
Discuss exam Review history Set protocol Select pulse sequences Review prior studies Other	Review images Determine if additional sequences are needed Inform tech, if necessary Interpret study Prepare report Other	Review and sign report Direct copies to referring physician Talk to referring physician Other

(continued)

Pre-Service	Intra-Service	Post-Service
74176 **CT ABDOMEN AND PELVIS WITHOUT CONTRAST**		
Review reason for exam	Supervise acquisition of scout views	Review and sign report
Review history	Prescribe area of coverage	Discuss with referring physicians
Review prior studies	Supervise acquisition of axial sections	Other
Determine appropriate protocol	Review image data	
Confirm non-contrast needed	Assure adequacy of coverage	
Communication protocol to techs	Assess need for other images	
Other	Supervise reconstruction of images	
	Interpret soft-tissue window	
	Interpret bone window images	
	Interpret liver window images	
	Interpret lung window images	
	Compare to previous studies	
	Dictate report	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
74177 **CT ABDOMEN AND PELVIS WITH CONTRAST**		
Review reason for exam Review history Review prior studies Determine appropriate protocol Confirm non-contrast needed Communication protocol to techs Other	Supervise insertion of catheter Supervise setup of injector Supervise acquisition of scout views Prescribe area of coverage Supervise use of injector Supervise acquisition of axial sections Monitor contrast Review image data Assure adequacy of coverage Assess need for additional sections Supervise reconstruction of images Interpret soft-tissue window Interpret bone window images Interpret liver window images Interpret lung window images Compare to previous studies Dictate report Other	Review and sign report Discuss with referring physicians Other

(continued)

Pre-Service	Intra-Service	Post-Service
74178 **CT ABDOMEN AND PELVIS WITH AND WITHOUT CONTRAST**		
Review reason for exam Review history, contraindications Review prior studies Determine appropriate protocol Communication protocol to techs Other	Supervise insertion of catheter Supervise setup of injector Prescribe area of coverage Supervise acquisition of axial sections Review image data Assure adequacy of coverage Supervise use of injector Supervise acquisition of axial sections Monitor contrast Review image data Assure adequacy of coverage Supervise reconstruction of images Interpret soft-tissue window Interpret bone window images Interpret liver window images Interpret lung window images Compare to previous studies Dictate report Other	Review and sign report Discuss with referring physicians Other
77080 **DXA BONE DENSITY STUDY**		
Review reason for exam Review history Review prior studies Other	Review scout images Assure satisfactory technique Interpret scan data Compare to established norms Compare to previous studies Dictate report Other	Review and sign report Discuss with referring physician Other

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Pre-Service	Intra-Service	Post-Service
78452		
MYOCARDIAL PERFUSION IMAGING		
Deter study appropriateness	Acquire stress and rest data	Review and sign report
Prescribe IV dose	Verify adequacy of data sets	Discuss results with referring physician
Oversee IV dose	Order additional imaging, if necessary	Discuss results with pat and family
Adjust protocol as necessary	Review images	Provide regulatory oversight
Assess cardiac rhythm	Review tomographic datasets	Other
Direct lead placement	Re-reconstruct, if necessary	
Answer questions	Compare tomographic datasets	
Review components of study	Score wall function and perfusion	
Other	Score wall motion	
	Attend to myocardial function	
	Judge myocardial scar	
	Note perfusion defects	
	Note geographic territories	
	Generate and review data	
	Compare data to images	
	Generate wall motion analysis	
	Note ejection fraction	
	Confirm correctness of calc	
	Review data	
	Refine qualitative impression	
	Compare to prior studies	
	Dictate report	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
88305 **TISSUE EXAM BY PATHOLOGIST**		
N/A Other	Review history Review previous studies Examine specimen Interpret test result Compare to previous studies Consider variations Identify findings Review literature Research Prepare report Communication with other professionals Other	N/A Other
88307 **SURGICAL PATHOLOGY**		
N/A Other	Review clinical history Review diagnostic studies Examine previous reports Communicate with other professionals Perform exam Interpret test result Compare to previous studies Consider statistical variations Identify findings Review literature Research test result Dictation and pathology report Report sign-out Communication with other professionals Other	N/A Other

(continued)

Pre-Service	Intra-Service	Post-Service
88309		
SURGICAL PATHOLOGY		
N/A	Review clinical history	N/A
Other	Review diagnostic studies	Other
	Examine previous reports	
	Communicate with other professionals	
	Perform exam	
	Interpret test result	
	Compare to previous studies	
	Consider statistical variations	
	Identify findings	
	Review literature	
	Research test result	
	Dictation and pathology report	
	Report sign-out	
	Communication with other professionals	
	Other	
88312		
SPECIAL STAINS		
N/A	Examine positive control	N/A
Other	Verify structures are stained	Other
	Examine patient sample	
	Examine presence of organisms	
	Interpret, morphologically	
	Correlate findings with pat history	
	Compose and dictate report	
	Edit and sign report	
	Communication results to caregivers	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
88331 **PATHOLOGY CONSULTATION DURING SURGERY**		
N/A	Receive specimen	N/A
Other	Review information from surgeon	Other
	Query medical record	
	Determine original diagnosis	
	Examine specimen	
	Maintain orientation	
	Ink margins, as appropriate	
	Section specimen	
	Embed tissues	
	Freeze tissue	
	Section tissue in a cryostat	
	Capture sections on glass slides	
	Evaluate stained slides	
	Formulate an interpretation	
	Present verbal report to surgeon	
	Record written report	
	Other	
88342 **IMMUNOHISTOCHEMISTRY**		
N/A	Perform immunohistochemistry	N/A
Other	Other	Other

(continued)

Pre-Service	Intra-Service	Post-Service
92133 **OPHTHALMIC COMPUTERIZED SCANNING**		
Boot computer	Align scanning head	N/A
Enter data	Adjust focus and brightness	Other
Examine patient	Obtain three scans	
Other	Examine for quality/adequacy	
	Obtain printout of mean image	
	Interpret printout/findings	
	Compare to previous studies	
	Dictate report	
	Other	
92134 **OPHTHALMIC COMPUTERIZED SCANNING**		
Prepare instrument	Position patient	N/A
Enter patient identifiers	Align scanner	Other
Assess fixation ability	Process images	
Describe procedures	Display output	
Other	Ensure image adequacy	
	Test fellow eye	
	Evaluate study quality	
	Interpret findings	
	Assess change, if follow-up	
	Correlate with clinical course	
	Prepare report	
	Send report to requesting physician	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
92557		
COMPREHENSIVE HEARING TEST		
Greet patient	Seat patient	Compile results
Review background	Place headphones	Generate report for referring physician
Record demographics	Explain test	Review findings, when stable
Other	Check ear canals	Other
	Test each ear at multiple Hz	
	Deter speech reception threshold	
	Deter speech discrimination	
	Other	
93000		
ELECTROCARDIOGRAM COMPLETE		
Review request	Review tracing	Prepare report
Review history	Make measurements	Sign report
Other	Make overall interpretation	Transmit to medical record
	Compare tracing to previous	Other
	Observe potential etiologies	
	Other	
93010		
ELECTROCARDIOGRAM REPORT		
Review request	Review tracing	Prepare report
Review history	Make measurements	Sign report
Other	Make overall interpretation	Transmit to medical record
	Compare tracing to previous	Other
	Observe potential etiologies	
	Other	

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Pre-Service	Intra-Service	Post-Service
93015		
CARDIOVASCULAR STRESS TEST		
Review medical records	Assess new symptoms	Review, edit, sign report
Review chart	Assess pharmacological stress	Discuss values with patient
Determine clinical questions	Answer questions	Discuss with referring physician
Other	Obtain consent	Other
	Supervise stress infusion	
	Assess adequacy of data	
	Treat untoward medical events	
	Treat side effects	
	Interpret resting ECG	
	Interpret serial ECGs	
	Review and analyze results	
	Dictate report	
	Other	
93016		
CARDIOVASCULAR STRESS TEST		
Review medical records	Assess new symptoms	N/A
Review chart	Assess stress versus treadmill	Other
Other	Answer questions	
	Obtain consent	
	Supervise infusion, if necessary	
	Assess adequacy of data	
	Treat untoward medical events	
	Treat side effects	
	Reviewithanalyze hemodynamics	
	Review and analyze arrhythmias	
	Review and analyze symptoms	
	Review functional capacity	
	Other	

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Pre-Service	Intra-Service	Post-Service
93018		
CARDIOVASCULAR STRESS TEST		
Review medical records	Assess adequacy of data	
Review chart	Interpret resting ECG	Review, edit, sign report
Deter questions to be answered	Interpret serial ECGs	Discuss values with patient
Other	Interpret timing, morphology, changes	Discuss with referring physician
	Review and analyze hemodynamics	Other
	Review and analyze arrhythmias	
	Review and analyze symptoms	
	Review functional capacity	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
93306 **TRANSTHORACIC** **ECHOCARDIOGRAPHY**		
Review information	Obtain structure and dynamics	Prepare report
Review records	Record on videotape or digitally	Review and correct report
Clarify indications	Make time-motion recordings	Sign report
Deter questions to be answered	View blood flow patterns	Review findings with requesting physician
Other	Record flow velocity	Facilitate patient management
	Verify suitability of images	Other
	Record additional views, if necessary	
	Review recorded views of heart	
	Analyze heart structure, dynamics	
	Note abnormalities in flow	
	Review velocity recordings	
	Verify quantitative measures	
	Assess heart function	
	Calculate pressure gradients	
	Calculate valve orifice areas	
	Calculate regurgitant volumes	
	Calc regurgitant fractions	
	Calc regurgitant orifice areas	
	Develop complete interpretation	
	Make anatomic, functional measures	
	Document sizes	
	Review tomographic views	
	Review hemodynamic data	
	Compare to previous studies	
	Deter if changes have occurred	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
93458		
CARDIAC CATHETERIZATION		
Prepare report	Administer conscious sedation	Discuss care with staff
Review and correct report	Verify sedation monitoring	Monitor patient
Sign report	Insert needle	Ensure hemostasis
Review findings with requesting physician	Insert guidewire	Discuss precautions with patient
Facilitate patient management	Remove needle	Examine patient prior to discharge
Other	Insert sheath/dilator	Review films and hemodynamics
	Remove dilator	Generate formal report
	Flush sidearm	Send report to referring physician
	Insert catheter	Discuss findings with patient
	Attach catheter to manifold	Recommend follow-ups
	Measure pressure	Other
	Check pressure and waveform	
	Test contrast injections	
	Perform injections with diff views	
	Remove catheter	
	Introduce additional catheters	
	Measure pressure	
	Attach catheter to power injector	
	Perform power injection	
	Disconnect power injector	
	Attach catheter to manifold	
	Perform pullback	
	Monitor pat throughout procedure	
	Remove catheter	
	Review images	
	Perform angiography	
	Treat side effects	
	Remove catheter and sheath	
	Achieve hemostasis	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
93880		
CEREBROVASCULAR ARTERIAL STUDIES		
Review equipment set-up	Evaluate arteries for flow	Review and sign report
Review history	Evaluate arteries for velocity	Direct copies to referring physician
Review risk factors	Evaluate arteries for stenosis	Prep report for referring physician
Other	Review previous studies	Other
	Look for interval changes	
	Interpret study	
	Prepare report	
	Other	
96372		
INJECTION SQ OR IM		
Provide and confirm orders	Provide direct supervision	Instruct re: immediate care
Interact with staff	Be available in office	Instruct re: ongoing care
Review plan	Assess response to treatment	Interact re: pat monitoring
Other	Other	Other
G0105		
COLORECTAL CANCER SCREENING		
Review symptoms	Start IV access	Transfer patient to recovery
Review history	Administer sedation	Assess vital signs
Assess need for antibiotics	Insert colonoscope	Dictate report
Review allergies	Identify ileo-cecal valve	Other
Note medications	Intubate terminal ileum	
Examine airway	Withdraw through colon	
Perform cardiopulmonary evaluation	Examine colon mucosa	
Review lab studies	Retroflex colonoscope	
Review x-rays	Examine rectal mucosa	
Review procedure with patient	Straighten colonoscope	
Obtain consent	Withdraw colonoscope	
Other	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
G0202		
SCREENING MAMMOGRAPHY		
Review clinical information	Review images	Discuss findings with patient
Discuss exam	Interpret images	Review and authenticate report
Other	Determine significant findings	Complete second interpretation
	Formulate recommendations	Review films
	Code using BIRADS terminology	Review disc with referring physician
	Dictate report for referring physician	Prepare report in lay language
	Make follow-up recommendations	Call results to referring physician
	Second review of images	Re-review images, if necessary
	Other	Review statistics
		Review quality assurance data
		Oversee mammography certification
		Prep for annual MQSA inspection
		Document MQSA compliance
		Other
G0204		
DIAGNOSTIC MAMMOGRAPHY		
Review screening mammography	Review requested views	Call results to referring physician
Decide on additional views	Compare with screening study	Discuss results with patient
Other	Request additional views, if necessary	Other
	Evaluate asymmetric density	
	Render interpretation	
	Dictate report for referring physician	
	Code using BIRADS terminology	
	Dictate report in lay language	
	Send report to patient	
	Other	

(continued)

Pre-Service	Intra-Service	Post-Service
G0206		
DIAGNOSTIC MAMMOGRAPHY		
Review history	Evaluate mammogram	Call results to referring physician
Review previous mammograms	Obtain additional views	Discuss results with patient
Other	Evaluate palpable mass	Other
	Interpret findings	
	Compare to previous studies	
	Dictate report for referring physician	
	Code using BIRADS terminology	
	Dictate report in lay language	
	Send report to patient	
	Other	

APPENDIX D
RECRUITMENT MATERIALS

This appendix includes various materials that were shared with potential and participating sites during the recruitment and engagement process:

- Overview of Project
- Overview of Primary Data Collection Process
- HIT Questionnaire and Worksheets

Objective of Study

We would like to inquire about your interest in taking part in an information-gathering study of Medicare's Physician Fee Schedule (PFS). The Centers for Medicare & Medicaid Services (CMS) has contracted with the Urban Institute (UI), Research Triangle Institute International (RTI), and Social and Scientific Systems (SSS) to collect data on the amount of physician time involved in the provision of a range of services, defined by CPT code. These time estimates will be based on reliable health information technology (HIT) administrative and clinical data sources (such as operating room logs, appointment schedules, time stamps from electronic health records (EHRs), etc.) and/or through direct observation. Previous work conducted by the UI/RTI/SSS team for CMS, ASPE, and MedPAC has shown that objective time data at the CPT code level are not readily available from secondary data sources for many types of services.

Physician time is an important part of the resource inputs to physician services. Original analysis by Harvard investigators, including Peter Braun, M.D., a member of our research team, found that when physicians in all specialties discussed their work, what was important to them was the time required, the knowledge and judgment they needed, the technical skill and physical effort, and the stress due to risk. Time was also the single most important factor in physicians' ratings of the work of surgical procedures. Further, time is a critical factor in the allocation of practice expenses within the PFS.

Prior research suggests that current estimates of time used by the American Medical Association (AMA) Relative Value Update (RUC) committee-based on physician surveys as opposed to more direct measures – may overstate time for many services. For example, survey reports of surgery times are significantly greater than the times taken from operative logs and other more objective sources. This may be partly the result of major changes that have occurred since the PFS was introduced almost 20 years ago. Through the substitution of new technologies, such as computerized interpretation of bone scans, the substitution of non-physician personnel, and the mastering a new techniques such as endoscopy, the physician time for a particular service may be much less than what the fee schedule work relative value units reflect. Many such services have never been restudied or validated, other than by the RUC.

Identification of Five Health Systems

We are seeking the participation in our study of five to eight health systems whose mission is to provide efficient, high-quality health care and that make use of information technology. Ideally, participating health systems will have

- experience with the extraction of clinical service time from electronic data systems,
- the ability to link CPT codes to clinical service time estimates, and

- a culture that would be receptive to direct observation to allow for validation of the time estimates developed from the electronic data or direct collection of time for a small set of services.

Overview of Primary Data Collection Process

Determination of Health System Capabilities. Our first step will be to schedule a conference call with your health system to obtain three types of preliminary information: (1) volume of services provided per week for the CPT codes of interest contained in the attached document; (2) Health Information Technology (HIT) system data; and (3) direct observation capabilities and experience. For HIT system information, we would like to discuss the degree to which you feel that your HIT systems can capture data on service time, the burden associated with extracting concurrent and retrospective time per service, and attaching CPT codes. We would also like to discuss whether your organization has conducted direct observation of clinical services and whether you have conducted any direct observation studies for any of the study services or related services, and your willingness to participate in a joint direct observation data collection effort involving both clinical and HIT direct observation activities.

Data Collection Plan. Following collection of service volumes and discussion of your willingness to jointly conduct direct observation, we will develop a data collection plan for a subset of the study services that require parallel HIT and direct observation and a separate data collection plan for a smaller set of services that will require direct observation only. The primary purpose of the parallel HIT and direct observation studies will be to determine if the HIT times need to be modified to account for interruptions or other factors that occur during the provision of the service that would over- or understate the time data from the HIT sources.

Because HIT information is such a critical component of this study and we know from prior work that administrative and clinical systems have not been developed uniformly across vendor systems to collect clinical service time, RTI will conduct a one-day on-site meeting with HIT staff at each of the finalist locations. There are two primary purposes to this meeting: (1) to build a relationship with the Chief Information Officer (CIO) and HIT department staff by explaining the intent of the HIT component of the study and to gain their active support; and (2) to document in a more detailed fashion the capabilities of their systems for capturing time estimates. This information will serve as the basis for the development of the HIT data collection protocol.

Development of Study Protocols. The UI/RTI/SSS team will develop two sets of data collection protocols in collaboration with your health system (one set for the collection of HIT data and a second set for direct observation data), working collaboratively with staff within your health system to determine the best approach.

Primary Data Collection. Over a subsequent 2 to 3 month period, primary data collection will occur across the participating health system. We plan on having 1 RTI HIT staff person and 2 to 3 UT/RTI/SSS clinical observers on-site at each health system for three to five days observing both clinical and HIT activities. The direct clinical observation would be done in collaboration with staff from each of the health systems. We will also require the receipt of HIT time data for the services for which concurrent direct observation is occurring and a larger set of times for

previously provided services by your health system. The number of time estimates and relevant time period for extracting the time data will be developed jointly with your health system. We are able to offer up to $50,000 as compensation for staff time during the planning and data collection phases.

Primary Data Analysis. At the completion of data collection at each health system, basic data validity checks will be made and an analytic file constructed of direct observation and HIT time estimates. We will send the derived average/median time estimates to your health system for review and use.

In summary, we are seeking objective time data for a set of clinical services that span the PFS. We will provide compensation to your health system for participation. If you are interested in learning more about this study, please contact Dr. Nancy McCall at 202-728-1968 or via email at nmccall@rti.org.

HIT QUESTIONNAIRE AND WORKSHEETS

As described in the introductory document, this project seeks to identify components of physician work time and sources of data available in electronic or manual (e.g., hardcopy operating room or scheduling records) systems in your organization for select procedures and services. We would like to spend some time discussing the portfolio of electronic and manual systems (e.g., EHR, surgical software suite, diagnostic software suite, practice management suite, audit logs, or hard copy records) that explicitly capture or support the calculation of time data for services under study, obtain estimates of the volume of services you provide during a typical week, discuss work flow processes that may affect the time estimates, and briefly discuss the processes that will be used and resources needed to obtain the time data.

We are providing an Excel workbook with several spreadsheets that define the type of information that we would like to discuss with your organization in the near future during an in-person meeting, webinar, or conference call depending upon your preference. We would like to ask that you provide preliminary information to help guide the discussion. You may return the completed Excel workbook to Rebecca Lewis at reblewis@rti.org. If you have any questions regarding this request, please contact Sue Mitchell at Suemitchell@rti.org, 919-597-5190 or Nancy McCall at Nmccall@rti.org, 202-728-1968.

We thank you in advance for your assistance.

Excel Workbook

1. Availability of Physician Work Time (Spreadsheet: Physician Time Data Availability)

The first spreadsheet in the Excel workbook provides a listing of CPT codes within 61 clinical families and requests information for each of the clinical families regarding the systems which you will need to access to provide physician time data.

Table 1: Instructions for Physician Time Data Availability

Column/Description	Instructions
Column A: CPT Code Range Range of CPT Codes for clinical family of service.	Click on ▼ in column header to filter list for specific code range(s) (e.g., select all codes in the 33000s)
Column B: Clinical Family of Service Descriptive name of clinical family of service. ***Note***: Services currently listed within the clinical families are preliminary assignments that will be refined during the course of the project.	Click on ▼ in column header to filter list for specific clinical family of service(s) (e.g., select all orthopedic clinical families of service)
Column C: Procedure Category Assigned category that correlates to definition of time components ▪ Time components are defined for each procedure category (see Appendix C - Components of Clinical Service Time)	Click on ▼ in column header to filter list for specific procedure category(ies) (e.g., select all items assigned to the "imaging" category)

(continued)

Table 1: Instructions for Physician Time Data Availability (continued)

Column/Description	Instructions
Column D: Site of Service Setting(s) in which service is performed: ▪ ambulatory surgery center (ASC), ▪ hospital, **and/or** ▪ office.	▪ **Click on the cell** to display the icon (▼) for the cell's dropdown list. ▪ **Click on** ▼ to select the service setting (ASC, hospital, or office) from the dropdown list. o If the service is performed in more than one setting, please **insert additional rows** beneath the clinical family to capture all settings for the clinical family of service if the system to capture the information or the components of time differ by site of service.
Column E: Process Used to Record Time Data Process used in capture of time data regarding the services in the clinical family: ▪ Manual system(s) (e.g., Operating Room log), ▪ Electronic system(s) (e.g., electronic health record, lab information system), or ▪ Both manual and electronic systems	▪ **Click on the cell** to display the icon (▼) for the cell's dropdown list. ▪ **Click on** ▼ to select the method used to record time data (electronic, manual or both) from the dropdown list.
Column F: Systems Electronic and/or manual system(s) that capture time data on the services in the clinical family.	▪ If "electronic" was selected in Column E, specify the system vendor/ developer, product name and version. o Please insert additional row(s) as needed to capture more than one electronic system ▪ If "manual" was selected in Column E, describe briefly the type of hardcopy data repository or records in which the time data resides o Please insert additional row(s) as needed to capture more than one manual system ▪ If "both" was selected in Column E, please insert additional row(s) as needed to capture relevant electronic and manual systems.
Columns G – J: Types of Time Data Available Components of physician work time available for services in each clinical family.	▪ **Click on the cell** to display the icon (▼) for the cell's dropdown list. ▪ **Click on** ▼ to select the appropriate response from the dropdown list to indicate availability of: o Total time only o Pre-service time o Intra-service time o Post-service time ***Please see Appendix C for time component definitions for the procedure category assigned to the clinical family.***

(continued)

Table 1: Instructions for Physician Time Data Availability (continued)

Column/Description	Instructions
Column K: Variances from RTI Definitions of Time Components Variances in components of time captured by facility systems that deviate substantively from the definitions provided by RTI.	▪ Please note if there are any variances in how your systems capture the components of time that deviate substantively from the definitions provided by RTI. ▪ Please note if any of the information (on systems to be accessed or components of time available) vary within the small clinical families
Column L: Format for Submitting Data to RTI Preferred format for submitting data to RTI	Please record preferred data submission format
Column M: Comments Note if any of the information (on systems to be accessed or components of time available) vary within the small clinical families, or other issues.	Please record any variances WITHIN the small clinical families or any other issues of note.

2. Availability of Technician Work Time (Spreadsheet: Technician Time Data Availability)

The second spreadsheet in the Excel workbook provides a listing of CPT codes within 11 clinical families and requests information for each of the clinical families regarding the systems which you will need to access to provide time data for technicians performing imaging services. The organization and functionality of this tab is identical to the spreadsheet described above for physician time data availability. Please follow the spreadsheet instructions found in section 1 when completing this tab.

3. Volume of Services (Spreadsheet: Service Volume)

The third spreadsheet in the Excel workbook provides a listing of CPT codes within 61 clinical families and requests an estimate of the volume of each service that you provide during a typical week.

Table 2: Instructions for Service Volume

Column/Description	Instructions
Column A: CPT Code CPT code of services in clinical family of services	Click on ▼ in column header to filter list for specific CPT code(s)
Column B: Narrative Description Narrative description for CPT code	Click on ▼ in column header to filter list for specific narrative description(s)
Column C: Procedure Category Assigned category that correlates to definition of time components	Click on ▼ in column header to filter list for specific procedure category(ies) (e.g., select all items assigned to the "imaging" category)
Column F: Typical Weekly Volume Typical weekly volume of service	Please provide a count of a typical weekly volume of service

(continued)

Table 2: Instructions for Service Volume (continued)

Column/Description	Instructions
Column G: Notes Notes of any current or potential circumstances that could influence the likely volume of services that would be provided in the next 2 to 3 months. *(This information will help guide the development of the direct observation operational plan.)*	Please note any current or potential circumstances that could influence the likely volume of services that would be provided in the next 2 to 3 months.

Additional Topics to be Discussed During Interview or On-site Visit

1. **Workflow processes and data related to physician work time:**
   a. Are there known limitations to the representation of time captured at present (e.g., multiple sessions of a patient's EHR in concurrent use by a clinician, thereby compromising the time stamp)?
      i. Workflow processes that impact time recorded or time stamps (e.g., concurrent service versus sequential service, interruptions while with patient, record accessed by multiple provider types).
      ii. If multiple physicians are involved in a service/procedure, can each physician's time be tracked so that we can identify the principal provider?
   b. Are there any organizational policies that would impact the time to complete a task (e.g., all physicians in practice required to schedule needed preventive services not directly related to the service they are providing that may influence the service time – such as psychiatrist scheduling mammograms)?
2. **Retrieval of Data Related to Service/Procedure Time**
   a. Are the data related to physician work time retrievable by organizational staff or will vendor support be needed?
      - If vendor support is needed:
        - What is the anticipated timeframe for fulfillment of the support (e.g., vendor needs 3 weeks to write a data extraction script)?
        - What are the anticipated costs?
      - If data can be retrieved by organizational staff:
        - Are staff resources available to support the data retrieval?
        - Are there any staff constraints we need to be aware of (e.g., key staff taking vacation/medical leave) for the next 2 to 3 month period?
   b. Are any targeted services provided by other organizations from whom we will need to seek their cooperation?

APPENDIX E:
DIRECT OBSERVATION DATA COLLECTION PROTOCOL

RELATIVE VALUE UNIT (RVU)
WORK TIME
DIRECT OBSERVATION
DATA COLLECTION PROTOCOL

Part of a Centers for Medicare & Medicaid Services (CMS) Sponsored Study:

Medicare Physician Fee Schedule (PFS): Development of a Model for the Valuation of Work Relative Value Units (RVUs)

RTI INTERNATIONAL

CONTENTS

1. INTRODUCTION AND OVERVIEW OF THE PROJECT

Thank you for participating in the Centers for Medicare & Medicaid Services (CMS) project entitled, "Medicare Physician Fee Schedule (PFS): Development of a Model for the Valuation of Work Relative Value Units (RVUs).

1.1 Data Collection within Your Health System

We will be collecting physician and radiology/imaging technician clinical service time data on a set of services performed in your hospital, physician offices, clinics, surgical centers, or other facilities appropriate to the services under study. Clinical service time data will be collected through direct observation, as well as from various electronic (and paper) systems within your organization.[1] The volume of targeted services your health system performs will determine which of the services in our study are observed.

This document is the direct observation data collection protocol. A separate protocol for data collection from your electronic (and paper) systems will be delivered to your information technology (IT) department and/or other department(s) as appropriate.

This direct observation data collection protocol will be customized based on feedback from your health system on how to best observe clinicians and technicians performing services included in this study. Direct observation will be done in collaboration with staff at your facility and our study team, and conducted over a mutually convenient, pre-scheduled 5-day period. The following sections describe your roles and responsibilities, as well as specific instructions, methods, and services for which clinical service time data through direct observation will be collected.

1.2 De-identifying Patient Information

No patient identifying information will be sent to RTI. The Study Coordinator (SC) will be responsible for maintaining a log to keep track of all patient unique study ID's. The SC will be provided a Patient Privacy and Confidentiality Crosswalk (see Figure 1) to use in maintaining patient study IDs. This is for your internal tracking purposes only - RTI will not see this form. The unique study ID assigned to each observed patient will be the only patient identification provided to RTI with the extracts of time data captured in your organization's electronic data systems, and will be used by the SC to verify the electronic records in the file prepared for RTI. Also, if there are any follow-up questions regarding a particular patient's data, RTI will reference the study ID when contacting the SC to obtain information.

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[1] The data from direct observation and your various information systems will be compared. We fully understand that the majority of information systems were never intended to capture clinical service time as a primary purpose. Consequently, this study is not intended to assess the adequacy of your individual information systems, nor your implementation of them. The objectives for comparing time data from your information systems against direct observation data are to identify if, and how well, current information systems capture clinical service time data.

Figure 1
Patient Privacy and Confidentiality Crosswalk

Patient Name Last, First	Date of Service	Appointment Time	Medical Record Number/Internal tracking number	Study ID/Unique Patient Identifier
Doe, John	10-15-2013	1:30 PM	123456	SITEINITIALS0001

2. OVERVIEW OF THE DIRECT OBSERVATION DATA COLLECTION PROCESS

This section provides an overview of the direct observation data collection process in the context of the overall process. The process is comprised of the following components:

- Activities *before* direct observation and data collection,
- *Direct* observation and data collection, and
- Activities *after* direct observation and data collection.

Table 1 presents an overview of the tasks associated with each of the study components listed above.

Table 1
Direct Observation Process

Step #		Task Description	Responsible Entity
Direct Observation & Data Collection Activities	**Steps Related to Direct Observation and Data Collection: Pre-Service Time**		
	1	Review Appendix A (Components of Clinical Service Time) to verify clinical service elements included in pre-service time for the service to be observed. Note: these elements are listed in the direct observation data collection tool for each service (see Section 4.2.)	
	2	Observe and time the duration of: ▪ pre-service elements for assigned service AND ▪ any interruptions or exceptions to pre-service time	
	3	On the Direct Observation electronic or paper form , document: ▪ each activity performed as part of pre-service (e.g., obtaining patient consent, reviewing patient chart, consulting with other providers, etc.), ▪ the type of provider performing the activity (e.g., physician, NP, PA, etc.) ▪ the time it took for the activity to be performed ▪ a description of any interruptions or exceptions to pre-service time ▪ the duration of the interruption(s)	
	Steps Related to Direct Observation and Data Collection: Intra-Service Time		
	1	Review Appendix A (Components of Clinical Service Time) to verify clinical service elements included in intra-service time for the service to be observe. Note: these elements are listed in the direct observation data collection tool for each service(see Section 4.2)	
	2	Observe and time the duration of: ▪ intra-service elements for assigned service AND ▪ any interruptions or exceptions to intra-service time	
	3	Document intra-service time on Direct Observation spreadsheet or form and describe any interruptions or exceptions to intra-service time	
	Steps Related to Direct Observation and Data Collection: Post-Service Time		
	1	Review Appendix A (Components of Clinical Service Time) to verify clinical service elements included in post-service time for the service to be observe. Note: these elements are listed in the direct observation data collection tool for each service (see Section 4.2)	
	2	Observe and time the duration of: ▪ post-service elements for assigned service AND ▪ any interruptions or exceptions to post-service time	
	3	Document post-service time on Direct Observation spreadsheet or form and describe any interruptions or exceptions to post-service time	
Activities After Direct Observation & Data Collection	**Steps Related to Collected Data**		
	1	Provide Direct Observation electronic and/or paper forms completed by facility staff to RTI researchers	
	2	Provide unique study identifiers for patients observed by RTI researchers and facility staff to IT department, and other departments as necessary, to use in compiling and reporting clinical service time data captured in electronic (and paper) systems	

3. TIME INFORMATION

This section will present a brief overview of the components of clinical service time that will be observed and reported during this study. A detailed description of the elements included in the time components is found in Appendix A.

For each clinical service observed, three different time durations associated with that service are to be collected: pre-service time, intra-service time, and post-service time. In this section, you will find:

- A brief description of each component of clinical service time
- A summary of elements for each time component
- A description on recording time for radiology/imaging technicians
- Information on the need to document interruptions to clinical service time

3.1 Time Components

3.1.1 Pre-Service Time

Pre-service time is the clinical service time the physician spends prior to performing the intra-service activity. Pre-service activities are those that occur prior to the actual performance of the service itself (e.g., obtaining patient consent, pre-operative review of medical record, hospital admission work-up), and will vary depending on the type and location of the service. Please see Appendix A for the pre-service components of clinical service time.

3.1.2 Intra-Service Time

Intra-service time is the clinical service time the physician spends performing the service (e.g., physician skin-to-skin time for major surgeries). Please see Appendix A for the intra-service components of clinical service time.

3.1.3 Post-Service Time

Post-service time is the clinical service time the physician spends following the completion of the intra-service activity. Post-service activities are those that follow the actual performance of the service itself (e.g., the physician's interaction with the patient in the recovery room, communication with other professionals, post-op care on day of procedure), and will vary depending on the type and location of the service. Please see Appendix A for the post-service components of clinical service time.

3.1.4 Elements within Each Time Component

The types of activities or elements associated with pre-service, intra-service, and post-service components of clinical service time are described for each service under study in Appendix A of this document.

The Access direct observation data collection tool (described in Section 4.1) will present the different activities or elements defined in Appendix A as being associated with pre-service, intra-service and post-service time components for each specific CPT code. Note, however, that not all of the activities/elements listed for a service may be performed during the observed procedure. It is also possible that other, additional activities/elements not listed for a service may be performed during an observed procedure. Finally, note that one or more of the listed activities/elements may be performed by a non-physician provider (technician, physician's assistant, nurse practitioner, RN, LPN, medical assistant, or other). All of these permutations will be captured in the direct observation process.

3.1.5 Recording Time for Radiology/Imaging Technicians

Time (for radiology/imaging technicians) is the time the technician spends in performing a radiological service (e.g., technician time to perform a head CT).

3.2 Interruptions during Observed Time

There may be instances during the observation of clinical services where a physician's, technician's, or other provider's engagement in service activity is interrupted. To obtain more accurate estimates of actual time that it takes to perform the service, the number and duration of interruptions will need to be deducted from the reported time for the service.

The Access Direct Observation Data Collection tool forms are designed to accommodate the capture of interruptions to clinical service time. Instructions on use of these tools are found in Section 4.2 (Access tool instructions) and Section (4.3) (paper form instructions).

3.3 Physician Observed Time: other physicians and non-physicians

There may be instances during the observation of clinical services where other physicians (such as residents or fellows as part of a teaching program) or other clinical staff (such as physician assistants (PAs)) performs elements of the pre-service, intra-service, and/or post-service components of clinical service time. If a physician such as a resident or fellow performs an element(s) of the service, this activity should be documented in the notes section of the Access tool, but there should be no change to the timing. If a non-physician (such as a PA or nurse practitioner (NP)) performs some of the service, this should be recorded as a second provider in the appropriate screen of the data collection tool.

Instructions on use of these tools are found in Section 4.2 (Access tool instructions) and Section 4.3 (paper form instructions).

4. DATA COLLECTION

4.1 Direct Observation Data Collection Access Tool Overview

The Access tool for Physician and Radiology/Imaging Technician Time captures the start and end times of pre-service, intra-service and post-service time components for services under study. The duration of time components are automatically calculated. In addition, the Access tool provides the ability to capture both interruptions and exceptions to components of clinical service time for physicians and radiology/imaging technicians.

The Access Tool has a variety of features designed to capture the start and end times of pre-service, intra-service, and post-service time components for services under study. The duration of time components is automatically calculated using the "Start" and "End" buttons. The Tool has a feature to identify the specific elements associated with pre-, intra-, and post-service time for each procedure (CPT code). In addition, the Tool provides the ability to capture both interruptions and exceptions to components of clinical service time for physicians and non-physician providers including technicians.

When recording technician time, the time is recorded in the same manner as for physicians, with the following exceptions: 1) the element(s) performed by the technician are documented in the Notes section (such as setting up equipment, bringing the patient back to the room, giving instructions to the patient, walking the patient to the imaging room, positioning the patient, taking view(s), checking the image quality, etc.); and 2) the second provider section of the Tool will not be used. The functionality of the Tool, including further detail on recording Technician Time, is described below.

4.2 Instructions for Using the Direct Observation Data Collection Access Tool – Live Observation of Physician and Radiology/Imaging Technician Time

4.2.1 Prior to Direct Observation Data Collection activity

1. Review the instructions on using the stop-watch (4.2.2 Capturing time with the stop watch).
2. Note the following provider types:
   Physician
   PA (physician assistant)
   NP (nurse practitioner)
   RN
   LPN
   Medical Assistant
   Technician
   Other
3. Next, familiarize yourself with the Activities listed on the form. These are possible activities the provider will perform during pre-service activity.

4.2.2 Recording Direct Observations in the Access Tool

I. **Open the Access direct observation data collection tool.** Click on Main Menu: Select New Observation. Next select an Activity to observe: click on a procedure in the box. If performing a live observation, select Live Observation. The Live Observation screen will open.

II. **Live Observation Screen.** At the top of the page is a dark green banner with text that indicate "Live Observation," a brief description of the procedure, the CPT code, the date of data entry, and an auto-generated Subject ID.

III. **The Live Observation Screen is divided into 3 sections: Pre-Service, Intra-Service and Post-Service**. Each of the three sections is divided into two sub-sections: for recording the time of the first provider and (if there is one) recording the time of the second provider.

Note: the basic steps to recording time are the same for Pre-Service, Intra-Service or Post-Service Time.

When recording time for a radiology/imaging technician performing the technical component of a radiological procedure, time is recorded in the same manner as for physicians, with the following exceptions: 1) the element(s) for any pre-, intra-, and post-service time performed by the technician are noted in the Notes section (such as setting up equipment, bringing the patient back to the room, giving instructions to the patient, walking the patient to the imaging room, positioning the patient, taking view(s), checking the image quality after taking views, etc.); and 2) the second provider section in the data collection Tool will not be used.

If the unique study patient identifier has not been pre-populated for you, please enter the unique study patient identifier into the Live Observation screen of the data collection tool, or, if recording time on paper, enter the unique study patient identifier onto the paper form.

IV. **Recording Pre-Service Time:**
Before beginning timing, select the provider type of the person performing the activity.

1. Put the cursor in the drop-down menu just below the header "Pre-service – first provider.
2. Select the provider type from the drop-down menu (physician, technician, PA, RN, LPN, etc.): prior to the start of pre-service.
3. At the start of the pre-service activity, click on the "Start" button. The time will display in the format of hh:mm:ss AM or PM
    a. The duration of pre-service will display as 0 in the third box until a pre-service end time is entered. A red highlighted message "Timing!" will appear in the third column until the End time is recorded.
    b. While timing the procedure, select the specific element/task(s) that are performed which are listed in the box on the left hand side of the screen just below the provider type drop-down box. This is done by putting the cursor on the element (numbered 1-Other) in the box. The element will be highlighted. If selecting an "Other" activity, please provide a definition of this activity in the Notes section. To unselect an element, just click again on the activity.

V. **Recording Interruptions**
Please document any interruptions to physician or other provider Pre-service time.

Note: one interruption can be captured for the first and second provider for each of the service components of clinical service time: Pre-Service, Intra-Service and Post-Service.

1. See the row marked as "Interruption." Note if there is an interruption to the Pre -Service activity, it must be recorded prior to clicking on the "End" of the Pre-Service time, or prior to completing Step III, below.
    2. Begin to time the interruption:
        a. At the start of the pre-service interruption, click on the "Start" button. Time will display in the format of hh:mm:ss AM or PM.
        b. The duration of the pre-service interruption will display as 0 in the third box until an end time for the interruption is entered. A red highlighted message "Timing!" will appear in the third column until the End time is recorded.
        c. While timing the interruption, note the reason(s) for the interruption in the Notes section at the bottom of the sub-section.
        d. At the end of the interruption, click on the "End" button in the same row. The time will display in the format of hh:mm:ss AM/PM. To the right of the "End" time display box, the total time for the interruption in minutes, now labeled "Complete" will display. The time will display in the format of "mm" for minutes.
        e. Continue timing the remainder of the Pre-Service activity. When that is complete, record the End time as instructed in Step III, below.
    3. Please document a brief description of the Interruption in the Notes section.

VI. **Recording Pre-Service End Time:**
At the end of the pre-service activity, click the "End" command button

1. The end time will display in the format of hh:mm:ss AM/PM.
    2. To the right of the "End" time display box, the total times in minutes, now labeled "Complete" will display.
    3. The time will display in the format of "mm" for minutes.

VII. **Recording Pre-Service: Second Provider**

1. If a second provider performs Pre-Service activities in addition to the first provider, record their time in the section on the right-hand side of the screen titled "Pre-Service – second provider"

2. Follow Steps IV.1-.3 and Step VI.1-.3, above
3. If there is an interruption to the Pre-Service Second Provider, please follow steps V.1-.3 above, Recording Interruptions.

Note: first and second providers may perform tasks simultaneously; if so, the observer needs to record their time simultaneously.

VIII. **Recording Intra-Service Time:**
Please see the section of the screen titled "Intra-Service"

1. Follow instructions in Step IV.1-.3 and Step VI.1-.3 above
2. If there is an interruption to the Intra-Service first provider, please follow steps VI.1-.3 above, Recording Interruptions.
3. If a second provider performs Intra-Service activities in addition to the first provider, record their time in the section on the right-hand side of the screen titled "Intra-Service – second provider," following Step IV.1-.3 and Step VI.1-.3 above.

IX. **Recording Post-Service Time:**
Please see the section of the screen titled "Post-Service"

1. Follow instructions in Steps I.1-I.3 – Step III.1 – III.3 above
2. If there is an interruption to the Post-Service first provider, please follow steps II.1 – II.3 above, Recording Interruptions.
3. If a second provider performs the Post-Service activities in addition to the first provider, record their time in the section on the right-hand side of the screen titled "Post-Service – second provider," following Step IV.1-.3 and Step VI.1-.3 above.

X. **Recording Radiology/Imaging Technician Time**

Note: when recording time for a radiology/imaging technician to perform the technical component of a radiological procedure, the element(s) for any pre-, intra-, and post-service time performed by the technician are noted in the Notes section (such as setting up equipment, bringing the patient back to the room, giving instructions to the patient, walking the patient to the imaging room, positioning the patient, taking view(s), checking the image quality after taking views, etc.). The second provider section in the data collection Tool will not be used when recording time for a radiology/imaging technician.

1. Go to the "Intra-Service" section of the screen.
2. Prior to the start of the activity(ies) by the Technician, see the provider type drop-down menu just below the header "Intra-service – first provider."
3. Select "Technician" from the menu.
4. At the start of the activity by the technician, click on "Start" button. The time will display in the format of hh:mm:ss AM/PM.

5. The duration of pre-service will display as 0 in the third box until a pre-service end time is entered. A red highlighted message “Timing!” will appear in the third column until the End time is recorded.
6. At the end of the activity by the technician, click the "End” command button
    a. The end time will display in the format of hh:mm:ss AM/PM.
    b. To the right of the “End” time display box, the total times in minutes, now labelled “Complete” will display.
    c. The time will display in the format of “mm” for minutes.

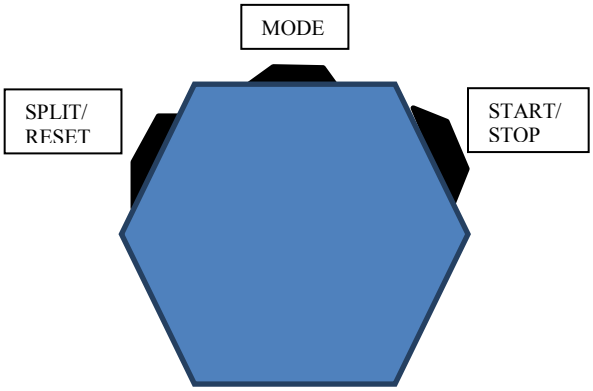
Please type any notes or comments and/or document any exceptions in the Notes section.

4.3 Direct Observation Data Collection Paper Form

If facility staff assigned to perform direct observation and data collection do not have access to the Access Direct Observation Data Collection tool, or devices to run Access, data capture can be performed by a manual process that uses stopwatches (see Figures 5 and 6). This section explains how time is captured with a stopwatch, how to print out the form for recording data, and then how to fill out the form appropriately.

4.3.1 Capturing time with the stop watch

1. At start of service (pre, intra or post), Hit START button
2. At first interruption:
    a) Hit SPLIT button at start of interruption
    b) Hit SPLIT button at end of interruption
    c) Quickly record time displayed on watch



3. Time will be recording on the watch as the physician/technician/other provider continues the service.
4. Time will be recording on the watch as the physician/technician/other provider continues the service.
5. Time will record on the watch as the physician/technician/other provider continues the service.
6. At conclusion of service, hit STOP button to conclude the recording of time.
7. Record the final time on the stopwatch.

4.3.2 Printing the data collection form

<<Insert Print Instructions Once This Functionality Is Available>>

4.3.3 Instructions: Completing the Direct Observation Data Collection Paper Form–Physician and Radiology/Imaging Technician Time

1. If service tracking information has not been pre-filled for you, please print the following information on the form:

   a) Your name
   b) The pre-assigned unique study ID for the patient
   c) The date of the service.
   d) The appointment time.

2. Please record the start and end times, as captured by your stopwatch(es) (see stopwatch instructions at 4.3.1), for each observed component of time:

   a) Pre-service
   b) Intra-service
   c) Post-service

Note: if recording time for a radiology/imaging technician to perform the technical component of a radiological procedure, the times on whatever component(s) the technician performs: pre-, intra-, and post-service time, should be collected.

3. Please record the provider type (physician, technician, PA, nurse practitioner, RN, LPN, medical assistant, or Other)
4. Please record the start and end times for any interruptions to physician or other provider pre-service, intra-service, or post-service time and provide a brief description of the interruption.
5. There may be instances during the observation of clinical services where other physicians (such as residents or fellows as part of a teaching program) or other clinical staff (such as PAs) perform elements of the pre-service, intra-service, and/or post-service components of clinical service time. If a physician such as a resident or fellow performs an element(s) of the service, this activity should be noted in the notes section, but there should be no change to the timing. If a non-physician (such as PAs or NPs) performs some of the service, this should be recorded as a second provider in the appropriate screen of the data collection tool.
6. Please record any element(s) performed by the radiology/imaging technician in the Notes section.
7. Please use the Notes section to capture any issues or questions encountered during the observation of pre-service, intra-service, or post-service activities.

Appendix A

STUDY SERVICES: PRE-SERVICE, INTRA-SERVICE, AND POST-SERVICE ELEMENTS

[The table includes the pre-, intra-, and post- service element descriptions from the RUC database. For reference, see the Main Report Appendix C.]

APPENDIX F:
PROTOCOL FOR SUPPORTING DATA

RELATIVE VALUE UNIT (RVU) WORK TIME: HIT PROTOCOL FOR SUPPORTING AND HISTORIC TIME DATA

Part of a Centers for Medicare & Medicaid Services (CMS) Sponsored Study:

Medicare Physician Fee Schedule (PFS): Development of a Model for the Valuation of Work Relative Value Units (RVUs)

March 4, 2013

RTI INTERNATIONAL

CONTENTS

1. INTRODUCTION AND OVERVIEW OF THE PROJECT

Thank you for participating in the Centers for Medicare & Medicaid Services (CMS) project entitled, "Medicare Physician Fee Schedule (PFS): Development of a Model for the Valuation of Work Relative Value Units (RVUs).

1.1 Data Collection within Your Health System

We will be collecting physician and radiology/imaging technician clinical service time data on a set of services performed in your hospital, physician offices, clinics, surgical centers, or other facilities appropriate to the service under study. Clinical service time data will be collected through direct observation, as well as from various electronic (and paper) systems within your organization.[2] The volume of targeted services your health system performs, as well as your procedures and systems for capturing clinical service time, will determine which of the services in our study will be

- Observation Only – Time data will be collected by direct observation only
- Observation & Supporting Data – Time data will be collected both through observation and supporting time data from electronic (and paper) systems will be submitted to the research team, and
- Historical Data - Time data on previously performed services, captured in electronic (and paper) systems, will be submitted to the research team.

This document is the HIT Protocol for Corroborative and Historic Time Data which addresses data collection from your electronic (and paper) systems. A separate Protocol for Direct Observation Data Collection will be delivered to your clinical site coordinator.

This Protocol will be customized based on feedback from your health system regarding the electronic (and paper) systems that contain information that support the clinical service time for services under study. The following sections describe your roles and responsibilities, as well as specific instructions, methods, and services for which corroborative clinical service and historic time data will be collected.

[2] The data from direct observation and your various information systems will be compared. We fully understand that the majority of information systems were never intended to capture clinical service time as a primary purpose. Consequently, this study is not intended to assess the adequacy of your individual information systems, nor your implementation of them. The objectives for comparing time data from your information systems against direct observation data are to identify if, and how well, current information systems capture clinical service time data.

2. ROLES AND RESPONSIBILITIES

2.1 Site Coordinator

One staff person at your facility will be identified as the site coordinator (SC). The SC:

- Serves as the primary contact person
- Assists in obtaining your facility's IRB approval, if necessary
- Assists in securing a Limited Data Set Agreement and/or a Business Associate Agreement, if necessary
- Coordinates dates and times for RTI staff to conduct on-site visit
- Works with RTI researchers to identify services to be observed by the RTI team and/or facility staff
- Maintains the Patient Privacy and Confidentiality Crosswalk (see Section 4), which enables your facility to accurately identify patients involved in this study, while not disclosing personally identifiable health information to RTI
- Provides unique identifiers of the patients—for which clinical service time data has been collected through direct observation by RTI's or your facility's staff—to your health system's IT department, and other departments as necessary, so that RTI can be provided with corroborative time data found in electronic (and paper) systems on those patients
- Coordinates with your health system's IT department, and other departments as necessary, to provide RTI with historical clinical service time data – for services and a time period as negotiated with your organization – found in electronic (and paper) systems
- Coordinates actions between your health system's IT department, other departments as necessary, and RTI to ensure that RTI has received accurate clinical service time data from your electronic (and paper) systems
- Ensures the destruction of the Patient Privacy and Confidentiality Crosswalk upon completion of the study

2.2 RTI Staff

RTI staff will work with the SC to coordinate study activities. The following staff will be available to answer any questions you may have regarding the electronic (and paper) system data component of the study.

Sue Mitchell
suemitchell@rti.org
919-597-5190

Don Mon
donmon@rti.org
312-777-5228

3. OVERVIEW OF THE PROCESS FOR COLLECTING SUPPORTING AND HISTORIC TIME DATA

This section provides an overview of the process for collecting corroborative and historic time data in the context of the overall process. The process is comprised of the following components:

- Activities *before* collecting corroborative and historic time data,
- *Collection of* corroborative and historic time data
- Activities *after* collection of corroborative and historic time data.

Table 1 presents an overview of the tasks associated with each of the study components listed above.

Table 1
Direct Observation Process

	Step #	Task Description	Responsible Entity
	Steps Related to Identifying Services/Patients for Study		
	1	Work with RTI researchers to identify targeted services with sufficient volume for study	
Activities Prior to Collecting Corroborative and Historical Time Data	2	Work with RTI researchers to determine volumes of services to be studied: ▪ By observation only ▪ By observation and supporting data ▪ By historical data	
	3	Work with RTI researchers to identify: ▪ electronic (and paper) systems that capture time data for services under study ▪ type(s) of time data available (i.e., total time and/or components of time such as pre-service/intra-service/post-service) (see Appendix A for definitions of components of time) ▪ resources needed to retrieve time data from electronic (and paper) systems (e.g., electronic data retrievable by staff, electronic data requires vendor support to retrieve)	

(continued)

Table 1 (continued)
Direct Observation Process

	Step #	Task Description	Responsible Entity
Collecting Corroborative and Historical Time Data	**Steps Related to Collecting Supporting Time Data –Direct Observation Patients**		
	1	Receive unique study identifiers for patients observed by RTI researchers and facility staff	
	2	Compile clinical service time data captured from electronic (and/or paper) systems	
	3	Report clinical service time data, in file format as agreed upon with RTI researchers, using unique study identifiers (RTI should NOT receive personally identifiable health information)	
	Steps Related to Collecting Historical Time Data – Previously Performed Services		
	1	Assign unique study identifiers to patients for whom time data on previously performed services will be captured from electronic (and/or paper) systems	
	2	Compile clinical service time data captured from electronic (and/or paper) systems	
	3	Report clinical service time data, in file format as agreed upon with RTI researchers, using unique study identifiers (RTI should NOT receive personally identifiable health information)	
Activities After Data Compiled	**Steps Related to Collected Data**		
	1	Work with RTI to ensure that accurate clinical service time data from electronic (and paper) systems has been received	
	2	Destroy the Patient Privacy and Confidentiality Crosswalk upon completion of the study	

4. DE-IDENTIFYING PATIENT INFORMATION

No patient identifying information will be sent to RTI. The SC will be responsible for maintaining a log to keep track of all patient unique study ID's. The SC will be provided a Patient Privacy and Confidentiality Crosswalk (see Figure 1) to use in maintaining patient study IDs. This is for your internal tracking purposes only - RTI will not see this form. If there are any follow up questions regarding a particular patient's data, RTI will reference the study ID when contacting the SC to obtain information.

Figure 1
Patient Privacy and Confidentiality Crosswalk

Patient Name Last, First	Date of Service	Appointment Time	Medical Record Number/Internal tracking number	Study ID/Unique Patient Identifier
Doe, John	10-15-2013	1:30 PM	123456	SITEINITIALS0001

5. TIME INFORMATION

This section will present a brief overview of the components of clinical service time that will be reported during this study. A list of the elements of pre-, intra- and post-time components is found in Appendix A.

For each clinical service, three different time durations associated with that service are to be collected: Pre-service time, Intra-service time, and Post-service time. In this section you will find:

- A brief description of each component of clinical service time
- A summary of elements for each time component
- A brief description of Total Time for radiology/imaging technicians

5.1 Time Components

5.1.1 Pre-Service Time

Pre-service time is the clinical service time the physician spends prior to performing the intra-service activity. Pre-service activities are those that occur prior to the actual performance of the service itself (e.g., obtaining patient consent, pre-operative review of medical record, hospital admission work-up), and will vary depending on the type and location of the service. Please see Appendix A for the pre-service components of clinical service time.

5.1.2 Intra-Service Time

Intra-service time is the clinical service time the physician spends performing the service (e.g., physician skin-to-skin time for major surgeries). Please see Appendix A for the intra-service components of clinical service time.

5.1.3 Post-Service Time

Post-service time is the clinical service time the physician spends following the completion of the intra-service activity. Post-service activities are those that follow the actual performance of the service itself (e.g., the physician's interaction with the patient in the recovery room, communication with other professionals, post-op care on day of procedure), and will vary depending on the type and location of the service. Please see Appendix A for the post-service components of clinical service time.

6. DATA COLLECTION

6.1 Data Mapping

Prior to commencing direct observation and data collection activities, RTI staff will work with appropriate facility personnel (clinical and IT) to carefully document what IT (or paper) systems and data elements are used to record the performance of each procedure/service targeted for study. Information sources for this process will include screen shots, data dictionaries,

procedures, training materials, staff interviews and/or other materials. This analytic activity will produce a data mapping that inventories the systems and data elements that capture components of time for targeted procedures/services. This data mapping will describe data:

- usage (e.g., recording activities during diagnostic cardiac procedures, time stamp showing record access)
- pairings (e.g., event activity description and time stamp), and
- idiosyncrasies (e.g., radiologist time stamps for access and closure of a record may reflect a file that sat open all day and not reflect actual "work time")

Particular emphasis will be placed on carefully identifying and describing the data elements that will be used as anchors for pre, inter, and post service time (see Figure 2).

Figure 2
Sample Data Map

CPT Code & Description	Service Time Component	System *Specify software app or manual process used to document performance of the procedure/ service*	Usage	Data Element	Pairing	Start of Service Anchor	End of Service Anchor	Other Comment
49505 – Prp i/hern init reduc >5 yr	Pre-service	XYZ Application	Procedure event log	Event	w/time stamp	N/A	N/A	1) Times re pre-Op are not completed consistently 2) Physician pre-Op activities are not recorded
49505 – Prp i/hern init reduc >5 yr	Intra-service	XYZ Application	Procedure event log	Event	w/time stamp	Value = Procedure Start/ Incision	Value = Procedure Finish/ Close	—
49505 – Prp i/hern init reduc >5 yr	Post-service	XYZ Application	Procedure event log	Event	w/time stamp	N/A	N/A	1) Times re post-Op are not completed consistently 2) Physician post-OP activities are not recorded
93458 – Cardiac Cath	Pre-service	XYZ Vascular Lab Application	Procedure event log	Event	w/time stamp	N/A	N/A	1) Some pre-service activities are listed (e.g., informed consent signed by patient, but service provider is not identified and duration cannot be computed
93458 – Cardiac Cath	Intra-service	XYZ Vascular Lab Application	Procedure event log	Event	w/time stamp	Value = "Access xxx" (e.g., Access 5 fr sheath into Rt radial artery. Single wall stick - uncomplicated	Value = "xxx catheter removed" (e.g., 5Fr JR 4.0 catheter removed)	—

6.2 Electronic Data

For each patient identified for the study groups "Observation and Supporting Data" and "Historical Data", we are requesting the following data from your organization.

- Unique facility study identifier
- Unique patient study identifier
- Date of service
- Time of service
- CPT code for service performed
- Provider type for reported time data (i.e., physician time or radiology/imaging technician time), if available
- Data elements, at the most granular level, that capture and support the components of clinical service time (pre, inter and post-service) as identified in the data mapping document. These data elements have a many to one relationship with the data elements above.

6.2 Data from Paper-based Systems

Facility specific processes will be developed with the organization for instances where information supporting clinical service time is captured in paper-based systems.

Appendix A

STUDY SERVICES: RUC PRE-SERVICE, INTRA-SERVICE, AND POST-SERVICE ELEMENTS

[The table includes the pre-, intra-, and post- service element descriptions from the RUC database. For reference, see the Main Report Appendix C.]