# Report on Clinical Practice Expert Panel (CPEP) Direct Cost Estimation

## Data Collection and Analysis for Generating Procedure-Specific Practice Expense Estimates (HCFA Contract No. 500-95-0009)

April 30, 1997

*Prepared for*
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## ACKNOWLEDGMENT

The development of the CPEP database represents the combined efforts of many individuals and organizations. We would particularly like to thank the CPEP members who donated their time and energy before, during and after two rounds of CPEP meetings, and the many national medical societies and professional associations that provided helpful comments and support throughout the CPEP process.

# Executive Summary

# 1.0 Background and Overview of the CPEP Process

## 1.1 Background

In 1992, the Health Care Financing Administration (HCFA) began phasing in the Medicare Fee Schedule (MFS) as mandated in the Omnibus Budget Reconciliation Act of 1989 (OBRA 1989, PL 101-239). The MFS is based on three components: physician work, practice costs, and malpractice insurance costs. All components of each service are assigned relative value units (RVUs) reflecting resource intensity. Component RVUs are geographically adjusted and summed, and the total RVUs for all services are then multiplied by a conversion factor to convert RVUs to dollar payment rates. The resource-based physician work component RVUs and their associated payment rates were initially developed prior to the implementation of the MFS. The RVUs for malpractice insurance continue to be based on historical charges, as are practice expense RVUs. Recognizing the need to make practice expense RVUs (which comprise approximately 41% of the relative values) resource based, Congress, in 1994 (PL 103-432), directed the Secretary of Health and Human Services to develop a resource-based payment methodology for practice costs.

In March 1995, HCFA awarded Abt Associates a contract to collect and analyze data for constructing resource-based practice expense relative values. Abt and HCFA developed a two-pronged approach to data collection that recognized two parts of practice expenses, direct and overhead costs.[1] Estimates of direct costs were to be generated through an expert panel process. Clinical Practice Expert Panels (CPEPs) were convened to provide service-specific data that could be used to estimate direct costs of each service. Estimates of overhead costs were to be generated from data collected in a survey of physician and non-physician practices. This survey would collect information on aggregate costs and service mix at the practice-level, and data from it would be used as one possible method to help to determine the appropriate allocation of overhead costs to individual services.

The direct and service-specific overhead cost data were to be analyzed by Abt Associates and other researchers to estimate the total practice expense of each service on the MFS. Practice expense estimates derived from these analyses would serve as one potential source of data to develop RVUs that would, in theory, reflect the variation in the total practice costs associated with providing different services.

1 Direct costs here are defined as those easily attributable to the provision of a specific service. This is related to, but different from, the economic concept of variable cost. Some variable costs may be captured in the indirect cost measurement, rather than by the direct cost measurements.

## 1.2 Design of the Direct Cost Estimation Process

CPEPs were empaneled to develop service-specific *resource profiles*, defined as estimates of staff time, and amounts and types of equipment and supplies required to produce MFS services, by setting (in- or out-of-office). To compute the direct components of practice costs, resource profiles were combined with input prices, collected from various sources.

The initial research design called for the following steps:

1) MFS services were to be grouped into clinically and resource homogeneous "families;"

2) A "reference service" for each family would be chosen;

3) Service families were to be grouped into CPEP groupings, with each CPEP grouping containing a set of clinically related families;

4) Physician and non-physician panelists familiar with the practice resources required to deliver the services contained in a CPEP grouping were to be selected for the panels;

5) In the first of two rounds of CPEP meetings, panelists would profile, in detail, the resource requirements for the reference services only;

6) External price data for the resources identified by the panelists (labor, equipment, and supplies) would be used to compute a direct cost estimate for each reference service;

7) In the second round of CPEP meetings, panelists would, for each family, extrapolate from the direct cost estimate for the reference service to all the other services in the family.

The first five steps described above were carried out essentially as described. Although the use of reference services underwent some modification during the CPEP meetings, and although extensive follow-up after the panel meetings was required to secure final profiles for a relatively small number of services, the CPEPs generally were able to profile the reference services. However, in response to preliminary discussions with some CPEP members, the process for the second round (steps 6 and 7) was redesigned. Rather than extrapolate costs from reference services to non-reference services within service families, CPEPs were instructed to draw on key "drivers" of resource requirements. This approach had certain implications. While the service family structure and reference service estimates were essentially retained, the service family structure became less critical to the final results. Also, the volume of data produced, and the size and complexity of the resulting data collection files, expanded enormously.

## 1.3 The CPEP Meeting Process

The CPEPs were charged with reaching consensus on resource profile estimates that were associated with the practice expense component of the MFS, reflected resources required to provide services to a "typical" patient (not just a Medicare patient), and followed practice patterns that were typical for 1995.

In the few instances where consensus was not achieved, explanations were noted in the *CPEP Recorders' Notes Files.*

### 1.4 Key Participants in the CPEP Process

Key participants in the CPEP process included 1) HCFA staff, who provided technical direction for the study and clinical and policy input at panel meetings, as needed; 2) Abt staff, who worked with HCFA to design and plan the process, moderate the panels, complete all data collection, and produce data files; 3) project consultants, who provided clinical input during the planning phase; 4) Technical Expert Groups (TEGs), one of which provided overall research design and implementation review, and another (the CPEP-TEG) that provided focused input on the CPEP process; 5) CPEP members, who produced the resource profiles; 6) Medical societies, that commented on the design, nominated panel participants; and 7) Society observers, who were available as resources to the CPEP process.

## 2.0 Developing the Service Groupings and CPEPs

Selecting and grouping services for development of practical resource estimates was a task of critical importance in preparing for the deliberations of the CPEPs, requiring clinical and Medicare policy expertise, as well as an understanding of group dynamics. Several steps were followed to develop service groupings and CPEPs.

**Identifying the services that had to be grouped.** Working with HCFA's Bureau of Policy Development, 6,251 separate services were selected for profiling. These included service codes in the MFS with a status code of active ('A'), plus selected other services.

**Grouping the related services into service families.** Abt modified two existing systems, the 3M Ambulatory Patient Groups (APG) and the Berenson-Eggers-Holohan (Urban Institute) systems to group services for profiling. In developing a grouping system, HCPCS/CPT-4 services were assigned to *service families* characterized by internal similarity of 1) direct costs and 2) clinical content. In addition, the number of services in each family was limited, to allow profiling by panels in a reasonable time frame.

**Grouping service families to CPEPs.** To achieve an initial grouping of CPEPs and service families, data from the Physician and Supplier Procedure Summary Master File and private data were used along with three general assignment criteria: 1) Specialties that provided a large percentage of services within each family should be represented on the relevant CPEP reviewing, 2) CPEP members should be familiar with most of the service families assigned to the CPEP, and 3) CPEP workloads should be manageable. In addition, one primary care provider and one surgeon were assigned to each panel. A total of 15 CPEPs, with an average size of from 12 to 15 individuals, resulted.

**Assigning services to multiple CPEPs.** Some "redundancy" was built into the groupings (families performed by multiple specialties, such as E&M services, were assigned to more than one CPEP), to incorporate a range of perspectives and to assess validity across panels.

| Clinical Practice Expert Panel (CPEP) Types | |
|---|---|
| **CPEP** | **Type** |
| CPEP 1 | Integumentary & Physical Medicine |
| CPEP 2 | Urology |
| CPEP 3 | Orthopaedic Surgery |
| CPEP 4 | OB/GYN |
| CPEP 5 | Ophthalmology |
| CPEP 6 | Radiology |
| CPEP 7 | Evaluation & Management |
| CPEP 8 | General Surgery |
| CPEP 9 | Otolaryngology |
| CPEP 10 | Miscellaneous Internal Medicine |
| CPEP 11 | Gastroenterology |
| CPEP 12 | Cardiothoracic and Vascular Surgery |
| CPEP 13 | Cardiology |
| CPEP 14 | Anesthesiology and Pathology |
| CPEP 15 | Neurosurgery |

**Selecting a reference service from each service family, for resource profile development.** Reference services were chosen to be representative of all services within a family. Criteria for reference service selection included : 1) commonly-performed services 2) near the median of the family's services in resource utilization, 3) the definition has remained stable over the last several years, 4) there is minimal treatment variation among physicians.

**Revising service groupings, reference service selection and CPEP assignments in response to review and comment from the medical community.** Of the 125 medical societies that were asked in August 1995 to comment on preliminary service groupings and assignments, 50 provided comments which were reviewed by Abt, HCFA, Abt's clinical consultants and members of the CPEP-TEG during its September 1995 meeting. In response to this feedback, some service families were merged or sub-divided, some services were reassigned to different families, some new families and reference services were created, and some CPEP assignments were revised. In all, 229 unique service families were defined after the last round of reviews. Including redundant assignments, the 15 CPEPs were presented a total of 299 families.

**CPEP specialty composition.** In general, the numbers of representatives from a specialty selected for a CPEP was determined from the fraction of the CPEP's total volume and Medicare allowed charges accounted for by the specialty and the percentage of the specialty's total volume and charges represented by services in that CPEP as determined from the 1994 Physician and Supplier Procedure Summary Master File. In addition, a primary care provider and a general surgeon were assigned to each CPEP to serve as independent assessors.

# 3.0 Round 1 of CPEP Meetings: Development of Reference Service Resource Profiles

The objective of the first round of CPEP meetings was to develop resource profiles for the 229 reference services. In preparation, Abt designed standardized worksheets to facilitate the CPEP discussions, selected CPEP members, requested that CPEP members complete these worksheets prior to the CPEP meetings, and compiled the worksheet information for presentation and discussion at the meetings.

## 3.1 Preparation for First Round of CPEP Meetings

In preparation for the first round of CPEP meetings, standardized worksheets were developed to collect resource profile estimates for each of the 229 reference services.

**Worksheet packages.** Four categories of services were identified and worksheet packages were developed for each of these services, that included:

***1) Worksheet Package G: procedural services with a global period***, usually major surgical procedures with a global fee covering pre- and post-procedure visits associated with the provision of a procedure;

***2) Worksheet Package P: procedural services without a global period***, i.e. services for which Medicare does not pay a global fee;

***3) Worksheet Package M: evaluation and management (E&M) services,*** for office or other outpatient visits/consults not paid through a global fee;

***4) Worksheet Package Pa: pathology services***, pathology services as defined under the AMA's Current Procedural Terminology.

**Labor input service/procedure time periods.** A system was created to capture labor inputs according to specific time periods associated with the provision of these services. For example, three (service) periods were defined to correspond to the provision of clinical labor for a global service (Worksheet Package G):

- *Pre-service period* included clinical services provided within 24 hours prior to the procedure around which services are bundled (i.e., included in the payment for the procedure).

- *Procedure period* included resources expended during the provision of the procedure (or service for E&M services) itself, regardless of the global status code. Additional resources were included in the procedure period, depending on the global status code as defined below:

— For services with '000' global periods, the procedure period included all related services on the day of the procedure.

— For services with '010', '090', and 'MMM' global periods, the procedure period included any services or activities commencing with the performance of the procedure (including patient prep), and ending with the commencement of the first follow-up office visit after discharge. If the service was performed on an inpatient basis, the procedure period included the time associated with all services provided by practice staff before the patient was discharged from the hospital.

- ***Post-service period*** for clinical labor applied only to services with '010', '090', or 'MMM' global periods, and commenced with the first follow-up office visit after discharge and ended at the point defined by the global period (e.g., 10 or 90 days after the day of the procedure).

For *administrative* labor, the service periods for global services were defined as follows:

- ***Procedure period*** included all administrative services preceding and contiguous to the performance of the procedure (or service for E&M services) itself. For global status codes that bundle the pre-service visit into the total payment, this encompasses administrative time associated with services provided in the 24-hour period prior to the provision of the procedure. For services with global periods of '010', '090', or 'MMM' performed in the hospital setting, the procedure period included all services provided until the patient is discharged, and up until the first follow-up office visit after discharge.

- ***Post-service period*** commenced with the first follow-up office visit provided after discharge for services with '010', '090', and 'MMM' global periods and ended with the expiration of the global period (e.g., 10 or 90 days after the day of the procedure).

For the three other service categories (M, P, and Pa) used for services without global periods, a single *service period* (procedure period) is identified for M, P and Pa services, and clinical and administrative labor estimates for this period are recorded in M1, P1, Pa1 and M2, P2, Pa2 worksheets, respectively.

**Labor input sub-periods.** In order to further articulate the process for developing labor resource profiles, three sub-periods were defined (*pre, intra, post*). These sub-periods were defined for all G, M, P, and Pa services. For example, within the pre-service period of a global service (G0), clinical staff could review patient charts (a *pre*-sub-period function), record medical history (an *intra*-sub-period function), and review results (a *post*-service function). Similar sub-periods were defined, with appropriate functions, for the other worksheet types.

**Supplies and equipment.** Supplies and equipment were profiled on separate worksheets for each reference service, but not in relation to the service periods and sub-periods used to profile labor inputs.

**Medical community input.** The CPEP-TEG and the medical community provided input to the worksheets. Medical society comments and suggestions for changes, particularly in terminology, were

incorporated and mapped to generic terminology and format already designed for profiling the reference services. Society comments also resulted in a separate worksheet package for pathology services.

### CPEP Member Selection

The selection of CPEP participants was a particularly challenging task, in size and complexity. Of the 135 medical societies and professional trade associations asked to nominate panel members, 113 submitted nominations of from 3 to 5 physicians, non-physician clinical staff (e.g. nurses, technologists), and practice administrators.

Selection of panelists was based on four criteria: 1) knowledge of practice costs, and experience in cost finding, 2) experience in a variety of settings, 3) experience with a variety of services and 4) for clinicians, being currently or recently in practice. After reviewing over 700 nominations, Abt selected 185 to participate in the first round of CPEP meetings held in February 1996. As designed, CPEPs included more clinical than administrative staff, and more physicians than non-physician clinical staff. In addition to the CPEP nominees, one observer from each medical society that sponsored a CPEP member was allowed to serve as an observer of the CPEP process.

### Data Collection Prior to the Round I CPEP Meetings

Once CPEP members had been recruited, the relevant worksheet packages were mailed to each panel member for completion prior to the meeting. The primary purpose of this exercise was to familiarize the panelists with the data required to develop resource profiles and to ensure that panel members arrived at the meetings prepared with preliminary profiles of the reference services. CPEP members were asked to profile each reference service, drawing not only on their own practice's experience but also on their knowledge of other practices or regional variations of "typical" practice patterns for "typical" patients. If unfamiliar with particular services, CPEP members were encouraged to collaborate with their colleagues to complete the worksheets. The medical societies were also given the opportunity to complete worksheets. These data were used to provide additional information to the CPEPs. CPEP members were instructed to regard the society data as a resource, not in any way replacing the consensus estimates developed by the panels.

Summary tables were prepared of labor time estimates for each reference service, based on both the CPEP member and society data submitted on these worksheets. Supply and equipment worksheets could not be summarized; rather, worksheets were photocopied as submitted. These summaries were distributed to each CPEP, to be used as the basis for discussing reference service profiling.

## 3.2 Conducting the Round I CPEP Meetings

**Groundrules and guidelines.** Abt staff developed groundrules that defined the roles of CPEP participants and guidelines to manage panel processes. Roles were defined for panel members and support persons. CPEP members were expected to be the experts for the services most familiar to them and act as independent assessors on other services. Society observers were to serve as resources, if needed. Abt moderators were to facilitate, to maintain a neutral stance, and to help panels reach

consensus. Abt and HCFA floaters were to move from meeting to meeting, providing any needed assistance, particularly related to Medicare coverage and payment policy. Abt recorders were to record consensus profiles and take written notes, with particular attention to estimates that required explanation. Guidelines regarding, among others, the definition of *practice expenses* and the expected sites of service for profiling were also provided.

**Mock CPEP.** In January 1995, prior to the first round of CPEPs, a mock CPEP panel meeting was convened, representing the members of CPEP4 (Obstetrics and Gynecology), to test various approaches for obtaining consensus estimates of reference service profiles. Tested in this meeting were feasible profile structures (defining inputs by time and function), logistics (working with sub-groups of the panel), panel capacity (ability to finish all reference services in the specified time frame) and tools (data capture tools, visual aids, etc.) From this meeting, a "building block" approach emerged, in which each of three types of service (global, non-global and E&M) were profiled in detail, function by function, to create *templates* that could later be applied to other services.

**Final approach to profiling reference services**. The first round of CPEP meetings was held in Baltimore from February 13 through February 28, 1996. Each panelist was furnished a data manual with information summarized from the worksheets. The "building block" approach developed by the mock CPEP was applied in these meetings. Each CPEP met for an evening introductory/working session, followed by a full day working session. At any given time during this period, three CPEPs were meeting simultaneously.

In the evening sessions, panels were asked to develop profiles for "walk-through" reference services of a particular type (e.g. a non-global period service). These walk-through services were selected because they were expected to be familiar to all panelists. Detailed templates, based on function and time, were developed, by site-of-service, where appropriate. Supply and equipment requirements were also developed.

During the full day session, panelists began by profiling another type of "walk through" (a global period service, if the previous night's service was non-global). Then the third walk-through (E&M) was profiled. Once the walk-through templates had been completed, panels moved to profile other reference services, type by type. Thus, for example, each global period service would be profiled, then non-global services, and finally E&M services, using lists developed before the meetings that grouped and prioritized reference services. In profiling the other reference services, the CPEPs tended to concentrate on building up profiles by time, without regard to detailed function. In some cases, where the templates that had been developed for the walk-through services were not applicable to another reference service, panels built up the relevant profile from "scratch."

For the most part, consensus was achieved in all the CPEPs. In a few instances, the type of case was considered an important determinant of resource requirements. For example, for the excision of a breast tumor, panelists argued that resource requirements depended on whether the tumor was benign or malignant. Profiles for these services attempted to reflect average resource needs, based on weighted prevalence of the case types (e.g. 50% of tumor cases benign and 50% malignant).

## 3.3 Follow-up CPEP Activities

**Outstanding codes**. At the conclusion of the February panel meetings, 22 of the 229 reference services had not been profiled. Lack of familiarity with the unprofiled codes and the time constraints of the CPEP meetings were the main reasons that panels did not complete all profiling assignments. Abt staff followed up through conference calls with CPEP members to complete the remaining profiles.

CPEP 4 was reconvened in April 1996 because, although this CPEP had served as the "mock CPEP", procedures used during the February meetings had not been uniformly applied during the pilot test. In addition, this CPEP had not completed all of its profiles during the mock panel meeting.

**Verification**. The reference service profiles were subjected to substantial review and verification. Panelists were asked to review and validate the resource profiles they had earlier completed in the first round of meetings. Twenty-eight panel members submitted written comments, to clarify or provide additional information. Identified errors were corrected, and most clarifications were incorporated. However any changes that would normally have required panel consensus were not incorporated into the profiles.

The panels were not able to provide a great deal of detail on the brand of equipment and supply quantities. As a result, the second round of CPEP meetings began with attempts to complete supply and equipment profiles for the reference services.

# 4.0 Second Round of CPEP Meetings: Profile Development for All Services

For the second round of CPEP meetings, it had been expected that panelists would extrapolate reference service costs to other services in the service families. However, based on input from CPEP members, this methodology was not implemented. Instead, the method applied for Round II was a slightly more aggregated version of the profiling approach used during Round I.

## 4.1 Preparation for the Second Round of CPEP Meetings

In total, all 15 panels had to profile over 6,000 codes within a 2-day period during the second round of CPEP meetings, drawing on a wider range of clinical expertise than was required for Round I. In addition, Abt staff had to enter and clean data as quickly as possible after the CPEP meetings to meet HCFA's schedule for the notice of proposed rule-making. Experience from the Round I meetings also showed that alternative sources for some data (particularly equipment utilization and maintenance cost information) would be required; and that additional effort would be needed to secure detailed supply and equipment information for the reference services.

**Reconsidering the "extrapolation" design**. The original design for estimating direct practice costs assumed that the panelists could extrapolate total direct costs of the reference services to other services in each service family. However, after meeting with CPEP volunteers to discuss this approach, it was determined that the remainder of the services should be profiled in the same units that were used to

develop the reference service profiles. To facilitate this process, it was decided that panelists would be encouraged to define sub-families of services within each family, or to define key indicators or "drivers" of resource use.

**Data capture design.** To accommodate this revised approach, data capture mechanisms were developed: one to record labor profiles and the other to record supply and equipment profiles. The labor profile data entry tool was able to pull up the reference service from a given family, add new staff types, adjust the number of post-operative visits, replicate the labor profile for a number of services that were exactly alike and copy and modify a profile from a previously profiled service, regardless of family identification. The supply and equipment recording tools were still based on hand recording, but were designed to more easily record additions to or deletions from the reference service supply and equipment profiles.

**Selection/replacement of CPEP members**. To assure continuity, all Round I CPEP members were invited to participate in the Round II panel meetings. Most (71%) participated. Replacements were selected from the same specialty, nominating society and practice staff type, wherever possible. In addition, medical societies were asked to recruit subspecialty participants to assist with the wider range of services to be profiled in Round II. Six CPEPS required additional subspecialty expertise.

**Preparing CPEP members for developing resource profiles for all services.** A briefing package was prepared which outlined the planned approach to Round II, with particular attention to introducing panelists to the concept of grouping services by "key drivers" of resource use. As part of the briefing package, CPEP members were asked to consider such factors that would distinguish sub-groups of services within families.

## 4.2 Conducting the Round II CPEP Meetings

After testing several approaches and concepts in a mock CPEP session, ground rules and guidelines for the Round II panel meetings were developed.

**Ground rules**. In addition to role definitions, inclusion/exclusion rules and other guidelines in force for the Round I meetings, new guidelines were established for Round II: 1) consensus of a panel was needed to change input estimates for reference services; 2) services could be moved from family to family within but not among CPEPs; 3) CPEPs should focus on groups or sub-groups for profiling rather than individual services; 4) sub-specialty representatives were expected to provide input on services in their areas of expertise.

**Mock CPEP.** CPEP9 (Otolaryngology) served as the pilot panel for Round II. Concepts and approaches that were tested included alternative sequences for profiling (labor first, versus all three inputs profiled together), methods for validating labor estimates, splitting the panel to test alternative approaches to profiling, and the use of formulae to generate profiles based on key drivers. This CPEP was also exposed to "supply packs", pre-drafted lists of commonly used supplies for certain groups of services which proved to be useful profiling tools. This panel completed 728 of the 732 profiles assigned to it.

**Final approach to profiling all services.** The 14 CPEPs that met between June 3 and June 20, 1996 proceeded through four steps to develop resource profiles for all services.

*Review service periods.* In order to simplify the service classifications, the four-level system (G, M, P, and Pa services) was consolidated into one, while retaining the basic structure of pre-service, procedure, and post-service time periods. Review of the methodology helped CPEP members become reacquainted with the labor profiling methodology.

*Review the reference service profile.* Each panel reviewed its appropriate reference service profiles. Panelists were asked to fill gaps in supply and equipment profiles, and were allowed, subject to achieving consensus, to make changes to the reference service profiles.

*Identify key drivers to group codes.* Panelists were asked to consider the differences in labor, supply, and equipment requirements between reference and non-reference services, and to define the factors driving these differences within sub-groups of services.

*Develop resource profiles.* CPEPs used various approaches to profiling non-reference services, including replicating the reference service profile, adding to or subtracting from time in the reference profile, using a "mix and match" method that drew from different reference services, using formulae, and developing service-specific profiles from scratch. Mix and match seemed to be the most commonly used approach. Despite guidelines stressing the importance of profiling groups or sub-groups, profiling was generally performed at the service level. To facilitate the proceedings, the order of profiling services and service groups was prioritized, so that related services and groups were considered together, and large service families were not introduced before panels had dealt with smaller, more manageable families.

## 4.3 Follow-up CPEP Activities

The CPEP meetings completed resource profiles for over 95% of the services. Lack of familiarity and time constraints were the major reasons not all profiles were completed. All profiles were reviewed for completeness, and followed up with panelists to fill in missing information. Most of the unprofiled services were subsequently profiled. Only 24 low volume services remained completely unprofiled at the end of the Round II follow-up period.

During the follow-up period, supply and equipment profiles were entered into a database and data cleaning and verification tasks were undertaken to ensure that the resource profiles developed during the second round of CPEP meetings were fully captured and recorded. In addition to a detailed review of each individual labor, supply, and equipment resource profile (comparing hand-written notes from the meetings to data-entered estimates from the databases), the profiles were subjected to intensive diagnostic checks to identify any internal inconsistencies or apparent anomalies that might require further verification. A *CPEP Recorders' Notes File,* designed to support any subsequent review, was prepared. In particular, the Notes File contains information to explain specific resource estimates.

# 5.0 Development of an Input Price Data Base

Having completed the CPEP resource profiling process, Abt staff prepared to compute direct practice costs by developing pricing methodologies and accessing available data on input prices, to develop an input price data base for labor, supplies, and equipment.

## 5.1 Development of Prices for Labor Resource Profiles

**Identifying staff types.** Over two rounds of panel meetings, the CPEPs identified approximately 100 types of clinical and administrative staff needed to provide MFS services.

**Selection of wage rates**. Selection of wage data sources was guided by several principles: 1) wages should be representative of staff employed in physician office settings, 2) the data should provide valid and accurate estimates, 3) data sources should distinguish skill levels within occupations.

Three nationally-representative data sets were chosen. 1) *The University of Texas Medical Branch (UTMB) Survey of Hospital and Medical School Salaries, 1994:* The UTMB covered the largest number of health related occupations, and presented annual salaries based on a 40-hour work week. 2) *The Bureau of Labor Statistics (BLS) White Collar Pay Survey of Service-Producing Industries, 1989, and the Occupation Compensation Survey, 1993:* The former survey is now dated, and was used for only a few categories of medical technicians. The Occupational Compensation Survey proved to be a good source of wage data for RNs, LPNs and many administrative occupations. 3) *The Current Population Survey, 1994:*, In contrast to the other two sources, the CPS could be used to develop individual-level hourly wages. In addition to these sources, for specialized occupations Abt solicited wage information from three societies: the American Academy of Ophthalmology, the American Association of Physicists in Medicine, and the American Psychological Association.

**Mapping staff types to occupations**. Staff types identified by the CPEP panels were mapped to the most appropriate occupation and wage rate in the available data sets. Rates were derived for both individual staff types and "composite" staff types (the latter defined when panelists could not agree on a "typical" staff type for a particular function). Weighted averages, with weights derived from Census counts of total persons employed in physicians offices, were used to assign wages to composite staff types.

In general, BLS data were preferred, particularly when occupations were graded into skill levels. The UTMB data were generally preferred over BLS data for technicians, because their job descriptions were more detailed.

**Converting wage rates to 1995 dollars**. Wages were converted into 1995 constant dollars using the BLS Employment Cost Index for Wages and Salaries in Private Health Service Industries. Wages were also converted to total compensation through a benefits multiplier, based on the BLS Employer Costs for Employee Compensation in the Private Health Services Industries. Total compensation was converted to total compensation per minute, to be applied to the labor profile estimates generated by the CPEPs.

## 5.2 Collection of Supply Prices

**Defining a representative price**. In defining a unique and representative price for each supply item, Abt staff first had to create a classification and coding system to standardize nomenclature (e.g., alcohol swabs were listed under a dozen names, and bandages come in different sizes, each with their own price). Sources of price variation had to be addressed: 1) different kinds of the same supply are available (e.g., sterile and non-sterile gloves), which required input from the panels on the importance of such differences and required some judgment on the appropriate level of aggregation; 2) for the same supply item, different manufacturers will sell at different prices, in which case prices of commonly used brand names were preferred; 3) the same manufacturer sells through different channels (distributors, retail outlets); here, the "typical" practice was the preferred option for pricing; and 4) the same supplier will sell at different prices to different customers; list prices were used because accurate transaction prices were almost impossible to obtain.

**Sources of representative prices**. Catalogs were the preferred source of supply prices. However, for many specialized supplies, suppliers were contacted (many of whom were willing to provide catalogues or quote list prices). Panel members were asked to provide prices on supplies less commonly used and therefore less accessible through catalogs.

**Defining units of supply.** Discrete items were reported by CPEPs for the smallest quantity that would be used in providing a service (e.g. one pair of gloves, one suture). For items with continuous quantities, selection of units varied from item to item (e.g. one liter of oxygen, 30 ml of lidocaine jelly). When practices purchased quantities in bulk, these small-unit prices were derived from the bulk price (e.g., the price of a single glove could be derived from the price of a case, the number of boxes in a case, and the number of gloves in a box).

**Reconciling units of supply and prices.** In order to compute supply costs for the MFS services, it was necessary to reconcile the units of supply identified by CPEP panel members (e.g. one roll of tape for a procedure) with the units obtained from sources used to collect prices (e.g. $0.015 per 6 inches of tape). Each required conversion had to be evaluated and addressed as a unique case.

## 5.3 Collection of Equipment Purchase Prices

Prices based on actual transactions were impossible to collect, due to unwillingness of manufacturers to release this information and due to the complex structures involved in buying and selling equipment. Abt was forced to use list price data, which will tend to overstate average prices and costs at an absolute level. To facilitate price collection for some types of equipment, Abt made use of aggregates or composites defined by the panels, including 12 "rooms" , (an example of which would be an "item" that represents all the equipment needed to produce a range of simple x-rays) and eight "lanes" (reflecting similar groupings of equipment used for some services, e.g. an examination "lane" of ophthalmic equipment). As with supplies, prices of equipment varied for four reasons: 1) the same basic item might have different features, 2)manufacturers will price the same item differently, 3) manufacturers will use different channels to sell the same type of item, and 4) the same supplier will sell at different prices to

different customers. Abt used catalogs and lists and, where necessary, made direct contact with suppliers. Panel members were relied on for prices of fairly rare and unusual equipment items.

# 6.0 Development of Direct Cost Estimates

Once resource profile data were cleaned and edited, the profile data were combined with input prices to compute labor, supply, equipment and total direct practice costs.

## 6.1 Development of Service-Specific Labor Cost Estimates

**Computing service-specific direct labor costs.** Service-specific labor time data, by staff type, were multiplied by the appropriate wage rates and summed over all labor types to compute total service-specific labor costs. Labor costs were computed at the service or procedure levels, and were also allocated to the pre-service, procedure, and post-service periods.

## 6.2 Development of Service-Specific Supply Cost Estimates

**Service-specific supply costs**. Supply requirements for each HCPCS service, identified by the CPEPs, were combined with supply prices to produce service-specific supply costs. Supply use was not allocated to service time periods.

## 6.3 Development of Service-Specific Equipment Cost Estimates

Equipment costs are a relatively small fraction of overall practice expenses. However, the analytical issues associated with producing per-service equipment costs are more complicated than for labor and supplies. Equipment is a joint cost which cannot be readily allocated according to cost differences. Nonetheless, to conform to the MFS' procedure level coding, a method for allocating these costs was devised.

**Methodology**

*Choosing a basis for allocation.* One issue addressed at the onset is whether fixed equipment costs should be allocated over a fixed period of elapsed chronological time (a "useful life") or over a fixed amount of usage (maximum number of uses). Although assuming a maximum number of uses has the virtue of simplicity, *the useful life approach* was adopted for two important reasons: 1) the useful life approach computes an average cost that is based on an explicit assumption about efficiency, 2) useful life information was available, but not information on the number of uses. Annual volume and time per procedure were used to allocate a greater amount of per-procedure cost to services which require a longer use of the equipment.

*Maintenance* costs. Maintenance costs were treated as part of direct equipment costs, for the determination of service-specific costs.

*Interest expense/opportunity costs.* Interest expenses, and the opportunity cost of interest earnings foregone if a practice purchases equipment, are legitimate parts of direct practice costs. The interest or opportunity cost of capital can be computed if the equipment purchase price, annual volume of a procedure and time to perform the procedure are known.

*Machine-volume relationship.* Lacking detailed information on equipment capacity and output, two assumptions were used: practices operate at a fixed number of hours per week (e.g. 50) and equipment operates at a fixed percentage of capacity (here assumed to be 70%). With these assumptions, and given the useful life, purchase price and maintenance costs for a piece of equipment, the per service cost for any one service depends only on the minutes of time required for that service. However, without practice level information on the number and types of equipment used, it was necessary to adopt an additional assumption of a fixed number of total lifetime operating minutes occurring during the useful life of the machine.

*Equipment cost for each service* was calculated as the sum, across all equipment items, of the minutes per procedure for each item used for service "i", multiplied by the annualized cost per annual machine minutes for each equipment item.

**Data Sources**

Implementation of the equipment costing methodology requires several data elements in addition to purchase price. Data to compute service-specific equipment costs came both from the CPEPs and from secondary sources.

*Equipment-to-service mappings.* Using a matrix format, CPEPs were asked to identify which pieces of equipment were required to perform each service. These mappings were modified in a small number of cases in one of two ways: 1) items costing less than $500 (included in estimates of overhead expenses and allocated separately) were dropped and 2) clinical equipment owned or leased by the practice used in non-office settings was not included in the CPEP-specific files, but was recorded separately.

*Interest rates.* Lacking nationally representative information on loan rates and terms for physician practices, proxy data were developed based on prevailing loan rates for small businesses, taken from Small Business Administration information and from national and regional lending institutions. Rates ranged from 9.5% per annum for a loan of under $25 thousand with a term of less than 7 years to 11% for a loan of over $25 thousand and a term longer than 7 years.

*Useful life.* American Hospital Association data were used to determine useful life of equipment. Though based on consensus estimates that reflect hospital utilization, and therefore possibly unrepresentative of small practice use, the lower costs stemming from long useful lives will to some degree offset the higher cost from low volume levels (in small practices).

*Maintenance costs* were set at 5% of the purchase price, based on previous research.[2]

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2 Pauly, M.V. and Highland, J.P., "Diagnostic Tests, Technical Component: Provider Volume Patterns," DHHS #99-C-99169/5-02, October 31,1990.

*Service-specific equipment times.* The CPEPs were not asked to assign equipment use to service time periods. However it was possible to use CPEP estimates of staff time as a basis for allocation of equipment costs to services. A default rule was chosen that selected the largest staff time estimate from the "G1" or procedure period for allocation. Most service-specific equipment allocations used the default option. However, in some cases (for example, when the equipment might be personally operated by the physician), the default rule was not appropriate. To allocate overhead equipment, the rule was based on the highest staff time from each period during which a patient was physically in the physician's office.

*Capacity/total utilization level.* Working with the assumptions that practices are open 50 weeks a year and 50 hours a week, at a service-specific utilization rate of 70%, equipment was assumed to be in use for 105 thousand of the 150 thousand minutes in a year. For clinical overhead equipment, the utilization percentage was assumed to be 100%. These assumptions are not empirically grounded.

# 7.0 Database Documentation

The CPEP Direct Practice Cost Database ("CPEP Database") contains profiles of service-specific labor, equipment and supply resources developed by the CPEPs, input prices, and direct cost estimates computed from these profiles, for each of 6,251 MFS services. This database is documented in the *User's Guide for the CPEP Direct Practice Costs Data Base, Data Dictionaries* for each of the database files, and *CPEP Recorders' Notes*, containing information which provides context for the data in the CPEP Database.

The calculation of total direct practice costs requires the user to combine data from all the profile and price files in the CPEP data base. Labor, supply and equipment profiles must be matched with appropriate labor, supply and equipment prices to estimate component direct costs. Abt's algorithm for costing equipment uses both labor and equipment data, because equipment costs are allocated to services based on labor minutes for the relevant staff types used in these services. Finally, for each service, labor, supply and equipment costs must be summed to compute total practice costs.

## 7.1 Overview of the CPEP Database

The CPEP Database includes four types of files:

- ***Resource profiles***, which include estimates of input quantities for each service (labor minutes, supply item quantities, equipment usage);
- ***Input prices,*** which include data on wage rates, supply prices, and equipment prices;
- ***Service-specific direct practice costs***, which include direct costs computed by multiplying resource profiles by input prices and summing;
- ***Auxiliary files,*** which include information on the CPEP data development process.

Files are also defined either as *CPEP-specific,* in which data are organized for each profiled service (resource profiles and service-specific direct practice costs) or *global* (input prices and auxiliary files) in

which data are not service or CPEP-specific (e.g., wage rates for specific types of labor are uniform across services).

*Global Files*

Five global files apply to all CPEPs:

***Global master files,*** used to calculate total service cost estimates:

***WAGEDAT:*** wage information for each staff type, collected from the Bureau of Labor Statistics and other sources;

***SUP_PRC:*** pricing information for each supply item, collected from catalogs, manufacturers' representatives, and individual CPEP members;

***EQP_PRC:*** pricing information for each equipment item, collected from catalogs, manufacturers' representatives, and individual CPEP members -- this file contains the price, useful life, and source of price information for each item of (service-specific and overhead) clinical equipment.

***Global auxiliary files,*** containing service-specific additional information not used to calculate costs:

***EXPSITES:*** service-specific information on expected sites of service (in-office, out-of office), which established a suggested cutoff at 10 percent of total volume in a site of service in order to reduce the workload of each CPEP.

***OUTEQCAP:*** service-specific equipment costs, in cases when CPEP members reported that they pay for equipment used during the procedure period in the out-of-office setting.

*CPEP-Specific Files*

For each CPEP, there are six detail files (five service profile files and one file of service-specific direct costs) for all services assigned to the CPEP. (Note that suffixes to the filenames index the CPEP number, e.g. LABDET.T04 contains detailed labor resource estimates for CPEP4).

***LABDET.Tnn:*** detailed labor resource estimates by staff type, in minutes, for each HCPCS code, separately for clinical and administrative labor, by service period and by in- and out-of-office settings;

***SUPDET2.Tnn:*** detailed supply estimates for each HCPCS code, with information on quantity and price per unit.

***EQPDET.Tnn:*** equipment estimates for each HCPCS code, with cost information on individual equipment items as well as capital calculations. Note that overhead equipment items, used across services, are detailed in the OVEQCAP files.

*PXEQCAP.Tnn:* data elements and computed variables needed to complete detailed procedure-specific equipment estimates for each HCPCS code. Variables include assumptions about total hours of operation, loan interest rates, maintenance costs, percent of equipment capacity, purchase price and useful life. All of these variables are inputs to formulas for estimating total equipment costs over the life of the equipment, annualized costs of the equipment, cost per minute for usage, and the equipment costs for the specific service (allocated using an algorithm that links equipment minutes to specific services based on the number of minutes of labor for the relevant staff type).

*OVEQCAP.Tnn:* detailed overhead equipment estimates for each HCPCS code, with cost information on individual equipment as well as capital calculations. Cost calculations used are the same as PXEQCAP algorithms, except equipment is assumed 100% used, and overhead allocation is based on labor times for all service periods during which the patient is physically present in the office.

*PROCSUM.Tnn:* service-specific total direct costs, aggregating labor (clinical and administrative), equipment (service-specific and overhead) and supply costs, with detail on labor costs by CPEP service periods. In addition, PROCSUM identifies setting (in- or out-of-office), whether the service was a reference service, the Medicare global period status code, and the number of post-operative visits used for profiling particular global services.

*CPEP Recorders' Notes*

The Recorders' Notes were created to assist users in understanding the data. Three categories of notes are provided: 1) *CPEP-level notes,* which describe specific conventions or formulae adopted by each CPEP; 2) *Family-level notes*, which apply only to specific service families and 3) *Service-specific notes,* which address a variety of issues (for example, explanations to clarify situations where data items may seem inconsistent if taken at face value).

## 7.2 Technical User Notes

Users of the CPEP data are advised to refer to the *User's Guide,* and the file-specific *Data Dictionaries* for details on technical issues. Certain general points are worth noting:

- CPEP data files link to each other through specific linking variables. Relationships are defined as one-to-many (for example, PROCSUM combinations may represent multiple records from LABDET) and one-to-one (for example, for every record in LABDET there exists exactly one record in WAGEDAT).

- Because over 1,000 HCPCS services were assigned redundantly for profiling by more than one CPEP, the user needs to be aware that certain analyses might require the concatenation of data from two or more CPEPs.

- Certain variables appear in more than one file. Files that have one-to-one relationships to each other are partially redundant with regard to their contents. For example, the RATE variable's values in WAGEDAT have also been included in the LABDET.

- Missing values were recorded in two general situations: 1) when a CPEP did not profile one of the two sites of service (in- or out-of-office) for a particular service, variables for the un-profiled site were set to missing, 2) when a CPEP did try to profile a service at a site, but a value for a particular variable was not obtained <u>or</u> the value of one or more *components* of a particular variable were not available or not provided, the variable in question was set to missing. The user should also remember that missing values propagate to all other variables in the same or other datasets that are directly or indirectly dependent on that variable.

- Special codes are included in the CPEP data to indicate situations when the data are not present. These are documented in the *Data Dictionaries*.

Users of these data should also keep several important points in mind:

- The service resource profiles are consensus panel data that have not been validated against external sources;

- The data on the CPEP files, though reviewed and checked for quality (of data entry, for example) have not been edited or altered, except with regard to interpretation of Medicare global payment policy. The *Recorders' Notes* identify these situations.

- The CPEP data were collected to determine relative values. Thus, it is the relationships among these values, rather than their absolute values, that is important.

# 1.0 Introduction

## 1.1 Background on the Study

In 1992, the Health Care Financing Administration (HCFA) began phasing in the Medicare Fee Schedule (MFS) in accordance with the Omnibus Budget Reconciliation Act of 1989 (OBRA 1989). The Fee Schedule defines predetermined payments for physician services that are based on three key components: physician work, practice expenses, and malpractice insurance costs. For each service, each of these components is assigned some quantity of relative value units (RVUs), which measure the relative payment level on a standardized scale. To determine payment for a service, each of the three RVU components are multiplied by a geographic practice cost index (GPCI) to adjust for local differences in the costs of providing services. The geographically adjusted RVUs are then summed and multiplied by a conversion factor, which translates the RVUs into a dollar amount, to derive the payment for a service. This new method of reimbursement was designed to replace the prior method of compensating physicians based on customary, prevailing, and reasonable charges, which may not have accurately reflected the resources required to provide physician services.

Physician work RVUs were developed in several phases during the decade prior to the implementation of the MFS, using a resource-based approach that reflects the time and level of physician effort required to provide each service. However, under OBRA 1989, the RVUs for the practice expense and malpractice insurance cost components were to be based on historical charge data predating the MFS. These charge-based RVUs are inconsistent with the "resource-based" approach to physician reimbursement. As a result, Congress passed the Social Security Act Amendments of 1994 (PL 103-432, Section 121) to direct the Secretary of Health and Human Services to "...develop a methodology for implementing in 1998 a resource-based system for determining practice expense relative value units for each physician service" covered by Medicare. This was considered particularly important, as practice expense payments account for approximately 41 percent of reimbursements under the MFS.

In response to this Congressional mandate, HCFA awarded a contract to Abt Associates Inc. in March 1995 to conduct a study entitled, *Data Collection and Analysis for Generating Procedure-Specific Practice Expense Estimates*. The primary goal of this project was to collect data on the practice resource requirements associated with providing the more than 6,000 CPT-4 (Current Procedural Terminology) and alphanumeric HCPCS (HCFA Common Procedure Coding System) codes on the MFS. HCFA intended to use this study as one potential source of data to be used in developing resource-based practice expense RVUs.

A two-pronged approach was developed for collecting data on the overhead and direct components of practice costs associated with Medicare-covered services. Following completion of the data collection phase of the study, direct cost estimates were to be added to the corresponding service-specific overhead cost estimates to determine the total practice cost of each service on the Fee Schedule. New practice expense RVUs computed from these estimates would, in theory, reflect the variation in the total practice costs associated with providing different services. Combined, these data were to be analyzed by Abt and other researchers to assess various formulations and methodologies for calculating practice expense RVUs.

It had been expected that estimates of overhead costs would be produced from data collected through a survey of physician practices. However, the response rate objective of the practice cost survey was not met, leading to the cancellation of the survey. The practice cost survey is described in a separate report.[1] This report addresses the direct cost estimation process.

Clinical Practice Expert Panels (CPEPs), comprised of physician and non-physician practice staff (e.g., registered nurses, practice administrators, medical technicians), were the primary vehicle for obtaining service-specific direct cost estimates. Since the CPEP data measure direct costs, the data generated by the CPEP, would only comprise one component of the practice expense RVU, as shown in Exhibit 1-1. This CPEP process is described in more detail in the next section, and in Chapters 3.0 and 4.0.

## 1.2 Design of the Direct Cost Estimation Process

For purposes of the practice expense study, direct costs are defined as those easily attributable to the provision of a particular service. This is related to, but different from, the concept of variable cost. Some variable costs, such as the electricity required to conduct a CT scan, are not captured by the direct cost measurement, and some costs that are fixed over a range of output, such as clinical equipment, are included in direct costs. Chapter 3.0 describes in more detail the types of resources profiled in the CPEP process.

Two types of data were obtained to produce estimates of direct costs. First, Clinical Practice Expert Panels (CPEPs), comprised of physician and non-physician practice staff (e.g., registered nurses, practice administrators, medical technicians), were convened twice to provide Abt with *service-specific resource profiles*. As defined for this study, a resource profile combines estimates of the staff time (separately for clinical and administrative staff), and types and amounts of other inputs (clinical disposable supplies and clinical equipment costing $500 or more) required to provide a single MFS service, by setting (in- and out-of-office setting). Second, prices for the staff, supplies, and equipment were obtained from various sources external to the CPEPs. Applying the prices to the resource profiles enabled the computation of direct cost estimates by site of service.

To collect these data for the development of direct cost estimates, the initial research design called for the following steps:

1. MFS services were to be grouped into clinically and resource homogeneous "families".

2. A "reference service" for each family would be chosen.

3. Service families were to be grouped into CPEP groupings, with each CPEP grouping containing a set of clinically related families.

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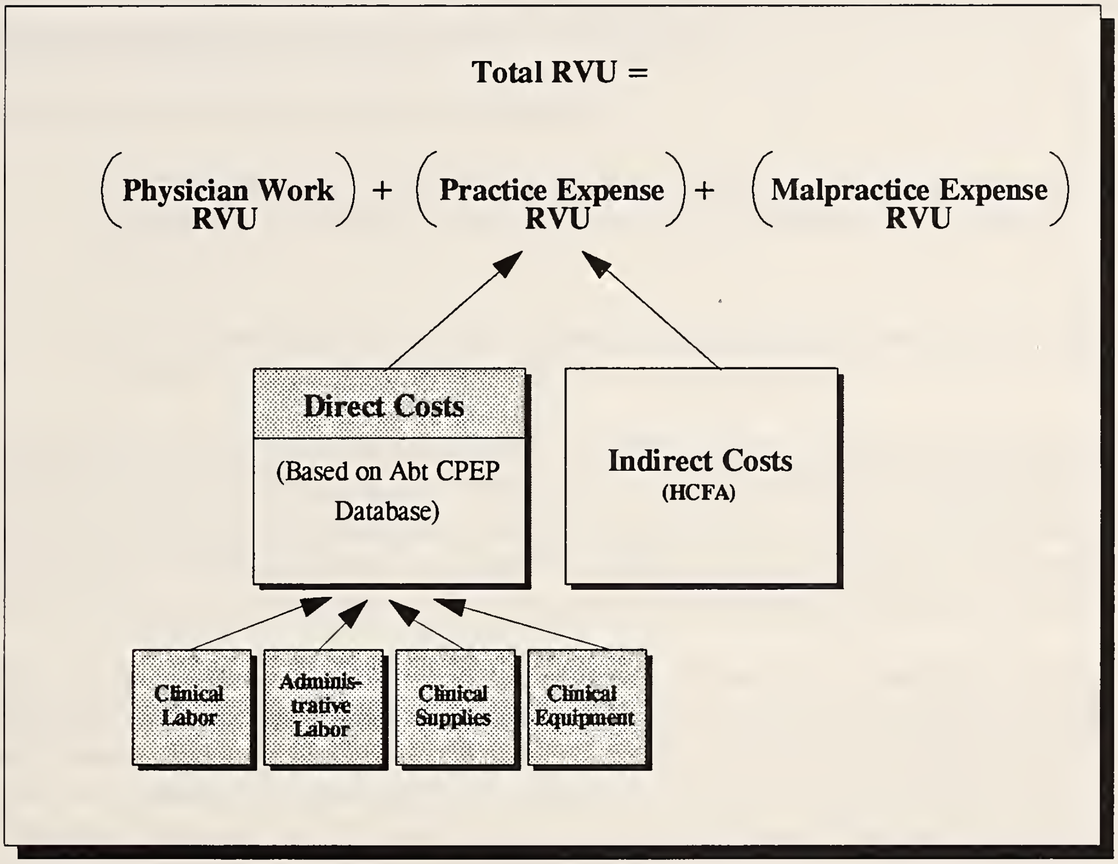
1 *Report on the Survey of Practice Costs,* HCFA Contract No. 500-95-0009, Abt Associates Inc., April 30, 1997.

**Exhibit 1-1**

**Relationship of CPEP Database to MFS RVUs**




4. Physician and non-physician panelists familiar with the practice resources required to deliver the services contained in a CPEP grouping were to be selected for the panels.

5. In the first of two rounds of CPEP meetings, panelists would profile, in detail, the resource requirements for the reference services only.

6. External price data for the resources identified by the panelists (labor, equipment, and supplies) would be used to compute a direct cost estimate for each reference service.

7. In the second round of CPEP meetings, panelists would, for each family, extrapolate from the direct cost estimate for the reference service to all the other services in the family.

The panel process was viewed as the only practically feasible way of collecting data on service-specific direct costs for the over 6,000 services on the MFS. Existing research suggests that the expert consensus process can produce valid estimates. Kahan and his colleagues describe the pilot study undertaken to test panel members' ability to reach consensus on work relative values.[2] They concluded that the process

2 Kahan, J.P., Morton, S.C., Farris, H.H., Kominsky, G.F. and Donovan, A.J. "Panel Processes for Revising Relative Values of Physician Work, A Pilot Study". *Medical Care.* Vol. 32, No. 11, pp. 1069 - 1085.

was feasible if panel members were presented with *reference sets* "to anchor the panelists' ratings on a common scale." (Kahan, p. 1073). Panel management was also found to be an important factor in achieving consensus in this pilot study. The role of the moderator in assuring that all panel members felt sufficiently comfortable participating in the process was emphasized.

Implicit in this approach were the following assumptions:

- The thousands of MFS services could be grouped, assigned appropriately to relevant specialties and benchmarked so that the CPEPs could finish their tasks in one or two meetings.

- CPEPs of mixed specialties, with both physician and non-physician participants, could reach consensus on the appropriate resource profiles for most services.

The project team worked to lay the groundwork for the CPEP meetings, incorporating lessons from other studies into planning and implementing the CPEP process. A "mock CPEP" was convened before the first meetings to pilot test the reference service methodology and to gain experience with the dynamics of the panel process. Panel moderators were trained to facilitate maximum participation. Each CPEP was provided two recorders, to free the moderator to focus entirely on managing the consensus process.

The first five steps outlined above were carried out essentially as described. As described in more detail in subsequent chapters, existing grouping systems, as well as input from expert consultants and medical societies were used to group services into 229 families, and families into 15 CPEP groupings. Reference services were selected for the process of profile development, and the speciality composition and membership of the panels was determined. Although the initial selection of reference services underwent some modification during the CPEP meetings, and followup after the meetings was needed to secure final profiles for a relatively small number of services, the first round of CPEPs generally achieved the objectives set for them in the detailed profiling of reference services.

As described in steps 6 and 7 above, the reference service profiles were to have been converted into direct costs with the application of price data, and the second round of panel meetings were to be held to extrapolate the estimates to the remaining 6,000 or so services on the MFS. However, preliminary discussions with some CPEP members during the first round panel meetings indicated that the panels might have difficulty making the judgments required to extrapolate from reference service direct cost estimates to the other services in each family. As a result, the estimation process was redesigned for the remaining MFS services. In brief, steps 6 and 7 above were redefined as follows:

6. Working at a somewhat more aggregated level of detail than in the first round CPEP meetings[3], using the first round reference service estimates as appropriate, and drawing on key "drivers" of resource requirements as appropriate, the second round CPEPs would develop labor, supply, and equipment profiles for each service on the MFS.

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3 The collection of labor resources was more detailed in the first round than in the second round (relative to the number and type of time periods); however, the second round estimates continued to differentiate several time periods for each staff type. The second round process continued to collect service-level detail for supplies and equipment.

7. Input prices would be obtained for all of the detailed labor, supplies, and equipment profiles for all of the MFS services.

This approach was carried out in the second round of CPEPs and resulted in a process of service-specific profiling. This revised approach had several significant implications for the study. First, while the service family structure and the reference service estimates were essentially retained, the service family structure became less critical to the validity of the overall results. The panel produced detailed time estimates for each staff type for each service period, detailed supply listings, and a separate equipment profile for each service by site of service. In doing this, they used a variety of methods to produce the estimates efficiently so as to complete the estimates for their assigned services, but they ultimately produced individual profiles for each service. Second, the volume of data produced, and the size and complexity of the resulting data files, expanded enormously. This had commensurate effects on the effort and time required to record, price, and verify the accuracy of the collected data.

## 1.3 The CPEP Meeting Process

The CPEPs were charged with providing resource profile estimates that would:

- Capture the costs associated with the practice expense component of the Medicare Fee Schedule (e.g., time for providers who bill separately to Medicare were excluded from practice cost labor estimates).
- Reflect resources required to provide services to a "typical" patient, not just a Medicare patient.
- Reflect the practice pattern that was typical for 1995.

The panels were conducted to achieve consensus, where possible, on the resource profiles that met the criteria above. Commentary and other information providing context for the consensus estimates were recorded in the *CPEP Recorders' Notes Files*.[4]

## 1.4 Key Participants in the CPEP Process

The CPEP process was a major undertaking, carried out within an extremely tight time frame. Preparing for and facilitating the deliberations of the 15 expert panels drew on the expertise and effort of several groups.

### HCFA staff

HCFA's Project Officer, other staff from the Office of Research and Demonstrations, and staff from the Bureau of Policy Development provided general policy guidance, feedback on design and implementation plans, and clinical guidance when needed. HCFA staff were also present at and participated in the CPEP meetings.

4 CPEP Recorders' Notes Files, April 30, 1997, Abt Associates Inc.

### Abt Associates staff

Abt staff worked with HCFA to plan the CPEP process. Abt also provided a moderator and two recorders for each session; one recorder took notes, and the other used a laptop computer to enter profile data directly into a data base, developed by Abt programming staff for this purpose. Abt staff also followed up with panels and individual CPEP members to complete profiles on services not completely addressed during the formal CPEP meetings. Abt staff gathered and compiled price data for labor, equipment and supply components of the service profiles, and produced data files with all service profile and price data.

### Project Consultants

Abt's clinical project consultants were involved in the development and refinement of the classification system. Specifically, they provided guidance for assigning services to families based on resource and clinical homogeneity, grouping related service families into CPEPs, naming service families and CPEPs, reviewing comments provided by medical societies, reconciling conflicting recommendations on the grouping of services, finalizing reference service selections, and identifying redundant family and service assignments.

### Technical Expert Groups (TEGs)

Two TEGs were recruited for this study. One was oriented toward the research and methodology of the entire practice expense study. This *Project TEG* was comprised of a total of 14 researchers and other experts on the Medicare Fee Schedule and physician practice expenses, as well as members of the medical community representing clinical (e.g., physician) and administrative (e.g., practice manager) personnel. A list of the TEG members is included as Appendix I.B. In addition, a CPEP-TEG, representing both primary and specialty care and composed of physicians, other clinicians (e.g. technicians and nurses), and practice administrators, was convened to advise Abt and HCFA on all facets of the CPEP design and process. A complete listing of CPEP-TEG participants is available in Appendix I.C. One of the primary roles of the CPEP-TEG was to review both the preliminary CPEP classification of services into resource and clinically homogenous families and the assignment of service families into CPEPs. The CPEP-TEG also identified guidelines for the selection of reference services for each service family and evaluated the process for conducting the CPEPs.

### CPEP Members

CPEP members were selected from nominees submitted by over 100 medical societies and other medical professional trade associations, and represented a wide range of physician and non-physician specialties. Members were asked to complete worksheets to familiarize themselves with the process of resource profiling in advance of the first meeting and to attend and participate in the CPEP meetings. Members were selected as practicing clinicians and administrators, knowledgeable about the costs associated with operating a medical practice, and expected to provide substantial input as primary providers of certain reference services and to serve as independent assessor of estimates in fields for which they were not primary providers. In some instances, members participated in follow-up phone calls, to complete the resource profiling process.

**Medical Societies**

The medical community was extremely active and supportive in providing input and comments on the data collection instruments and methodology for this project, as well as providing background data for the CPEP meetings. HCFA invited over 130 medical societies to two informational public meetings on June 13, 1995, in Washington, D.C. during which an overview of the project and planned data collection strategies were presented; and another meeting on August 18, 1995, during which the CPEP process was described. Questions from the societies were addressed at both meetings. Approximately 50 medical societies and other provider organizations subsequently submitted written comments about the overall research design and CPEP process. The societies also nominated CPEP members and provided observers at the CPEP meetings.

**Society Observers**

One observer from each society that sponsored a CPEP member was allowed to attend CPEP meetings. The society observers were available as resources to the panels, and were also able to explain any data submitted on behalf of their societies.

**Report Organization**

The remainder of this report describes the CPEP process and the construction of data files for estimating the direct components of physician practice costs, as described in the following chapters:

- **Chapter 2.0** describes the selection and grouping of services into service families. In addition, the criteria used to select reference services for each service family is discussed, as well as the grouping of services into CPEPs and the specialty composition of each CPEP.

- **Chapter 3.0** discusses the process for profiling the reference services during the first round of CPEP meetings. **Chapter 4.0** describes the process for profiling the remainder of the services during the second round of CPEP meetings. Chapters 3.0 and 4.0 describe the activities undertaken to prepare for the meetings, the process of conducting the meetings and follow-up activities for each round of meetings.

- **Chapter 5.0** describes the data sources for labor, supply, and equipment prices.

- **Chapter 6.0** describes the methodology used to compute direct costs from the resource profiles and input prices, with particular emphasis on equipment costs.

- **Chapter 7.0** presents technical information on the CPEP Direct Practice Cost Database derived from the estimates provided by the CPEPs, including brief descriptions of the data files and technical notes on the use of the files.

CHAPTER [illegible]

# 2.0 Developing the Service Groupings and CPEPs

To facilitate the task of developing resource profiles for the more than 6,000 services included in the Medicare Fee Schedule (MFS), these services were organized into a classification system, with the objective of developing clinically and resource homogenous groups. These groups, referred to as service families, were, in turn, grouped into fifteen CPEP groupings. This process was conducted with extensive input from clinical consultants, HCFA medical staff, and the medical community. The key steps implemented in determining the appropriate grouping of services are described in Sections 2.1 - 2.7.

The classification system's family structure and CPEP grouping were important determinants of which services were selected for profiling in the first round of CPEPs. As noted in Chapter 1.0 and discussed in detail in Chapter 4.0, the process used in the second round of CPEP meetings relied much less on the classification system than originally anticipated.

## 2.1 Identifying Services to be Grouped

Abt consulted with staff in HCFA's Bureau of Policy Development to determine the specific set of services for which practice expenses were to be measured. These services were selected from the HCFA Common Procedure Coding System (HCPCS), which has three levels of codes: level 1 CPT-4 (numeric codes), level 2 (alphanumeric national codes), and level 3 (alphanumeric local codes). Payment rates for the level 3 codes are assessed at the local level by local carriers: therefore, this project focused mostly on the level 1 and level 2 codes whose payment rates are determined at the national level.

All HCPCS level 1 and level 2 codes are designated by HCFA with a status indicator that identifies whether the HCPCS code is included in the fee schedule and whether it is separately payable if the service is covered by Medicare.[1] Exhibit 2-1 lists the status indicators that are used to define the level 1 and level 2 codes. As illustrated in this exhibit, HCFA concluded that the practice expenses for selected services with status indicators A (5,873), B (3), C (45), G (4), N (30), R (39), and T (4) were to be evaluated as part of this project. In addition, 253 anesthesia codes were included in the project, resulting in a total of 6,251 services for which detailed data on the practice resource requirements of providing these services were to be collected. Approximately 850 of these codes had technical/professional component modifiers; the approach used for direct cost estimation allowed for the computation of the direct practice costs associated with these components.

## 2.2 Grouping Services into Service Families

A method was developed for categorizing the 6,251 services identified for evaluation into useful groups for analysis. These groups are referred to as *service families*. All services were grouped into service families based upon the following criteria as agreed upon by the CPEP-TEG:

- Services in each family were characterized by relatively comparable direct costs;

1 Except for enteral and parental therapy, durable medical equipment, orthotics, and temporary codes for non-physician services or items.

Exhibit 2-1

Level 1 and Level 2 Codes (1995) with Status Indicators Evaluated by Project

| Status Indicator | No. of Codes with Status Indicator | No. of Codes with Status Indicator Included in Project |
|---|---|---|
| A= Active code | 5,875 | 5,873 |
| B= Bundled into another service | 41 | 3 |
| C= Carrier-priced | 161 | 45 |
| D= Deleted codes | 134 | --- |
| E= Excluded from the fee schedule by regulation | 437 | --- |
| G= Not valid for Medicare | 29 | 4 |
| H= Deleted modifier | 1 | --- |
| N= Non-covered service | 140 | 30 |
| P= Bundled or excluded codes | 107 | --- |
| R= Restricted coverage | 482 | 39 |
| T= Injections | 4 | 4 |
| X= Exclusion by Law | 1160 | --- |
| NONE (Anesthesia services) | --- | 253 |
| **Total** | **8,571** | **6,251** |

- Services within a family were clinically related so that panel members were familiar with all or most of the services in a family to promote discussions during the panel meetings;

- Services were assigned to families based solely on the HCPCS/CPT-4 definitions of these services, not patient or physician-specific factors, so that a single payment rate could be derived for each HCPCS code as required by the MFS; and,

- Services were grouped such that each family had a manageable number of services that could be profiled in a reasonable time frame.

In addition to these criteria, to the extent possible, codes that were assigned to a family were predominantly performed in the same setting (e.g., simple skin procedures all performed in ambulatory settings.)

Portions of two existing classification systems were combined and modified to generate a preliminary grouping of services: the Ambulatory Patient Groups (APG) system developed by 3M and the Berenson-Eggers-Holahan (BEH) system.[2] Useful elements of these two systems, as well as the criteria listed above, were used to arrange the 6,251 services into appropriate service families. This resulting grouping of services was reviewed extensively to verify that all codes identified for inclusion in this study were accounted for and assigned uniquely into families.

## 2.3 Grouping Service Families into CPEPs

With the preliminary set of service families defined, the process began for organizing the service families into CPEP groupings, such that related families were grouped into the same CPEP. The CPEP grouping and their service family assignments were determined with the following objectives in mind:

- Service families should be organized in a manner to ensure that CPEP members would be familiar with the service families assigned to the CPEP;
- Each CPEP should have a workable number of services to evaluate (neither too many nor too few); and
- The number and size of the CPEPs had to be within the resource constraints of the project.

The Physician and Supplier Procedure Summary Master File was used to assess for each service family the distribution of the services performed by different specialties. Since some specialties (e.g., pediatrics, OB/GYN) are not well represented in this file, another source of private claims data was also used.[3] Those specialties that provide the largest percentage of services within each family (i.e., top specialty providers), as determined by these data, were identified. Families with similar top specialty providers were then grouped into the same CPEP. Thus, this process resulted in CPEPs that were organized largely along specialty lines.

## 2.4 Assigning Services to Multiple CPEPs (Redundancy Assignments)

In the first round of CPEP meetings, some families were assigned to more than one CPEP to provide built-in validation of the resource estimates developed by the panels. Clinical consultants recommended

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2 Each of these systems had advantages and disadvantages for the purposes of classifying services into families. The APG system, with nine major categories and 297 APGs, was useful to the extent that it groups procedures performed on an outpatient basis according to resource and clinical homogeneity. However, it did not include inpatient services, and it classifies evaluation and management (E&M) codes by diagnosis. The BEH system, which collapses CPT codes into over 100 categories, assigns inpatient and E&M services into groups of services with similar clinical characteristics that could be incorporated into a meaningful classification scheme for estimating practice expenses. Averill, R., Goldfield, N., et al. "Design of a Prospective Payment. Classification System for Ambulatory Care." under HCFA cooperative agreement No. 17-C-90057/5-01; and Berenson , Robert and Holahan, John. "Using a New Type of Service Classification System to Examine the Growth in Medicare Physician Expenditure, 1985-88." Urban Institute Paper, December 1990.

3 The American Medical Association provided an extract from a claims database developed by the MEDSTAT group, which contained claims from over 100 private insurers, spanning 3.3 million covered lives for the year of 1991 (personal correspondence from Kurt Gillis, American Medical Association, August 3rd, 1995).

many of these redundancy assignments. For example, service families consisting of evaluation and management services (E&M), which are common to the entire medical community, were not only assigned to a primary CPEP (CPEP 7 Evaluation and Management), but were also assigned across all CPEPs in order to obtain data from a wide range of specialties. The assignment of E&M service families to a CPEP was determined by using the Physician and Supplier Procedure Summary Master File data to identify those E&M service families which were most commonly provided by the specialty(ies) comprising each CPEP. In establishing these redundancy assignments, an attempt was made to maintain a manageable workload for each CPEP.

In addition to the family level redundancy assignments from the first round of meetings, several individual services were assigned to more than one CPEP for the second round of meetings to reflect the provision of services by specialties assigned to different CPEPs. These code-level redundancy assignments were also established by using the Physician and Supplier Procedure Summary Master File data to identify high volume services where the top specialty providers of that service were not limited to one CPEP (e.g. a service provided by both Neurosurgeons and Orthopaedic Surgeons was assigned to the Orthopaedic and Neurosurgery CPEPs).

## 2.5 Selecting Reference Services

To facilitate the process of obtaining detailed resource profiles, a reference service was selected from each service family. As will be described in more detail in Chapter 3.0, the purpose of the reference service was to serve as an example, or point of comparison, for generating resource profiles for the remainder of the services within each family. Reference services were chosen to be representative of the codes within a particular family. To ensure that appropriate reference services were identified, the following guidelines, which are listed in order of priority, were utilized in the selection process:

- The service should be commonly-performed (i.e., high-volume and high Medicare allowed charges relative to the other services in the family);
- The service should have a mid-range level of resource usage relative to the other codes in the family;
- The service should be a code whose definition or coding application has not changed in the last several years; and
- The variation across physicians in the way the service is performed should be minimal.

These guidelines and their priority ranking were developed in consultation with the CPEP-TEG. As explained in Section 2.6, a preliminary list of reference services was compiled based on recommendations submitted by numerous medical societies. Clinical consultants and HCFA medical staff reviewed the candidate reference services suggested by these societies and made final selections based upon the above criteria.

## 2.6 Finalizing the Grouping of Services

In August of 1995, the preliminary grouping of services, which had been developed in close consultation with HCFA clinical staff and clinical consultants, was released to the medical community for review. Over 125 medical societies were asked to provide comments on the service groupings and assess the extent to which services had been categorized based on resource and clinical homogeneity. More than 50 medical societies submitted comments, which were reviewed by Abt and HCFA staff, clinical consultants, as well as by members of the CPEP-TEG during its September 1995 meeting. Feedback obtained from these societies resulted in several modifications to the grouping of services, including the following:

- Reassigning codes to service families,
- Creating new service families,
- Merging service families with similar codes,
- Sub-dividing families that contained a wide range of services,
- Introducing new redundancy assignments, and
- Reassigning families to different CPEPs.

As depicted in Exhibit 2-2, the resulting grouping of services contained 229 unique service families allocated across 15 CPEPs, with each CPEP having between 8 and 25 service families. Including the redundancy assignments (See Section 2.4), there were 299 service families assigned across the 15 CPEPs with each CPEP having between 10 and 36 service families. Appendix II.A provides a detailed listing of the service families and CPEP groupings. The final list of services that were assigned to more than one CPEP (i.e., the redundancy assignments) is provided in Appendix II.B.

In addition to providing comments on the service groupings, the societies were asked to recommend reference services for each family. As noted in Section 2.5, the CPEP-TEG assisted in establishing a set of guidelines to determine which service should be selected as the reference service for each of the families. Using these guidelines, HCFA clinical staff and clinical consultants identified appropriate reference services for those families for which the societies had provided candidate reference services, as well as for families for which the societies had not submitted recommendations.

The revised grouping of services, including the reference service selections, was made available to the medical societies. Several societies subsequently submitted written comments, most of which concerned reference service changes. Those reference service changes that were approved by HCFA were incorporated into the final grouping of services. A complete list of the reference services selected from each family is included as Appendix II.C.

## 2.7 CPEP Specialty Composition

In general, the number of representatives from a specialty, which included physicians, clinical support, and administrative personnel that were selected to serve on a CPEP was determined from the fraction of the CPEP's total volume and annual Medicare allowed charges accounted for by the specialty, and the percentage of the specialty's total volume and charges represented by services in that CPEP as

**Exhibit 2-2**

**Summary of Clinical Practice Expert Panels**

| CPEP | Description | Number of Unique Service Families[a] | Total Number of Service Families[b] |
|---|---|---|---|
| 1 | Integumentary and Physical Medicine | 12 | 17 |
| 2 | Male Genital and Urinary | 19 | 23 |
| 3 | Orthopaedics | 24 | 29 |
| 4 | Obstetrics and Gynecology | 18 | 22 |
| 5 | Ophthalmology | 16 | 19 |
| 6 | Radiology | 17 | 19 |
| 7 | Evaluation and Management and Other Services | 15 | 19 |
| 8 | General Surgery | 25 | 36 |
| 9 | Otolaryngology | 16 | 22 |
| 10 | Miscellaneous Internal Medicine and Other Services | 17 | 22 |
| 11 | Gastroenterology | 8 | 12 |
| 12 | Cardiothoracic and Vascular Surgery | 9 | 16 |
| 13 | Cardiology | 14 | 19 |
| 14 | Anesthesiology and Pathology | 9 | 10 |
| 15 | Neurosurgery | 10 | 14 |
| **Total** | | **229** | **299** |

[a] The classification of services into service families and CPEPs resulted in the creation of 229 mutually exclusive and exhaustive clinical and resource homogenous service family groupings assigned across 15 CPEPs. The number of unique service families is based on the grouping system as of November 7, 1995 (see Appendix II.A).

[b] For validation purposes, certain service families have been assigned to multiple CPEPs resulting in 299 service family assignments allocated across the 15 CPEPs. In addition, a small number of individual services were assigned to additional families, also for validation purposes.

determined by 1994 Physician and Supplier Procedure Summary Master File data. The specialty categories were modeled after the AMA's specialty categorization system, to which were added non-physician providers of services. Given that these data represent only Medicare service utilization, both HCFA medical staff and Abt Associates' clinical consultants reviewed the services in each CPEP to ensure appropriate representation from specialties not normally reflected in the Physician and Supplier Procedure Summary Master File data (e.g., pediatrics). In addition, a primary care provider and a surgeon were assigned to each CPEP.[4]

Abt Associates worked with over 125 medical societies to recruit physicians, non-physician clinicians (e.g. nurses, technicians), and practice administrators to participate in the CPEPs. The criteria and process implemented for recruiting panel members is described in Chapter 3.0.

4 The assignment of specialties to each CPEP, including the assignment of a primary care provider and surgeon, did not necessarily reflect the actual specialty composition of each CPEP. As described in the next chapter, when necessary, attempts to replace CPEP members from the same specialty, were made, but were not always feasible. In addition, in a few instances due to travel delays, some CPEP members were unable to attend the meetings at the last minute, leaving some specialities unrepresented.

# 3.0 Round 1 of CPEP Meetings: Development of Reference Service Resource Profiles

The objective of the first round of CPEP meetings was to develop resource profiles for the 229 reference services. A *resource profile* is an itemization of the direct labor, supplies, and equipment used in the provision of a service.[1] This chapter discusses the preparation for and process used to develop these reference service resource profiles, which included:

- Designing worksheets for profiling each reference service;
- Recruiting CPEP members and medical society observers;
- Distributing worksheets to CPEP members and medical societies for completion before the first round of panel meetings;
- Establishing guidelines for the panel meetings;
- Pilot testing the process (the "mock CPEP");
- Profiling reference services in the first round of CPEP meetings;
- Conducting follow-up on a limited number of unprofiled services;
- Submitting all profiles to CPEP participants for review and verification; and,
- Incorporating corrections identified by CPEP members into the database.

## 3.1 Preparation for First Round of CPEP Meetings

Several activities were undertaken in preparation for development of the reference service resource profiles, including: designing standardized worksheets to facilitate the CPEP discussions; selecting CPEP members; providing CPEP members and societies with the opportunity to complete these worksheets prior to the CPEP meetings; and, compiling the submitted worksheet information for presentation and discussion at the meetings.

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1 The resource profiles developed from the CPEP meetings were converted into *cost profiles*, if prices for each of the inputs delineated in the resource profile were available. If price data were unavailable for some inputs, a service had a *resource profile* (i.e., inputs were specified), but was only partially *costed*.

### 3.1.1 Development of Worksheets

*Overview of Worksheet Packages*

In preparation for the first round of CPEP meetings, Abt developed standardized worksheets to collect resource profile estimates for each of the 229 reference services. Standardized worksheets were used not only to facilitate the CPEP discussions, but also to ensure that the information obtained on resource usage was complete and consistent across all services and CPEPs. For each reference service, the worksheets solicited information on the time spent by practice support staff to perform clinical and administrative functions, as well as on the utilization of medical equipment and disposable medical supplies.

The first step in designing the worksheets was to determine the major types of services for which resource profiles had to be developed. Four categories of services were identified and worksheet packages were developed for each of these service types as outlined below:

- ***Worksheet Package G: Procedural services with a global period.*** Designed for services (usually major surgical procedures) for which Medicare pays a global fee that covers pre- and post- procedure visits associated with the provision of a procedure (e.g., total knee replacement - CPT-4 27447);

- ***Worksheet Package P: Procedural services without a global period***: Designed for services (usually minor surgical procedures) for which Medicare does ***not*** pay a global fee that covers pre- and post- procedure visits associated with the provision of a procedure (e.g., MRI - CPT-4 72148);

- ***Worksheet Package M: Evaluation and Management (E&M) services***: Designed for office or other outpatient visits or consults that are ***not*** included in a global fee (e.g. office visits, new patient - CPT-4 99203); and,

- ***Worksheet Package Pa: Pathology services.*** Designed for services defined as pathology services under the AMA's Current Procedural Terminology (e.g., immunocytochemistry, each antibody - CPT-4 88342).

For each service type, worksheets were developed to capture the three primary categories of direct practice expense inputs: labor, equipment, and supplies. Each of these is discussed in detail below.

*Labor Profiling*

Exhibit 3-1 displays the four worksheet package types. As illustrated in this table, each worksheet package was subdivided into functional categories and service periods to facilitate collection of labor resource requirements.

**Exhibit 3-1**

**CPEP Service Period Designation by Type of Service**

| | Worksheet/Type of Service | | | |
|---|---|---|---|---|
| | **Package G** | **Package P** | **Package M** | **Package Pa** |
| | **Procedures with Global Period** | **Procedures without Global Period** | **E&M Services** | **Pathology Services** |
| **Service Time Period** | | | | |
| ***Clinical Functions*** | | | | |
| Pre-Service Period | G0.1 | ------ | ------ | ------ |
| Procedure Period | G1 | P1 | M1 | Pa1 |
| Post-Service Period | G1.1-G1.9 | ------ | ------ | ------ |
| ***Administrative Functions*** | | | | |
| Procedure Period | G2* | P2 | M2 | Pa2 |
| Post-Service Period | G2.1-G2.9 | ------ | ------ | ------ |
| * The G2 worksheet includes administrative time for both the pre-service and procedure periods. | | | | |

For each worksheet package, there was a fundamental separation of time estimates into two functional categories: ***clinical functions*** and ***administrative functions***. These functional categories were further broken down into service periods, which reflected the different phases of providing a service. For example, three (service) periods were defined to correspond to the provision of clinical labor for a global service (Worksheet Package G):

- ***Pre-service period*** included clinical services provided within 24 hours prior to the procedure around which services are bundled (i.e., included in the payment for the procedure). During the CPEP process, pre-service period time estimates were collected for services with '000', '010', '090', and 'MMM' global period status codes. Clinical labor in the pre-service period was collected in the G0.1 worksheet.[2]

- ***Procedure period*** included resources expended during the provision of the procedure (or service for E&M services) itself, regardless of the global status code. Clinical labor in the procedure period was collected in the G1 worksheets for each global service. Additional resources were included in the procedure period, depending on the global status code as defined below:

  — For services with '000' global periods, the procedure period included all related services on the day of the procedure.

2 Not all services with a global period included the provision of services within this 24 hour period; some services with a global period included only the provision of the service itself and post-service visits.

- For services with ‘010‘, ‘090', and ‘MMM’ global periods, the procedure period included any services or activities commencing with the performance of the procedure (including patient prep), and ending with the commencement of the first follow-up office visit after discharge. If the service was performed on an inpatient basis, the procedure period included the time associated with all services provided by practice staff before the patient was discharged from the hospital. For example, a 090 global service may require phone calls from the practice nursing staff to the hospital nursing staff while the patient is still in the hospital.

- *Post-service period* for clinical labor applied only to services with ‘010', ‘090', or ‘MMM’ global periods, and commenced with the first follow-up office visit after discharge and ended at the point defined by the global period (e.g., 10 or 90 days after the day of the procedure). Clinical labor in the post-service period was recorded in the G1.1 - G1.9 worksheets, with the assumption that services would require no more than nine post-discharge follow-up office visits.[3]

For *administrative* labor, the service periods for global services were defined as follows:

- *Procedure period* included all administrative services preceding and contiguous to the performance of the procedure (or service for E&M services) itself. For global status codes that bundle the pre-service visit into the total payment, this encompasses administrative time associated with services provided in the 24-hour period prior to the provision of the procedure. For services with global periods of ‘010’, ‘090’, or ‘MMM’ performed in the hospital setting, the procedure period included all services provided until the patient is discharged, and up until the first follow-up office visit after discharge. Administrative labor in the procedure period was recorded in the G2 worksheets.

- *Post-service period* commenced with the first follow-up office visit provided after discharge for services with ‘010’, ‘090’, and ‘MMM’ global periods and ended with the expiration of the global period (e.g., 10 or 90 days after the day of the procedure). Administrative labor in the post-service period was recorded in the G2.1 - G2.9 worksheets, with the assumption that services would require no more than nine post-discharge follow-up office visits.

For the three other service categories (M, P, and Pa) used for services without global periods, the three-level articulation of clinical service time periods was not appropriate, nor was the two-level articulation of administrative service time periods. The pre- and post-service clinical time periods were not applicable to these codes, nor was the post-service administrative time period. Therefore, as Exhibit 3-1 shows, a single *service period* (procedure period) is identified for M, P and Pa services, and clinical and administrative labor estimates for this period are recorded in M1, P1, Pa1 and M2, P2, Pa2 worksheets, respectively.

3 Nine separate worksheets were developed to obtain labor time estimates for one of up to 9 follow-up visits included in the global fee. If there was panel consensus that a particular code had greater than 9 follow-up visits, the labor time associated with these extra visits was recorded appropriately on additional worksheets.

For both the clinical functions and administrative functions of all four service types, these periods were subdivided into *sub-periods*, which were defined by discrete, commonly performed tasks as follows:

- ***Pre-period***: incorporates activity prior to the provision of the service (e.g., greeting the patient, reviewing the patient chart, preparing the patient and the exam room);

- ***Intra-period:*** incorporates activities during the provision of the service (e.g. taking medical histories); and,

- ***Post-period:*** incorporates activities after the service was provided (e.g., cleaning the exam room and equipment, providing patient education/instruction, arranging check out, etc.).

As defined above, the intra period of a service consists of the *clinical* functions that are performed during the provision of the service itself (e.g., the face-to-face time with the patient). Therefore, administrative staff time estimates were obtained for only the pre-period and the post-period.

For example, if a service with a 10 day global period had one pre-service office visit and one post-service office visit included in the 10 day global period, the clinical functions of each one of these separate services was subdivided into pre-, intra-, and post-period sub-periods. Similarly, the administrative functions for each of the individual services were divided into pre-period and post-period categories. Time estimates for these sub-periods were obtained based on the different staff types (e.g., RN, medical secretary) involved in performing tasks associated with these periods. Exhibit 3-2 displays the sub-periods and the functions included within them for the clinical and administrative labor worksheets for each of the four service types.[4]

4 Labor resource profiles were collected at the micro-task level (e.g., gown patient) for the first few services. The majority of services were profiled at the aggregate service period level (pre-service, procedure, post-service). As a result, the data files reflect the time estimates by staff type at those aggregate levels.

## Exhibit 3-2

## Summary of Staff Worksheet Functions for Different Service Categories

| Services with a Global Period (Worksheet Package G) | |
|---|---|
| **Clinical Functions** | **Administrative Functions** |
| G0.1 - PRE-SERVICE PERIOD<br>**Pre-Service**<br>- Obtain medical history/review patient charts/treatment plan<br>- Greet patient/provide gowning<br>- Perform room prep/prepare medical equipment & supplies<br>- Prep and position patient<br>- Obtain vital signs<br><br>**Intra-Service**<br>- Assist in performing visit<br>- Record/Obtain medical history<br>- Record notes<br><br>**Post-Service**<br>- Clean room/equipment<br>- Provide education prior to procedure<br>- Complete pre-procedure diagnostic medical forms<br>- Review results<br>- Arrange for check-out | |
| G1 - PROCEDURE PERIOD<br><br>**Pre-Procedure**<br>- Obtain medical history/review charts/review treatment plan<br>- Provide final pre procedure education/obtain consent<br>- Greet patient/provide gowning<br>- Perform room prep/medical equipment & supplies/"scrub"<br>- Prep patient/monitor patient/prep wounds/set-up IV<br>- Obtain vital signs<br><br>**Intra-Procedure**<br>- Sedate/apply anesthesia<br>- Assist in performing procedure<br>- Record notes<br><br>**Post-Procedure**<br>- Monitor patient following procedure<br>- Clean room/equipment/shut-down equipment<br>- Provide post procedure education/instruction/counseling<br>- Complete diagnostic forms, lab & X-ray requisitions, prescriptions<br>- Review/read X-rays, lab, and pathology reports<br>- Arrange discharge/complete nursing form<br>- Conduct follow-up calls to patient/call-in prescription refills | G2 - PROCEDURE PERIOD *(includes administrative time associated with both G0.1 and G1)*<br><br>**Pre-Procedure**<br>- Obtain referral from referring MD<br>- Schedule patient/remind patient of appointment<br>- Obtain medical records/manage patient database<br>- Pre-certify patient / conduct pre-procedure billing<br>- Verify insurance/register patient<br><br>**Post-Procedure**<br>- Transcribe results/file and manage records<br>- Schedule post -op or return E&M services<br>- Notify and complete report to referring MD's<br>- Conduct billing activities |

## Exhibit 3-2 (Continued)

### Summary of Staff Worksheet Functions for Different Service Categories

| Services with a Global Period (Worksheet Package G) | |
|---|---|
| **Clinical Functions** | **Administrative Functions** |
| **G1.1 -G1.9 Post Service Period**<br><br>**Pre-Service**<br>- Review patient charts<br>- Greet Patient/provide gowning<br>- Perform room prep/set-up medical equipment & supplies<br>- Prep patient<br>- Obtain vital signs<br><br>**Intra-Service**<br>- Assist in performing E&M service (where applicable)<br>- Obtain medical history<br>- Record Notes<br><br>**Post-Service**<br>- Clean room/equipment/shut-down equipment<br>- Provide education/ instruction/counseling<br>- Complete diagnostic forms, lab & X-ray requisitions, prescriptions<br>- Review/read X-rays, lab and pathology reports<br>- Arrange discharge/complete nursing form<br>- Conduct follow-up phone calls/call-in prescription refills | **G2.1 - G2.9 Post Service Period**<br><br>**Pre-Service**<br>- Schedule Patient and remind of visit<br>- Obtain medical records, manage/recall patient database, assemble/develop chart<br>- Register Patient<br><br>**Post-Service Time**<br>- Transcribe results/file and manage patient records<br>- Schedule subsequent post procedure E&M services |
| **P1, M1 - Service Period**<br><br>**Pre-Service**<br>- Obtain medical history/review patient charts/treatment plan<br>- Provide final pre-procedure education/obtain consent (Worksheet P only)<br>- Greet patient/provide gowning<br>- Perform room prep/prepare medical equipment & supplies<br>- Prep and position patient<br>- Obtain vital signs<br><br>**Intra-Service**<br>- Sedate/apply topical anesthesia (Worksheet P only)<br>- Assist in performing service<br>- Obtain medical history (Worksheet M only)<br>- Record notes | **P2, M2 - Service Period**<br><br>**Pre-Service**<br>- Obtain referral from referring MD<br>- Schedule patient/remind patient of appointment<br>- Obtain medical records/manage patient database<br>- Pre-certify patient/conduct pre-procedure billing<br>- Verify insurance/review coverage/register patient |

**Exhibit 3-2 (Continued)**

**Summary of Staff Worksheet Functions for Different Service Categories**

| Services with a Global Period (Worksheet Package G) | |
|---|---|
| **Clinical Functions** | **Administrative Functions** |
| **P1, M1 - Service Period (Cont'd)**<br><br>**Post-Service**<br>- Monitor patient following service (Worksheet P only)<br>- Clean room/equipment/shut down equipment<br>- Provide post-service education/instruction/counseling<br>- Complete diagnostic forms, lab & x-ray requisitions, prescriptions<br>- Review/read X-rays, lab, and pathology results<br>- Arrange discharge/complete nursing form<br>- Conduct follow-up phone calls to patient/call-in prescription refills | **P2, M2 - Service Period (Cont'd)**<br><br>**Post-Service**<br>- Transcribe results/file and manage records<br>- Schedule post-op or return E&M services<br>- Notify and complete reports to referring MDs<br>- Conduct billing activities |
| **PA1 - SERVICE PERIOD**<br><br>**Pre-Service**<br>- Prepare specimen containers/preload fixative/label containers/distribute requisition form(s) to physician<br>- Accession of specimen/prepare for examination<br><br>**Intra-Service**<br>- Assist pathologist with gross specimen examination and perform screening function (where applicable)<br>- Prepare specimen for manual/automated processing<br>- Clean-up exam area while performing examination<br>- Process specimen for slide preparation<br><br>**Post-Service**<br>- Prepare, pack, and transport specimens and reports for in-house and external storage<br>- Dispose of remaining specimens, spent chemicals/other consumables, and hazardous waste<br>- Clean room/equipment following procedure | **PA2 - SERVICE PERIOD**<br><br>**Pre-Service**<br>- Retrieve previous patient medical records and slides, manage/recall patient database<br>- Verify insurance coverage<br>- Assemble and deliver slides with paperwork to pathologist<br><br>**Post-Service**<br>- Transcribe results/file and manage records<br>- Submit/receive material for consultation (where applicable)<br>- Notify and complete reports to referring MDs<br>- Conduct billing activities |

*Equipment and Supply Profiling*

Each worksheet package included worksheets for developing profiles of the medical equipment (e.g., EKG machines, dilators, endoscopes, and other diagnostic and therapeutic equipment) and supplies (e.g., needles, syringes, surgical gloves) used in the provision of each reference service. No attempt was made to ask CPEPs to allocate equipment and supply usage to service periods or sub-periods. The collection of information on medical equipment (worksheets M3; G3; P3; Pa3) was limited to equipment that was leased or owned by the practice and which had a per unit acquisition cost greater than or equal to $500. In addition to specifying the generic type of medical equipment, the worksheets requested information on the brand or model number. This information was requested for equipment when the service was performed in the office and in the few cases when the practice's equipment was used out of the office (e.g., rather than using the hospital's equipment).

In addition, the equipment worksheet asked for estimates of turnaround time, or the time that the equipment item was "tied up" during the procedure and unavailable for use for another patient (including clean up time). The turnaround times were intended to be used in developing service-specific equipment cost estimates. However, these estimates were difficult to obtain during the CPEP meetings due to time constraints, requiring that an alternative methodology be used (detailed in Chapter 6.0).

In order to obtain information on the annual utilization and maintenance costs of the medical equipment used in the provision of the reference services, a separate worksheet package (Package E) requested four additional types of information, including the total hours the equipment was used per week (across all services); the total weeks it was used per year (across all services); the number of services per year involving the use of the medical equipment item; and the annual maintenance costs of the equipment. Feedback obtained from CPEP members and societies that completed the worksheets indicated that this information was difficult to obtain; therefore, other sources of these data were used, as explained in Chapter 6.0.

For each reference service, profiles of disposable supplies were captured on the G4, P4, M4, and Pa4 worksheets.[5] Disposable medical supplies include those items that are purchased and provided by the practice for a service, and which are not separately reimbursable by Medicare (e.g., patient gowns, sterile gloves, needles, etc.). For each disposable supply item used in the direct provision of a reference service, the worksheets requested information on the type of supply item, the unit price, and the quantity of each supply that the practice provides when the service is performed in the office and out of the office. As described in Section 3.3.2, however, the supply profiles developed in the first round of CPEPs were not always sufficiently detailed for purposes of pricing or for validation of submitted price information (i.e., missing quantities for supply items, overly general names for supply items).

*Summary of Worksheet Packages*

Exhibits 3-3 and 3-4 provide a summary of the worksheet packages. Exhibit 3-3 illustrates the time periods that are captured by each of the worksheets and the type of data (i.e., clinical staff time, medical equipment) captured on each form. Exhibit 3-4 provides an example of the worksheets that were created

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5 All supply items profiled are disposable supplies. Reusable items profiled were limited to items meeting the $500 equipment threshold described above. Where they exceeded $500, they were treated as capital equipment.

to capture clinical and administrative staff time, medical equipment and supplies. Complete copies of all of the worksheets are included in Appendices III.A and III.B[6].

The design of the worksheets reflected input from the CPEP-TEG and the medical community. For example, the CPEP-TEG recommended the core set of staff types (e.g., RN, LPN) for which labor estimates should be collected and assisted in defining the standard set of labor functions (e.g., obtain medical history/review charts) to facilitate collection of the staff time estimates. The medical societies focused their comments on the terminology for describing the specific clinical and administrative functions listed on the worksheets. Wherever possible, these comments were incorporated into the final version of the worksheets. Several societies recommended that additional functions be included in the worksheets that were specific to their specialty. For example, the American College of Radiology (ACR) suggested adding functions such as 'radiopharmaceutical preparation' or 'insert catheters'. Each recommendation was carefully reviewed and it was determined that most of the additional functions recommended by the societies could be mapped to existing functions on the worksheets. In the case of ACR's suggestions, for example, "radiopharmaceutical preparation" was mapped to "perform room prep/prepare or set up medical equipment and supplies...before procedure". Likewise, "insert catheters" was mapped to "prep (e.g., dress, move...) patient ...set-up IV and/or other pre-procedure drug therapies".

The comments received from the societies did result in the separate worksheet package for pathology services. The creation of this package reflected the distinct functions that are performed in the provision of pathology services (i.e., functions related to the examination of patient specimens, rather than to the examination or treatment of patients).

The worksheets and the specific data elements that were to be included in developing the labor, equipment and supply profiles are discussed in further detail below.

6 Note that the G0.1 worksheet was not included in the original worksheet packages displayed in the appendices.

**Exhibit 3-3**

**Overview of Standardized Worksheet Packages**

| Worksheet | Type of Data Collected by Worksheet | Timeframe Covered by Worksheet |
|---|---|---|
| **Package G: Services with a Global Period of 000, 010, 090, and MMM** | | |
| G0.1 | Clinical staff time | Time to provide service (visit) performed within 24-hour period prior to procedure |
| G1 | Clinical staff time | Time to provide procedure, including time to prepare for procedure (pre-procedure), face-to-face-time (intra-procedure), time to monitor patient following procedure until the first follow-up office visit (post-procedure) |
| G1.1 - G1.9 | Clinical staff time | Time to provide first and subsequent follow-up office visits included in global fee |
| G2 | Administrative staff time | Time to provide administrative functions associated with provision of procedure and with service provided within 24-hour period prior to procedure |
| G2.1 - G2.9 | Administrative staff time | Time to provide administrative functions associated with first and subsequent follow-up office visits included in global fee |
| G3 | Medical equipment | All medical equipment (with acquisition cost > $500) used during pre-service (G0.1), procedure (G1), and post-service periods (G1.1 – G1.9) |
| G4 | Medical supplies | All disposable medical supplies used during pre-service (G0.1), procedure (G.1), and post-service periods (G1.1 – G1.9) |
| **Package P: Services without a Global Period** | | |
| P1 | Clinical staff time | Time to provide service |
| P2 | Administrative staff time | Time to provide administrative functions associated with provision of service |
| P3 | Medical equipment | All medical equipment (with acquisition cost > $500) used during provision of service |
| P4 | Medical supplies | All medical supplies used during provision of service |

**Exhibit 3-3 (Continued)**

**Overview of Standardized Worksheet Packages**

| Worksheet | Type of Data Collected by Worksheet | Timeframe Covered by Worksheet |
|---|---|---|
| **Package M: Evaluation and Management Services (E&M)** | | |
| M1 | Clinical staff time | Time to provide service |
| M2 | Administrative staff time | Time to provide administrative functions associated with provision of service |
| M3 | Medical equipment | All medical equipment (with acquisition cost > $500) used during provision of service |
| M4 | Medical supplies | All medical supplies used during provision of service |
| **Package Pa: Pathology Services** | | |
| Pa1 | Clinical staff time | Time to provide service |
| Pa2 | Administrative staff time | Time to provide administrative functions associated with provision of service |
| Pa3 | Medical equipment | All medical equipment (with acquisition cost > $500) used during provision of service |
| Pa4 | Medical supplies | All medical supplies used during provision of service |

Exhibit 3-4: Example of Worksheet to Collect Resource Requirements

**Worksheet G0.1: Time Spent (in Minutes) on *Clinical Functions* by Support Staff for Pre-Service Visit Provided Within 24-hours of Procedure**
**CPT Code:**
**Global Period:**
**Pre-Procedure Visit Time**

| *Clinical Function* | RN | | LPN | | Technician | | Medical Secretary | | Receptionist | | Other | | Other | | Other | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office |
| **Pre-Service Time:** | | | | | | | | | | | | | | | | | | |
| Review Patient Charts | | | | | | | | | | | | | | | | | | |
| Greet patient/provide gowning | | | | | | | | | | | | | | | | | | |
| Perform room prep/prepare or set-up medical equipment and supplies | | | | | | | | | | | | | | | | | | |
| Prep (e.g., dress, move, and position) patient | | | | | | | | | | | | | | | | | | |
| Obtain vital signs | | | | | | | | | | | | | | | | | | |
| Other (specify): | | | | | | | | | | | | | | | | | | |
| Other (specify): | | | | | | | | | | | | | | | | | | |
| Other (specify): | | | | | | | | | | | | | | | | | | |
| **Subtotal Pre-Service Time (min)** | | | | | | | | | | | | | | | | | | |
| **Intra-Service Time:** | | | | | | | | | | | | | | | | | | |
| Assist in performing E&M service (where applicable) | | | | | | | | | | | | | | | | | | |
| Obtain medical history | | | | | | | | | | | | | | | | | | |
| Record notes | | | | | | | | | | | | | | | | | | |
| Other (specify): | | | | | | | | | | | | | | | | | | |
| Other (specify): | | | | | | | | | | | | | | | | | | |
| **Subtotal Intra-Service Time (min)** | | | | | | | | | | | | | | | | | | |

Exhibit 3-4: Example of Worksheet to Collect Resource Requirements (Continued)

Worksheet G1: Time Spent (in Minutes) on *Clinical Functions* by Support Staff
for *Reference Procedures* (with a Global Period) Performed in Office and Out-of-Office Settings (by CPT Code)

| | *CPT Procedure Code Number:* ________ | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | RN | | LPN | | Technician | | Medical Secretary | | Receptionist | | Other ____ | | Other ____ | | Other ____ | | Other ____ | | Other ____ | |
| *Clinical Function* | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office |
| **Pre-Procedure Time:** | | | | | | | | | | | | | | | | | | | | |
| Obtain medical history/review charts/review treatment plan | | | | | | | | | | | | | | | | | | | | |
| Provide final pre-procedure education/instruction (to patient and family) and obtain patient's consent | | | | | | | | | | | | | | | | | | | | |
| Greet patient/provide gowning | | | | | | | | | | | | | | | | | | | | |
| Perform room prep/prepare or set-up medical equipment and supplies/"scrub" before procedure | | | | | | | | | | | | | | | | | | | | |
| Prep (e.g., dress, move, and position) patient/monitor patient/ prep wounds/set-up IV and/or other pre-procedure drug therapies | | | | | | | | | | | | | | | | | | | | |
| Obtain vital signs | | | | | | | | | | | | | | | | | | | | |
| Other (specify): ________ | | | | | | | | | | | | | | | | | | | | |
| Other (specify): ________ | | | | | | | | | | | | | | | | | | | | |
| Other (specify): ________ | | | | | | | | | | | | | | | | | | | | |
| Subtotal Pre-Proc. Time (min) | | | | | | | | | | | | | | | | | | | | |

**Exhibit 3-4: Example of Worksheet to Collect Resource Requirements (Continued)**

**Worksheet G1.1: Time Spent (in Minutes) on *Clinical Functions* by Support Staff for**
***Post-Procedure Office Evaluation and Management (E&M) Equivalent Services* Included in the Global Procedural Period**

| ***CPT Procedure Code Number:*** ________ ***Average No. of Post-Procedure Office E&M Equiv. Svcs:*** ______ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **POST-PROCEDURE OFFICE E&M EQUIVALENT SERVICE #1** | | | | | | | | | |
| | **RN** | **LPN** | **Technician** | **Medical Secretary** | **Receptionist** | **Other** ____ | **Other** ____ | **Other** ____ | **Other** ____ |
| ***Clinical Function*** | **In Office** | **In Office** | **In Office** | **In Office** | **In Office** | **In Office** | **In Office** | **In Office** | **In Office** |
| **PRE-SERVICE TIME:** | | | | | | | | | |
| Review patient charts | | | | | | | | | |
| Greet patient/provide gowning | | | | | | | | | |
| Perform room prep/prepare or set-up medical equipment and supplies | | | | | | | | | |
| Prep (e.g., dress, move, and position) patient | | | | | | | | | |
| Obtain vital signs | | | | | | | | | |
| Other (specify):________ | | | | | | | | | |
| Other (specify):________ | | | | | | | | | |
| Other (specify):________ | | | | | | | | | |
| **SUBTOTAL PRE-SERVICE TIME (MIN)** | | | | | | | | | |
| **INTRA-SERVICE TIME:** | | | | | | | | | |
| Assist in performing E&M service (where applicable) | | | | | | | | | |
| Obtain medical history | | | | | | | | | |
| Record notes | | | | | | | | | |
| Other (specify):________ | | | | | | | | | |
| Other (specify):________ | | | | | | | | | |
| Other (specify):________ | | | | | | | | | |
| **SUBTOTAL INTRA-SERVICE TIME (MIN)** | | | | | | | | | |

**Exhibit 3-4: Example of Worksheet to Collect Resource Requirements (Continued)**

**Worksheet G2: Time Spent (in Minutes) on *Administrative Functions* by Support Staff for *Reference Procedures* (with a Global Period) Performed in Office and Out-of-Office Settings (by CPT Code)**

| | *CPT Procedure Code Number:* ______ | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Medical Secretary | | Scheduling Secretary | | Receptionist | | Insurance/ Billing Staff | | Practice Manager | | Other ______ | | Other ______ | | Other ______ | | Other ______ | | Other ______ | |
| *Administrative Function* | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office | In Office | Out of Office |
| **Pre-Procedure Time:** | | | | | | | | | | | | | | | | | | | | |
| Obtain referral from referring M.D. | | | | | | | | | | | | | | | | | | | | |
| Schedule patient/remind patient of appointment | | | | | | | | | | | | | | | | | | | | |
| Obtain medical records, manage/ recall patient database, and assemble/develop chart | | | | | | | | | | | | | | | | | | | | |
| Pre-certify patient/conduct pre-procedure billing | | | | | | | | | | | | | | | | | | | | |
| Verify insurance/review coverage/register patient | | | | | | | | | | | | | | | | | | | | |
| Other (specify): ______ | | | | | | | | | | | | | | | | | | | | |
| Other (specify): ______ | | | | | | | | | | | | | | | | | | | | |
| Other (specify): ______ | | | | | | | | | | | | | | | | | | | | |
| **Subtotal Pre-Time (min)** | | | | | | | | | | | | | | | | | | | | |

**Exhibit 3-4: Example of Worksheet to Collect Resource Requirements (Continued)**

**Worksheet G2.1: Time Spent (in Minutes) on *Administrative Functions* by Support Staff for *Post-Procedure Office Evaluation and Management (E&M) Equivalent Services* Included in the Global Procedural Period**

*CPT Procedure Code Number:* ____________ *Average No. of Post-Procedure Office E&M Equiv. Svcs:* ________

POST-PROCEDURE OFFICE E&M EQUIVALENT SERVICE #1

| *Administrative Function* | Medical Secretary | Scheduling Secretary | Receptionist | Insurance/ Billing Staff | Practice Manager | Other ____ | Other ____ | Other ____ | Other ____ |
|---|---|---|---|---|---|---|---|---|---|
| | In Office | In Office | In Office | In Office | In Office | In Office | In Office | In Office | In Office |
| **PRE-SERVICE TIME:** | | | | | | | | | |
| Schedule patient/remind patient of appointment | | | | | | | | | |
| Obtain medical records, manage/recall patient database, and assemble/develop chart | | | | | | | | | |
| Register patient | | | | | | | | | |
| Other (specify):____ | | | | | | | | | |
| Other (specify):____ | | | | | | | | | |
| Other (specify):____ | | | | | | | | | |
| SUBTOTAL PRE-SERVICE TIME (MIN) | | | | | | | | | |
| **POST-SERVICE TIME:** | | | | | | | | | |
| Transcribe results/file and manage patient records (including any relevant utilization review/quality assurance activities and regulatory compliance filings) | | | | | | | | | |
| Schedule subsequent post-procedure E&M services (that are included in global procedural period) and arrange for hospital readmission | | | | | | | | | |
| Other (specify):____ | | | | | | | | | |
| Other (specify):____ | | | | | | | | | |
| Other (specify):____ | | | | | | | | | |
| SUBTOTAL POST-SERVICE TIME (MIN) | | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| TOTAL TIME (MIN) | | | | | | | | | |

Exhibit 3-4: Example of Worksheet to Collect Resource Requirements (Continued)

Worksheet G3: *Medical Equipment* Required to Perform *Reference Procedures and Their Global Office E&M Equivalent Services* (by CPT Code)

*CPT Procedure Code Number:* ____________________

| Type of Medical Equipment | Medical Equipment Description (e.g., brand, model #, specific features) | In Office: Medical Equipment Turn-Around Time (in Minutes) | Out-of-Office: Medical Equipment Turn-Around Time (in Minutes) |
|---|---|---|---|
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |
| ______ | ______ | ______ | ______ |

**Exhibit 3-4: Example of Worksheet to Collect Resource Requirements (Continued)**

Worksheet G4: *Disposable Medical Supplies* Required to Perform
*Reference Procedures and Their Global Office E&M Equivalent Services* (by CPT Code)

***CPT Procedure Code Number:*** ______________________________

| Disposable Medical Supply Description | List Price Per Unit (if available) | Number/amount of each supply provided by practice when performed in office setting | Number/amount of each supply provided by practice when performed in out-of-office setting |
|---|---|---|---|
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
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| ____________ | $________ | ______ | ______ |
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| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |
| ____________ | $________ | ______ | ______ |

### 3.1.2 CPEP Member Selection

Once the worksheet design had been finalized, preparations began for conducting the CPEPs, beginning with identification of CPEP participants. The selection of CPEP participants was a particularly challenging task, both in terms of volume and complexity. Nearly 200 participants were recruited from over 100 medical societies. Participants were expected to represent a variety of medical specialties, practice settings, staff types, and regions. A systematic process for CPEP nominee submission and selection was undertaken by Abt Associates, working with HCFA and the medical community.

Over 135 medical societies and professional trade associations were solicited to submit nominations for CPEP participants (see Appendix III.C for the list of societies and associations). Each society was requested to submit 3–5 nominations for each of the following types of practice staff: physicians, non-physician clinical staff (e.g., nurses, technologists), and practice administrators. Societies were asked to submit nominees that were knowledgeable about the clinical and/or cost aspects of the services provided by their practice. In addition, societies were requested to provide a brief paragraph description of each nominee, highlighting the qualifications that would make that nominee a valuable participant in the CPEP process. In all, over 740 CPEP nominations were submitted from approximately 113 societies and associations.

As requested, societies included brief biographies of each nominee which were subsequently coded and entered into a CPEP nominee database. Key elements included in this database were as follows:

- Specialty(ies)
- Subspecialty(ies)
- If physician, whether an MD or DO
- Type of allied health professional (if applicable)
- Practice type (solo/group; single specialty/multi-specialty; office/hospital-based/academic practice)
- Nominating society(ies)
- Staff type (i.e., physician, non-physician clinician; practice administrator)
- Participation on other payment-related panels (i.e., RUC panels, CPT coding committees)
- Experience with costing services or practice finance
- Urban/rural practice setting
- State

This information was provided for most nominees, though in many cases, societies had to be recontacted to obtain further details on one or more of these items.

From this database, candidates were systematically identified to serve on the CPEPs. The selection of panelists was conducted based on the following criteria:

- Panel members should be knowledgeable about the costs associated with operating a medical practice;

- Panel members for a given CPEP should represent a variety of settings (e.g., physician office, clinic, academic center);

- Panel members should have experience with a variety of services (within the context of the given CPEP); and,

- Panel members who were clinicians should be currently or recently in practice.

Abt used additional criteria, defined at the CPEP level, to achieve an appropriate mix of skills and qualifications for each CPEP by assuring representation of the appropriate specialties, geographic regions, and a mix of practice staff (physicians, who were expected to be in the majority, as well as non-physician clinicians, and practice administrators).

After reviewing and sorting the hundreds of nominees by specialty and type of practice staff, 185 nominees were selected to participate in the first round of CPEP meetings held in February, 1996. Both CPEP participants and the societies that nominated them were notified in mid-December, 1995 of the individuals identified to serve on the CPEPs.[7] Appendix III.D lists the names and affiliations of the members for each CPEP.

Exhibit 3-5 displays the composition of the first round CPEPs by profession and region. As designed, CPEPs were composed of more clinical staff (physician and non-physician staff) than administrative staff. Among the clinical staff, panels generally included more physicians than non-physician clinicians. In addition, CPEP members came from the four main Census regions: East, Central, Mountain and Pacific. Appendix III.E presents the distribution of CPEP members by practice type and region, as well as by specialty, for each CPEP.

One society staff representative from each medical society that sponsored a CPEP member was allowed to attend the CPEP meetings as an observer.[8] These society observers were available as a resource to the panel when needed, as well as available to explain any data submitted on behalf of their society, as described below.

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7 Approximately one-third of the original CPEP nominees who had been selected to participate on the first round of CPEP panels responded that they would be unavailable to attend the meetings. To the extent feasible, replacement CPEP members were selected to represent the same specialty, the same medical society or association, and the same type of practice staff as the CPEP member originally selected.

8 Some CPEP members were sponsored by more than one society. In these instances, the sponsoring societies designated one staff member to represent all sponsoring societies. In addition, the costs associated with medical society staff attending the CPEP meetings were not assumed by HCFA, but were the responsibility of the society.

## Exhibit 3-5

### Distribution of Round I CPEP Participants by Profession and Region

| CPEP | Total Number of CPEP Participants | Profession | | | Region | | | |
|---|---|---|---|---|---|---|---|---|
| | | Clinical | | | | | | |
| | | Physician | Non-Physician | Administrator | East | Central | Mountain | Pacific |
| CPEP1: Integumentary and Physical Medicine | 14 | 6 | 5 | 3 | 5 | 5 | 2 | 2 |
| CPEP2: Male Genital and Urinary | 7 | 3 | 1 | 3 | 4 | 2 | 1 | 0 |
| CPEP3: Orthopaedics | 15 | 7 | 3 | 5 | 3 | 9 | 1 | 2 |
| CPEP4: OB/GYN | 9 | 4 | 2 | 3 | 5 | 2 | 1 | 1 |
| CPEP5: Ophthalmology | 10 | 5 | 2 | 3 | 5 | 4 | 1 | 0 |
| CPEP6: Radiology | 15 | 11 | 2 | 2 | 6 | 5 | 0 | 4 |
| CPEP7: Evaluation and Management | 17 | 10 | 3 | 4 | 8 | 7 | 0 | 2 |
| CPEP8: General Surgery | 13 | 6 | 4 | 3 | 6 | 5 | 0 | 2 |
| CPEP9: Otolaryngology | 12 | 5 | 3 | 4 | 1 | 8 | 0 | 3 |
| CPEP10: Miscellaneous Internal Medicine | 13 | 8 | 2 | 3 | 3 | 6 | 2 | 2 |
| CPEP11: Gastroenterology | 11 | 5 | 5 | 1 | 2 | 7 | 1 | 1 |
| CPEP12: Cardiothoracic and Vascular | 10 | 6 | 1 | 3 | 4 | 2 | 1 | 3 |
| CPEP13: Cardiology | 14 | 7 | 2 | 5 | 5 | 7 | 1 | 1 |
| CPEP14: Anesthesiology/Pathology | 12 | 7 | 2 | 3 | 6 | 3 | 1 | 2 |
| CPEP15: Neurosurgery | 7 | 3 | 1 | 3 | 1 | 4 | 1 | 1 |
| TOTAL | 179[a] | 93 | 38 | 48 | 64 | 76 | 13 | 26 |

[a]Six of the 185 selected CPEP members were unexpectedly unable to attend the Round I CPEP meetings.

### 3.1.3 Data Collection Prior to the Round I CPEP Meetings

Once CPEP participants had been recruited, the relevant worksheet packages were mailed to each panel member for completion *prior to the meeting*. The primary purpose of this exercise was to familiarize the panelists with the data required to develop resource profiles and to ensure that panel members arrived at the meetings prepared with preliminary profiles of the reference services. The packages included detailed instructions on how to complete the forms and which worksheet package should be completed for each reference service. A separate attachment listed each reference service and the specific worksheet package that was to be completed for each service. The list also provided, if appropriate, the global period and the average number of post-discharge follow-up office visits included in the global period.[9] This information was provided as a starting point for identifying the number of post-service worksheets (G1.1-G1.9; G2.1-G2.9) that needed to be completed for services with a global period (worksheet package G).

The instructions emphasized that the estimates should reflect the resources required for the typical patient. Practitioners were encouraged to draw not only on their own practice's experience, but also on their knowledge of other practices or regional variations of practice patterns for typical patients. CPEP members were requested to complete worksheets for every reference service in his or her CPEP. If unfamiliar with particular services, CPEP members were encouraged to collaborate with their colleagues to complete the worksheets. CPEP members were requested to submit their worksheets prior to the meetings, so that the information could be compiled and made available as a starting point for the CPEP meetings.

As part of the project's continuing effort to broaden the range of expertise and input available, the medical societies were also granted the opportunity to complete these worksheets in advance of the CPEP meetings (see Appendix III.A). Societies used a variety of approaches to collect the worksheet information. While the societies were not instructed to use a specific data collection approach or sample selection methodology, most societies distributed the worksheet packages to selected members for completion. Some societies convened their own "mini-CPEPs" to develop consensus estimates. Societies were instructed to compile and summarize individual members' worksheets into a single set of worksheets. Societies were allowed to submit data on any reference service, regardless of the CPEP to which the services were assigned. In general, however, societies submitted worksheet data on those reference services with which their membership was most familiar.

CPEP members and the societies had over 4 weeks to submit worksheet information.[10] An Abt staff person was named to serve as the point of contact to answer questions about the worksheets. The data submitted by the societies were used to provide additional information to the CPEPs. CPEP members were instructed to regard them as a resource that they could use as they saw fit. The society data did not in any way replace consensus estimates developed by the panels.

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9 The post-discharge follow-up office visit data were provided by the AMA-sponsored Multi-specialty Relative Value Update Committee (RUC). These data were generated as part of the Congressionally Mandated five-year review of the Medicare Fee Schedule Physician work relative values.

10 CPEP worksheet mailing sent out December 18, 1995, with a deadline for submission of January 26, 1996. Society worksheet mailing sent out October 27, 1995, with a deadline for submission of December 22, 1995.

Labor time estimates from the worksheets were data entered and organized into summary tables for the meetings. For example, Exhibit 3-6 shows one of the summary tables prepared for the pre sub-period of the procedure period for the removal of eye lesion service (CPT-4 65420) for the Ophthalmology CPEP (CPEP 5). The labor estimates by staff type for clinical and administrative activities provided by the CPEP members were presented separately from the labor estimates submitted by the medical societies. Given the wide range of equipment and supply items specified by the CPEP members and societies, presentation of this information was limited to simple photocopies of submitted forms.

These summaries were prepared for each reference service and were provided to the panelists as part of their meeting materials. As described below in Section 3.2, panel members were asked to review this information and, if appropriate, use the estimates as a starting point for arriving at consensus for the final resource profiles for each reference service. Panelists were not constrained by the summary data; rather, these data were intended to serve as an initial point of reference and to facilitate the discussions.

## 3.2 Conducting the Round I CPEP Meetings

The actual conduct of the first round of CPEP meetings followed a set of established ground rules and guidelines for developing the resource profiles. To ensure the feasibility and efficiency of the expert panel process, a pilot-test, or "mock" CPEP, was convened which provided valuable lessons for the final profiling approach.

### 3.2.1 Ground Rules and Guidelines

Before embarking on the profiling exercise, ground rules and guidelines that had been developed prior to the meetings as part of the planning phase were presented to each panel (see Appendix III.F for the ground rules and guidelines for the first round of CPEP meetings). The first set of ground rules applied to the respective roles of the participants as highlighted below:

*Role of CPEP members:*

- Act as experts in their fields
- Present their judgements about practice expenses from the perspective of their own practice and knowledge of typical practices (e.g., not representing their society's perspective)
- For the CPEP members who are not the primary providers of the reference service, to act as independent assessors of the resource estimates, to ask questions to ensure validity, as well as to add their own clinical judgement

*Role of Society Observers:*

- Serve as resources to the CPEP process
- Explain worksheet data, if needed

**Exhibit 3-6**
**Example of Round I Worksheet Data Provided by Medical Societies and CPEP Members**

| *Worksheet G1* *Clinical Functions* | Source | RN | | LPN | | Tech | | Med. Sec. | | Receptionist | | Medical Assistant | | Physician Assistant | | Missing/Not Specified | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office |
| **65420 – REMOVAL OF EYE LESION** | | | | | | | | | | | | | | | | | | | |
| **PRE-SERVICE** | | | | | | | | | | | | | | | | | | | |
| Obtain medical history/review charts/-review treatment plan* | AAO | | 2.1 | | | 2.4 | | | 0.7 | | | | | | | | | 2.4 | 2.8 |
| | Panelist 1 | 1.5 | | | | | | | | | | | | | | | | 1.5 | |
| | Panelist 2 | | | | | 3.0 | | | | | | | | | | | | 3.0 | |
| | Mean | 0.5 | 0.7 | | | 1.8 | | | 0.2 | | | | | | | | | 2.3 | 0.9 |
| Provide final pre-procedure education/-instruction and obtain patient's consent | AAO | | 1.0 | | | 1.7 | | | 0.3 | | 0.7 | | | | | 2.9 | | 4.6 | 2.0 |
| | Panelist 1 | | | | | | | | | | | | | | | 2.5 | | 2.5 | |
| | Panelist 2 | | | 10.0 | | | | | | | | | | | | | | 10.0 | |
| | Mean | | 0.3 | 3.3 | | 0.6 | | | 0.1 | | 0.2 | | | | | 1.8 | | 5.7 | 0.7 |
| Greet patient/provide gowning | AAO | | 1.0 | | | 0.6 | | | 0.3 | 0.1 | | | | | | | | 0.7 | 1.3 |
| | Panelist 1 | | | | | | | | | | | | | | | | | | |
| | Panelist 2 | | | | | 3.0 | | | | | | | | | | | | 3.0 | |
| | Mean | | 0.3 | | | 1.2 | | | 0.1 | 0.0 | | | | | | | | 1.2 | 0.4 |
| Perform room prep/prepare or setup medical equipment and supplies scrub before procedure | AAO | 0.7 | 3.6 | 1.7 | | 3.3 | | | 1.4 | | | | | | | | | 4.7 | 5.0 |
| | Panelist 1 | | | | | | | 3.5 | | | | | | | | | | 3.5 | |
| | Panelist 2 | | | | | | | 5.0 | | | | | | | | | | 5.0 | |
| | Mean | 0.2 | 1.2 | 0.2 | | 1.1 | | 2.8 | 0.5 | | | | | | | | | 4.4 | 1.7 |
| Prep (e.g. dress, move, and position) patient-monitor/prep wounds/set-up IV and/or other pre-procedure drug therapies | AAO | 0.7 | 2.1 | | | 3.7 | | | 1.4 | | | | | | | | | 4.4 | 3.5 |
| | Panelist 1 | | | | | | | | | | | | | | | | | | |
| | Panelist 2 | | | | | 2.0 | | | | | | | | | | | | 2.0 | |
| | Mean | 0.2 | 0.7 | | | 1.9 | | | 0.5 | | | | | | | | | 2.1 | 1.2 |
| Other vital signs | AAO | 0.1 | 0.7 | | | 0.1 | | | | | | | | | | | | 0.2 | 0.7 |
| | Panelist 1 | | | | | | | | | | | | | | | | | | |
| | Panelist 2 | | | | | | | | | | | | | | | | | | |
| | Mean | 0.0 | 0.2 | | | 0.0 | | | | | | | | | | | | 0.1 | 0.2 |
| Subtotal Pre-service Functions | AAO | 1.5 | 10.5 | 0.7 | | 11.8 | | | 4.1 | 0.1 | 0.7 | | | | | 2.9 | | 17.0 | 15.3 |
| | Panelist 1 | 1.5 | | | | | | 3.5 | | | | | | | | 2.5 | | 7.5 | |
| | Panelist 2 | | | 10.0 | | 8.0 | | 5.0 | | | | | | | | | | 23.0 | |
| | Mean | 1.0 | 3.5 | 3.6 | | 6.6 | | 2.8 | 1.4 | 0.0 | 0.2 | | | | | 1.8 | | 15.8 | 5.1 |

* Means include zero values that are displayed as blanks.

**Exhibit 3-6**
**Example of Round I Worksheet Data Provided by Medical Societies and CPEP Members**

| *Worksheet G2* *Administrative Functions* | Source | Med. Secretary | | Schedul. Sec. | | Receptionist | | Billing Staff | | Practice Manager | | Nurse – RN | | Medical Records | | Other Staff | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office | In Office | Out-of-Office |
| **65420 – REMOVAL OF EYE LESION** | | | | | | | | | | | | | | | | | | | |
| **PRE-SERVICE** | | | | | | | | | | | | | | | | | | | |
| **Obtain referral from referring M.D.** | AAO | | 1.4 | | 0.3 | 1.9 | | | | | | | | | | | | 1.9 | 1.7 |
| | Panelist 1 | 1.5 | | | | | | | | | | | | | | | | 1.5 | |
| | Panelist 2 | | | | | 3.0 | | | | | | | | | | | | 3.0 | |
| | **Mean** | 0.5 | 0.5 | | 0.1 | 1.6 | | | | | | | | | | | | 2.1 | 0.6 |
| **Schedule Patient/remind patient of appointment** | AAO | | | | 5.0 | 1.9 | | | | | | | | | | | | 1.9 | 5.0 |
| | Panelist 1 | | | | | | | | | | | | | | | 2.5 | | 2.5 | |
| | Panelist 2 | | | 10.0 | | | | | | | | | | | | | | 10.0 | |
| | **Mean** | | | 3.3 | 1.7 | 0.6 | | | | | | | | | | 0.8 | | 4.8 | 1.7 |
| **Obtain medical records, manage/ recall patient database, and assemble/ develop chart** | AAO | | 1.4 | | 0.3 | 1.0 | 2.1 | | | | | | | | | 1.6 | | 2.6 | 3.8 |
| | Panelist 1 | | | | | | | | | | | | | | | | | | |
| | Panelist 2 | | | | | 3.0 | | | | | | | | | | | | 3.0 | |
| | **Mean** | | 0.5 | | 0.1 | 1.3 | 0.7 | | | | | | | | | 0.5 | | 1.9 | 1.3 |
| **Pre-certify patient/conduct pre-service billing** | AAO | | | | | | | 1.4 | 2.9 | | | | | | | | 0.4 | 1.4 | 3.3 |
| | Panelist 1 | | | | | | | 3.5 | | | | | | | | | | 3.5 | |
| | Panelist 2 | | | | | | | 5.0 | | | | | | | | | | 5.0 | |
| | **Mean** | | | | | | | 3.3 | 1.0 | | | | | | | | 0.1 | 3.3 | 1.1 |
| **Verify insurance/review coverage/ register patient** | AAO | | | | | 1.3 | | 1.4 | 2.1 | | | | | | | | | 2.7 | 2.1 |
| | Panelist 1 | | | | | | | | | | | | | | | | | | |
| | Panelist 2 | | | | | 2.0 | | | | | | | | | | | | 2.0 | |
| | **Mean** | | | | | 1.1 | | 0.5 | 0.7 | | | | | | | | | 1.6 | 0.7 |
| **Subtotal Pre-service Functions** | AAO | | 2.8 | | 5.6 | 6.1 | 2.1 | 2.8 | 5.0 | | | | | | | 1.6 | 0.4 | 10.5 | 15.9 |
| | Panelist 1 | 1.5 | | | | | | 3.5 | | | | | | | | 2.5 | | 7.5 | |
| | Panelist 2 | | | 10.0 | | 8.0 | | 5.0 | | | | | | | | | | 23.0 | |
| | **Mean** | 0.5 | 0.9 | 3.3 | 1.9 | 4.7 | 0.7 | 3.8 | 1.7 | | | | | | | 1.4 | 0.1 | 13.7 | 5.3 |

* Means include zero values that are displayed as blanks.

*Role of Abt Moderator:*

- Facilitate an open discussion and manage the process
- Maintain a neutral role regarding the content
- Help the panel reach consensus

*Role of Abt and HCFA Floaters:*

- To 'float' from meeting room to meeting room to handle any issues requiring detailed clinical and/or Medicare policy knowledge
- Provide assistance in resolving difficult consensus decisions

*Role of Abt Recorders:*

- Record consensus resource profiles for labor, supplies and equipment
- Take written notes about the general discussion, particularly consensus estimates that did not conform to Medicare policy

Abt also developed guidelines for the development of the resource profiles. These guidelines enumerated the types of resources that constitute practice expenses, as shown in Exhibit 3-7. Explicit examples of valid and invalid practice expenses were identified. For example, panelists were instructed to include in the labor profiles the time required to perform service-specific functions by support staff (not performed by physicians) who are typically employees of or contractors to a practice. Time spent performing service-specific functions by staff employed by a hospital or another facility was to be excluded from the labor profiles.

In addition, guidelines were established regarding the site(s) for which a service should be profiled (i.e., in-office and out-of-office settings [11]). Services provided in-office more than 10 percent of the time, based on 1994 Medicare data, were expected to be profiled in the in-office setting. Similarly, services provided out-of-office more than 10 percent of the time based on 1994 Medicare data were expected to be profiled in the out-office setting.[12] This 10 percent cutoff was established to maintain a manageable workload in each CPEP. This information was also provided as part of the worksheet data summaries. However, CPEP members used their clinical judgement and practice experience to assess the validity of the expected site. In some cases, the panel profiled a service in a setting not consistent with the 10 percent rule.

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11 Out-of-office settings include: outpatient hospital/clinic, ambulatory surgery center (ASC), inpatient hospital, nursing homes and all other non-office sites.

12 In-office and out-of-office Medicare volumes were derived from the 1994 Physician and Supplier Procedures Summary Master File.

## Exhibit 3-7:
## Inclusion/Exclusion Guidelines

<table>
<tr><th colspan="2">Resource Profiles</th></tr>
<tr><th>SHOULD:</th><th>SHOULD NOT:</th></tr>
<tr><td>1. Include activities most commonly <u>not</u> performed by physicians as defined by Medicare (MDs, DOs, ODs, Psychologists, Chiropractors, Dentists, Podiatrists).</td><td>1. Include activities most commonly performed by physicians as defined by Medicare.</td></tr>
<tr><td>2. Be based on recent, accepted clinical practice.</td><td>2. Be based on outmoded clinical practices or new practices that have yet to be adopted by most providers.</td></tr>
<tr><td>3. Be based on the typical patient across all age groups.</td><td>3. Be based on an unusually easy or difficult case. Nor should resource estimates be based only on the Medicare population.</td></tr>
<tr><td>4. Reflect the practice's variable costs. Variable costs include costs of resources directly attributable to performing a particular service.</td><td>4. Reflect the practice's overhead costs. Overhead costs include fixed expenses of the practice and are not directly related to a specific service. These costs are the focus of the Survey of Practices. Examples of resources that are part of overhead costs, but are often mistaken as part of variable costs include:<br><br>• Standby time<br>• Time to transport/courier patient test results/specimens<br>• Time to restock supplies<br>• Quality assurance activities<br>• Employee training</td></tr>
<tr><td>5. Reflect time required to perform service-specific functions by support staff who are typically employed or contracted by a practice and who cannot bill separately. Examples of support staff include:<br><br>• Registered nurses(RNs)<br>• Licensed Practical Nurses (LPNs)<br>• Medical Secretaries<br>• Receptionists<br>• Technicians</td><td>5. Include time spent performing service-specific functions by staff, who are employed and paid by a hospital or other facility, nor time spent by fellows or physicians.<br><br>Reflect time spent on service-specific functions by staff who bill separately for their services through the physician work component. Since these staff bill through the work component of the fee schedule, they are not considered part of practice expenses. Staff who can bill separately include:<br><br>• Certified Registered Nurse Anesthetists (CRNAs)<br>• Clinical Social Workers(CSWs)<br>• Chiropractors<br>• Dentists<br>• Doctors of Osteopathy<br>• Nurse Midwives (NMs)<br>• Nurse Practitioners (NPs)/ Clinical Nurse Specialists (CNSs)<br>• Optometrists<br>• Podiatrists<br>• Physical/Occupational Therapists (PT/OTs)<br>• Physician Assistants(PAs)<br>• Physicians<br>• Clinical Psychologists(CPs)</td></tr>
<tr><td>6. Include the turnaround time for medical equipment, with acquisition cost > $500, that is purchased or leased by practice, and that is used in the direct provision of a given service.</td><td>6. Include any medical equipment owned or provided by a hospital, nor any non-medical capital items (e.g., office computers and software, photocopiers, or desks) .</td></tr>
<tr><td>7. Include disposable medical supplies that are purchased by practice and that are used in direct provision of a given service.</td><td>7. Include any disposable medical supplies purchased or provided by a hospital.</td></tr>
</table>

### 3.2.2 Mock CPEP

In January 1995, prior to the first round of CPEPs, Abt Associates convened a mock CPEP to test various approaches for obtaining consensus estimates of reference service profiles. The mock CPEP involved members from CPEP 4, Obstetrics and Gynecology. In addition, as part of the planning activities, Abt developed a data entry tool to capture for each reference service the labor inputs for each type of staff by function.

The feasibility of several concepts was tested during this mock CPEP, as listed below:

- Did it make sense to profile all labor inputs for each reference service first, before profiling all supply and equipment inputs?
- Could panelists specify labor input requirements at a discrete task level (e.g., gown patient, prep IV, etc.) within time periods (e.g., pre, intra, post)?
- Was it feasible and efficient to separate the panel into two groups to profile a reference service and then have each group present its estimates to the other group for discussion and consensus?
- Could the panel accomplish the profiling exercises for all reference services within the specified time frame?
- How useful, flexible and accurate was the tool designed to capture data from the panel (e.g., laptop labor data entry program)?
- What tools and other techniques (e.g., visual aides) were most appropriate for facilitating discussion and arrive at consensus?

Several lessons were learned from this mock CPEP. For example, the panel thought that the process would proceed more smoothly if all inputs (labor, equipment, supplies) for a given service were profiled, rather than profiling one type of input (labor) across all reference services and then profiling the other inputs (equipment and supplies).

Most importantly, this mock CPEP identified an efficient and effective method, referred to as the “building block” approach, for profiling each reference service. As more fully described below, this method was implemented by developing detailed profiles at the discrete task level for one of each of the three types of services (a procedure with a global period, a procedure without a global period, and an evaluation and management service). This detailed profile served as the template (or “building block”) for profiling other services within each service type category. This method was adopted by the remaining CPEPs, as explained in the following section.

### 3.2.3 Final Approach to Profiling Reference Services

The first round of CPEP meetings were held in Baltimore from February 13 through February 28, 1996. A total of 14 separate panels were convened. Each panel was responsible for developing resource

profiles for between 11 and 36 HCPCS reference service codes.[13] As more fully described below, each meeting consisted of an evening introductory and working session, followed by a one-day working session. The schedule was arranged so that three CPEP panels met simultaneously during each day and a half session.

Every panelist, society observer, moderator, and recorder received a data manual specific to the CPEP. Manuals contained summaries of all the labor estimates from the worksheets submitted by CPEP members and societies prior to the meetings, arranged by HCPCS code (as shown previously in Exhibit 3-6).[14] As mentioned above, photocopies of submitted lists of equipment and supply data for each HCPCS code were also included. These data served as a reference for the CPEP meetings. Discussions among the panel members were necessary to arrive at final resource estimates.

As mentioned above, applying lessons learned in the mock CPEP, a 'building block' approach was implemented. Each of the three types of services (a procedure with a global period, a procedure without a global period, and an evaluation and management service) was profiled in detail (micro-profiling), as described below, to provide a *template* of staff times and supply and equipment profiles. Once the panel developed the template for each of these three service types, the profiling of the other reference services was performed at a more aggregate level.

For example, in the evening session, panels were asked to develop detailed staff requirements for one particular "walk-through" reference service (e.g., a procedure without a global period). These "walk-through" reference services were selected because they were assumed to be familiar to all panelists. Time requirements for each of the discrete functions in the pre-, intra-, and post- clinical and administrative sub-periods were separately identified (e.g., 2 minutes of a receptionist to greet the patient; 3 minutes of an RN to gown the patient; etc.). In addition, where appropriate, separate resource profiles were developed for each site-of-service in which the reference service was performed. For services with a global period, the site of service was anchored to the site in which the procedure itself was performed. Thus, the time for the post-discharge follow-up office visits (G1.1-G1.9) included in the global fee for a procedure performed out of the office (e.g., inpatient hospital setting) was included in the out-of-office resource profile, even though these visits were conducted in the office. Following completion of the labor profiles, equipment and supply requirements for providing the service in-office and/or out-of-office were also itemized. Panels were asked to report as much detail as possible, including the brand and model of equipment used and the quantity of each supply provided.

The following morning's session began with the profiling of another type of "walk-through" code (e.g., a procedure with a global period). In the case of procedures with a global period, time estimates were obtained at the sub-period level for each of the service periods defined for the global service (See Section 3.1). The final "walk-through" code focused on the third service category (e.g., E&M).

These micro-profiled resource estimates for each of the walk-through reference services were entered on laptops and recorded on flip charts, to be posted around the room for reference . As appropriate, these detailed profiles were revised to reflect variation in the resource requirements for the other services. The

13 As noted below, the OB/GYN CPEP (CPEP 4), which had served as the mock CPEP, was reconvened as the 15th panel in April 1996.

14 The data reported by the societies did not replace the CPEP process in any way. The CPEP panels were responsible, based on their own expertise and the submitted worksheet data, for developing resource estimates for all reference services.

panelists tended to profile the other reference services based on pre-, intra-, and post-period aggregates, without explicit reference to the detailed functions (e.g,. a total of 5 minutes of an RN prior to the service (pre-period); a total of 8 minutes of a physician assistant and another 3 minutes of an LPN during the intra-time, etc.). Similarly, the list of supplies and equipment that were developed for the walk-through codes were modified (items were added or deleted), as necessary, to reflect the supply and equipment resources required for the other reference services. In cases where none of the micro-profiled resource estimates were applicable to another reference service, the panel profiled the service from the beginning, building the labor profile function by function and by staff type.

As noted, this approach to resource profiling was referred to as the "building-block" approach. To implement this approach effectively, reference services were prioritized prior to the meetings so that services of the same type (e.g., all services with a global period) were grouped together. Once the detailed resource profiles had been developed for each service category represented by the reference services assigned to a CPEP, the panel proceeded to develop profiles for the remainder of the services as they were organized or grouped by the prioritization lists (e.g., profiles for all services with a global period were developed first, followed by profiles for services without a global period). These prioritization lists (see Appendix III.G) provided a recommended order and allocation of time devoted to profiling each reference service. Panel members were not constrained by this order or the recommended time allocation. The prioritization lists were intended to help structure the process so that profiling of the services was completed in an efficient and timely manner.

The panels were able to achieve consensus on the resource estimates for most of the reference services. CPEP members' prior exposure to the worksheets and the types of data required to develop the resource requirements facilitated the consensus process. Discussions among the panel members focused on clarifying and resolving any initially divergent views in order to achieve the agreement of all panel members. In a few instances, the panel could not agree on the 'typical' profile. For example, in some cases, the panel reported that the resource estimate depended on whether the service was done on an elective or emergent basis. In situations such as these where the panel could not arrive at one 'typical' profile, estimates of both types of cases were recorded, along with the proportions of each type of case. Except when the split was 50-50, the estimate that was ultimately used was the median, or typical value, and the other information collected (time estimates for the different cases and percentage weights of these time estimates provided by CPEP members) was included in the Round I notes.[15] In the case of 50-50 splits, a weighted average was used.

For each service with a global period, panel members also assessed the number of post-discharge follow-up office visits included in the global service (as provided by HCFA from the Harvard Study). In some cases, panel members increased or decreased the number of follow-up office visits based on their clinical judgement. This type of change affected the resource profile for the follow-up visits (G1.1-G.1.9) performed during the post-service period. In addition, the panel sometimes treated services as add-on services (services typically performed in conjunction with another service) when these services were not formally designated as such ('ZZZ' global period status code) under the MFS, and vice versa. The implication of this adjustment is that only the incremental administrative or clinical time expended beyond the provision of the service to which the add-on service was anchored would be included in the resource profile.

15 These written notes are formally included under the column 'Notes' in the Round I summary data.

## 3.3 Followup CPEP Activities

Overall, the objective of completing resource profiles for the majority of the reference services during the first round of CPEP meetings was achieved. Resource profiles were developed for over 90% of the reference services. The few services that were not profiled during the CPEP meetings were profiled during followup activities. In addition, to ensure that the profile estimates reflected the consensus arrived at during the meetings, CPEP panelists were given the opportunity to verify the final values of the reference service profiles.

### 3.3.1 Outstanding Reference Service Profiles

At the conclusion of the February panel meetings, the panels had been unable to profile only 22 of the 229 reference services.[16] As shown in Exhibit 3-8, these 22 reference services were spread across eight CPEPs, with the majority in two CPEPs (CPEP 12: Cardiothoracic and Vascular; and CPEP 13: Cardiology). In an effort to obtain profiles for every reference service prior to the second round of panel meetings, most of the unprofiled codes were subsequently profiled via conference calls with CPEP members, or were profiled by one CPEP member and later discussed and approved by the remainder of the panelists.

There were two main reasons for failing to complete profiling of all reference services during the first round of meetings. In some cases, the panel members were unfamiliar with a reference service and did not feel qualified to provide a resource profile. In these few cases, the service was either dropped from the CPEP (if redundantly assigned) or moved to another family or CPEP for profiling, based on the panel's recommendation. In a few other cases, the panel members did not have enough time to develop the resource profile.

**Exhibit 3-8**
**Round I Summary of Outstanding Reference Service Resource Profiles**

| CPEP | Number of Reference Services Not Profiled |
|---|---|
| CPEP 3 Orthopaedics | 1 |
| CPEP 4 Obstetrics/Gynecology | 3 |
| CPEP 9 Otolaryngology | 2 |
| CPEP 10 Miscellaneous Internal Medicine | 1 |
| CPEP 12 Cardiothoracic and Vascular | 6 |
| CPEP 13 Cardiology | 7 |
| CPEP 14 Anesthesiology/Pathology | 1 |
| CPEP 15 Neurosurgery | 1 |

16 Including redundantly assigned services, resource profiles were obtained for 301 services.

In addition, the OB/GYN CPEP (CPEP 4) was reconvened in April 1996. As described above, CPEP 4 served as the mock CPEP, during which alternative approaches to profiling were tested. Because the format of the mock CPEP differed from the rest of the panel meetings, and the resource profiles were not developed for many of the references services of this panel (due to time constraints), this panel was reconvened. Consensus estimates for reference services in CPEP 4 were developed, using the same methodology as that used for the other 14 CPEPs convened in February.

### 3.3.2 Verification

The reference service resource profiles developed during the first round of CPEP meetings were subjected to substantial review and verification. Given that these reference service resource profiles were to serve as the basis for developing the resource estimates for the remaining 6,022 services during the second round of CPEP meetings, it was critical to ensure that the data were accurate.

As part of the verification process for the first round, CPEP members were asked to review and validate the resource profiles developed for the reference services. Approximately six weeks after the end of the first round of CPEP meetings (mid-April 1996), a complete set of CPEP-specific reference service profiles were sent to CPEP members.[17] The panel members were asked to verify that the resource profiles reflected the consensus of the panel as determined during the February meetings. Panelists were asked to submit their comments within a month (mid-May 1996) to enable sufficient time for staff to review and implement appropriate changes to the reference service profiles prior to the second round of CPEPs (scheduled for the first week of June).

Approximately 28 panel members across nine CPEPs submitted written comments, primarily providing clarification, and in some cases providing additional information or different estimates.[18] A thorough review of each comment was undertaken to determine whether the reference service profiles required revision. Several principles were established to determine whether or not to implement the recommended changes to the reference service profiles:

- Labor time estimates that were clearly recorded in error based on multiple CPEP member comments and confirmation from recorder notes were changed to reflect the correct estimate.

- In some cases, the labor profile included only a total labor time without specifying the allocation to specific staff types. If, as part of this review and validation, CPEP member(s) provided the allocation of labor time to staff type, this added detail was incorporated into the resource profile. Similarly, clarification of staff types were implemented (e.g., nuclear medicine technologist vs. 'tech' ).

- Additions and/or clarification to the equipment and supply listings were incorporated into the reference service profiles.

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17 Due to the timing of convening two panels, resource profiles developed by two CPEPs were not sent out for review and validation by its members: CPEP 4 (OB/GYN) which was reconvened in April 1996; and CPEP 9 (Otolaryngology), which served as the mock CPEP for the second round of CPEP meeting.

18 Comments were received from the following CPEPs: CPEP 1 Integumentary; CPEP 3 Orthopaedics; CPEP 5 Ophthalmology; CPEP 6 Radiology; CPEP 7 Evaluation and Management; CPEP 8 General Surgery; CPEP 10 Internal Medicine; CPEP 12 Cardiothoracic and Vascular; and, CPEP 14 Anesthesia and Pathology.

- *Any changes to the labor profiles that normally would have required consensus by the panel were not incorporated into the reference service profiles (including increasing and/or decreasing staff times or reallocating labor times from one type of staff to another).*

The final reference service resource profiles for labor were entered into a database which included time estimates for the pre-, intra-, and post- sub-periods within each CPEP service period by staff type for both clinical and administrative functions (see Section 3.1 for a more detailed discussion). These labor profiles included the following conventions:

- Panels were requested to provide resource profiles for the typical patient. Weighted averages were calculated and recorded for labor profiles only in instances where the panel determined that the 'typical' case represented an average of the types of cases (consensus could not be reached otherwise). The formula used to calculate the weighted average was recorded in a note. Ultimately, the median, or typical value, was recorded as the panel's estimate. Examples of situations where panel members did not agree on "typical" labor profiles were: time requirements for young vs. old patients, benign vs. malignant cases, and emergent vs. elective procedures.

- During the CPEP meetings, panel members often identified activities that two or more staff types might perform. For example, panels often reported that a physician assistant (PA), nurse practitioner (NP), or licensed nurse practitioner (LPN) were responsible for obtaining the patient's medical history. In these instances, 'composite' staff types (e.g., PA/NP/LPN) were used to reflect the labor times as determined by the CPEP consensus.

- A "notes" column in the reference service database was created to accommodate any commentary from the panel needed to explain the resource estimates or to highlight unusual cases considered to be important by the panel. For example, pediatric cases were often not considered to be typical of most services, but a note was provided to capture the differentiation in labor resources (e.g. pediatric patients take 20 minutes longer than the typical patient). Similarly, the 'notes' column was used to explain certain labor estimates (e.g., clinical support staff performing functions in the out-of-office setting such as accompanying the physician to the hospital to assist in performing a surgical procedure in the hospital setting).

The reference service labor profiles, validated and recorded in the database as specified above, served as the basis for profiling the remainder of the services during the second round of CPEP meetings.

Equipment and supply profiles for reference services were input into spreadsheets for review and use during the second round of CPEP meetings. The panels, however, did not in all cases provide sufficient detail on the equipment and supplies used in the provision of the reference services (e.g., missing brand type, missing quantity of supply, etc.), limiting the ability to finalize the equipment and supply profiles for each reference service. As a result, Abt staff were required to begin the second round of CPEP meetings with discussions of incomplete or unspecific supply and equipment profiles for the reference services.

## 3.4 Reference Service Profiles

As described above, reference service profiles were developed during the first round of CPEP meetings for 207 reference services. Separate labor profiles were developed to capture the clinical and administrative staff time associated with these services. Exhibit 3-9 provides an example of the labor profile for CPT-4 11643 (excision, malignant lesion, scalp, neck, hand, feet, genitalia; lesion diameter 2.1 to 3.0). As illustrated in this exhibit, for each service, staff time estimates are listed for the in- and/or out-of-office settings, depending upon the site(s)-of-service in which the service is performed. The first column of each labor profile indicates the service period (i.e., G0 pre-service period, G1 procedure period, etc. ) for which the in and/or out-of-office time estimates are reported.[19] For each of these service periods, the labor time estimates are shown by sub-period (pre, intra, post) and staff type (e.g., RN, LPN, PA, etc.). The total time across each of these sub-periods (pre + intra + post) is also shown for each staff type.

In addition to the clinical and administrative staff time estimates, notes are included to document instances in which the consensus estimates for the times reached by the panel do not conform to Medicare policy (e.g., a code is treated as an add-on code when it is not defined as such in the MFS) or to document other special circumstances pertaining to the consensus estimates (e.g., use of weighted averages).

A detailed explanation of the example labor profile for CPT-4 11643 is provided below to clarify how these data should be interpreted. Appendix III.H includes the detailed labor profiles for each of the reference services.

### 3.4.1 Clinical Labor Profile

As shown in the example, CPT-4 11643 is performed in both the in- and out-of-office settings. The clinical labor profile is composed of time required during the procedure period (G1) and one post-service office visit (G1.1). There are no services (visits) provided prior to the excision (G0). When the service is performed in the office, an RN or MA assists for a total of 80 minutes during the procedure period (G1), including all three sub-periods (pre — 15 minutes, intra — 45 minutes, post — 20 minutes). When the service is provided out of the office, the only time required by the RN or MA is during the post- sub-period of the procedure period — 3 minutes. According to the profile, the panel determined that only one post-discharge follow-up office visit is provided during the global period. The amount of time required, 20 minutes (pre — 7 minutes, intra — 5 minutes, and post — 8 minutes) of an RN or MA, is the same for the in- and out-of-office settings. As explained in Section 3.2.3, for services with a global period, the site-of-service was determined based on the site in which the procedure itself was provided. Therefore, in the case of CPT-4 11643, the follow-up office visit was included in the out-of-office profile for this procedure, even though the follow-up visit was provided in the office.

In the case of CPT-4 11643, the panel provided estimates that were not characterized by other unique considerations; therefore, no notes were provided.

19 Note that the service periods in this discussion and hereafter are referenced using the terminology for the "G" worksheets, including services that are recorded on P, M, or Pa worksheets. As shown in Exhibit 3-2, the P1, M1, and Pa1 service periods correspond to the G1 service period. Similarly, the P2, M2, and Pa2 service periods correspond to the G2 service period.

Exhibit 3-9
Example of Reference Service Labor Profile

CPT-4 11643
(Excision, malignant lesion, scalp, neck, hand, feet, genitalia;
lesion diameter 2.1 to 3.0)

Round I Reference Service Data – Clinical
Time Estimates by CPEP Service Period by Staff Type

IN______________________ OUT______________________

11643

| | | | | | | |
|---|---|---|---|---|---|---|
| G0 | Pre | | | Pre | | |
| | Intra | | | Intra | | |
| | Post | | | Post | | |
| | Total | | | Total | | |
| G1 | Pre | RN/MA | 15 | Pre | | |
| | Intra | RN/MA | 45 | Intra | | |
| | Post | RN/MA | 20 | Post | RN/MA | 3 |
| | Total | RN/MA | 80 | Total | RN/MA | 3 |
| G1.1 | Pre | RN/MA | 7 | Pre | RN/MA | 7 |
| | Intra | RN/MA | 5 | Intra | RN/MA | 5 |
| | Post | RN/MA | 8 | Post | RN/MA | 8 |
| | Total | RN/MA | 20 | Total | RN/MA | 20 |

Round I Reference Service Data – Clinical
Notes

< No Clinical Notes>

## Round I Reference Service Data – Administrative
## Time Estimates by CPEP Service Period by Staff Type

| | IN | | | OUT | | |
|---|---|---|---|---|---|---|
| G2 | Pre | Medical Secretary | 10 | Pre | Medical Secretary | 10 |
| | | Receptionist | 8 | | Receptionist | 8 |
| | | Insurance Billing Staff | 22 | | Insurance Billing Staff | 33 |
| | Post | Medical Secretary | 12 | Post | Medical Secretary | 12 |
| | | Receptionist | 2 | | Receptionist | 2 |
| | | Insurance Billing Staff | 15 | | Insurance Billing Staff | 15 |
| | Total | Medical Secretary | 22 | Total | Medical Secretary | 22 |
| | | Receptionist | 10 | | Receptionist | 10 |
| | | Insurance Billing Staff | 37 | | Insurance Billing Staff | 48 |
| G2.1 | Pre | Medical Secretary | 5 | Pre | Medical Secretary | 5 |
| | Post | Medical Secretary | 2 | Post | Medical Secretary | 2 |
| | Total | Medical Secretary | 7 | Total | Medical Secretary | 7 |

## Round I Reference Service Data – Administrative
## Notes

| CPEP | PROCCODE | WRKSHT | PREPOST | NOTE1 | NOTE2 |
|---|---|---|---|---|---|
| C1 | 11643 | G2 | Pre | Panel said that out of office admin times will take longer for precertification | |

### 3.4.2 Administrative Labor Profile

A review of the administrative profile indicates that three staff types are involved in performing administrative functions for CPT-4 11643: a medical secretary, receptionist, and insurance billing staff. When this service is performed in the office, the total time required for the procedure period (G2) is 69 minutes (22 minutes of a medical secretary, 10 minutes of a receptionist, and 37 minutes of insurance billing staff). Conversely, for the out-of-office setting, 80 minutes are required across these three staff types. As noted in Exhibit 3-2, the G2.1 – G2.9 worksheets capture administrative staff time for the follow-up office visits provided during post-service periods. The staff time requirements for the in- and out-of-office settings are the same for the post-service period — 7 minutes of a medical secretary. Thus, when the procedure is performed out of the office, an additional 11 minutes of administrative staff time is required, as compared to the labor profile for the in-office setting. As documented in the notes, the panel explained that the pre-certification process for this procedure when it is performed in the out-of-office setting requires more time.

# 4.0 Second Round of CPEPs: Profile Development for All Services

In the second round of CPEP meetings, it had been expected that the panels would *extrapolate* the resource requirements from *costed* reference service profiles to all HCPCS/CPT-4 codes in each service family assigned to a CPEP. Cost estimates, which were to be derived from reference service resource profiles developed during Round I, were to serve as baselines for extrapolating within each service family. However, the cost extrapolation methodology was not implemented. Instead, in response to input from panelists prior to the Round II meetings, the method selected for profiling the remainder of the services resembled the approach used in the first round of panel meetings. This chapter documents the reasons for this change in approach. It describes the design and implementation of the process for profiling the remainder of the services, as well as the process and principles applied to processing the final resource estimates for all 6,251 services that were covered during the second round of CPEP meetings.

## 4.1 Preparation for the Second Round of CPEP Meetings

There were a number of challenges that had to be addressed in designing and preparing for the second round of CPEP meetings:

- Structuring and designing a process to develop resource profiles for over 6,000 codes, where each CPEP was responsible for profiling hundreds of services within a 2-day period.

- Designing and implementing an efficient data capture process to collect, data enter, clean, and cost the resource profiles for over 6,000 services as quickly as possible after the CPEP meetings so that HCFA could meet its tight timetable for a notice of proposal rulemaking.

- Ensuring that a wide range of clinical expertise was available, given that each CPEP was now profiling approximately 20 times as many services in Round II as in Round I, including some services that are performed rarely or performed by few specialties and/or individuals.

In addition to these challenges, experience from Round I meetings had implications for the design and conduct of the second round of CPEP meetings:

- During Round I, CPEP members had not provided sufficient information which was necessary to calculate procedure-specific cost estimates, including equipment utilization factors (e.g., hours/week used, weeks/year used, volumes of procedures) and maintenance costs. It became clear that alternative sources for much of this information were needed.

- The level of specificity for equipment and supplies (e.g., supply quantities or equipment models/brands) provided by CPEP members during the CPEP meetings was not sufficient for purposes of pricing these components of the reference service profiles.

- As described in Chapter 3.0, in the few cases where the panel could not come to consensus on the typical case, the resource profile was based on a weighted average (e.g., instances when 50% of the time the procedure was provided on an emergent basis and did not require a pre-op visit, while 50% of the time the service was provided on an elective basis and a pre-op visit was completed). It became clear that guidelines on defining typical cases were needed.

- Panel members often included estimates for resources inputs that are not covered under the practice expense component of the MFS (e.g., bringing practice staff to the hospital; bringing the practice's surgical loupes to the hospital ). Collecting these types of expenses required more detailed recording and documentation for each staff type and CPEP service period, so that these inputs could be differentiated from those that pertain to services and inputs that are covered under the MFS.

- Panelists did not use the data compiled from the worksheet packages extensively in developing the reference service profiles during the first round of panel meetings. Therefore, the preliminary steps of having panel members complete worksheets prior to the meeting was eliminated.

With these challenges and lessons in mind, the project team worked with the medical community to finalize the process for the second round of CPEP meetings.

#### 4.1.1 Reconsidering the 'Extrapolation' Design

The *original* design for estimating direct practice costs assumed that the appropriate price data (e.g., wages for the labor estimates, prices for the supplies and equipment) would be applied to reference service resource profiles produced in Round I of the CPEP meetings, generating *total direct costs* for each reference service. Then, in the second round of meetings, each panel would review these reference service costs and determine how each of the remaining services in the family would vary in cost to the reference service. These estimates were to be quantified as "adjustment factors," by which the total direct costs for the reference service could be multiplied to compute costs of all other services in the family. For example, if the cost calculated for a reference service was $50 and the panel thought that the cost of another code within that family was two times that of the reference service, the $50 would be multiplied by a factor of 2, resulting in a cost of $100 for the other service. Thus, Round II panels were expected to *extrapolate from total direct costs.* This original design would have resulted in approximately 10,000 estimates, one data point for each of the HCPCS services within the scope of the project, and an additional data point for each service provided in both the in-office and out-of-office settings.

Abt held several pilot meetings with volunteers from the medical community to assess the feasibility of this and other approaches.[1] The following recommendations from these meetings were used to guide the process for the second round of CPEP meetings:

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1 The first meeting was held with one of the CPEP panels during the first round of CPEP meetings in February 1996. The second meeting was held on April 15, 1996 with representatives from the American College of Surgeons. The third meeting was convened on May 7, 1996. As discussed in Section 4.2.2, a mock CPEP was also convened in May 1996.

- Rather than extrapolate direct costs from the reference services, the remainder of the services should be profiled in terms of the same units that were used to develop the resource profiles for the reference services: *time* (i.e., minutes) for labor; and *units of input* for supplies (i.e., quantities) and equipment (i.e., type/brand). This recommendation reflected a concern that converting the reference service inputs into a total cost (i.e., dollars), as originally designed, would not provide a sufficiently detailed basis for comparing reference to non-reference services.

- Sub-families of services within each family should be created, where the sub-families would consist of similar or identical services as defined by key indicators or "drivers" of resource use (e.g., benign/malignant cases; number of post-discharge follow-up office visits). Each panel could profile inputs for one procedure within each sub-family, and this profile could then be applied or adjusted for the remainder of the services in that given sub-family.

- Given the time constraints, it was considered important to ensure that, at a minimum, families with a substantial number of high volume and high cost services were profiled by the panels.

Based on these recommendations and the results of pilot tests of several of these approaches, the direct cost extrapolation methodology for profiling non-reference services was abandoned. Instead, the final process for developing resource estimates for the remainder of the codes was very similar to the profiling approach used for the reference services -- *developing resource estimates for each service, including separate labor, supply, and equipment profiles by site-of-service.* The implications of this approach on the number of data elements that required collection via consensus, and the eventual data entry of these data elements, were immense. Rather than the 10,000 or so data points that would have resulted if the original extrapolation approach had been maintained, well over one million points of primary data were collected in the Round II CPEP meeting.[2]

### 4.1.2 Data Capture Design

Because a relatively complex profiling methodology was selected over extrapolation for costing non-reference services, an efficient data capture mechanism became an integral component of the design of the Round II CPEP meetings. Two separate data collection tools were designed: one to record the labor profiles and a second to record the supply and equipment profiles.

A computer data entry system was developed to record labor profiles. Two major objectives guided the design of this tool: 1) to the extent possible, reference service profiles should be used as a benchmark for increasing or decreasing the reported labor profiles for the rest of the services in a family; and 2) to minimize followup data entry and data cleaning activities. A data entry tool was developed which allowed entry of the reported changes from the reference service labor profiles for each staff type and for in- and out-of-office settings. At its most basic, the system could pull up the reference service profile from a given family and, for another service in that family, allow for entry of the reported increases or decreases in the time estimates by staff type. Several additional features were built into the system including:

2 Based on tabulations of the labor, supply, and equipment detail files.

1. A listing of all staff types, for point and click entry;
2. The ability to add new staff types;
3. Access to all reference service profiles within each CPEP;
4. The ability to adjust the number of post-discharge follow-up office visits;
5. The ability to replicate the labor profile for a number of services that were exactly alike; and
6. The ability to copy and modify a labor profile from a previously profiled service, regardless of the family within a CPEP, and modify certain parameters of that profile.

Based on the mock CPEP (described in Section 4.2.2), the system was modified to include the CPEP service periods (pre-service - G0; procedure period - G1/G2; and post-service, - G1X/G2X).

In addition, supply and equipment grids were developed which provided for entry of the supply item and the quantity by setting. These grids were designed to be used after finalizing the reference service supply and equipment profiles, so that additions and deletions of the profile were more easily recorded.

### 4.1.3 Selection/Replacement of CPEP Members

In order to maintain continuity and build upon the experience gained in Round I, all CPEP members were invited to participate in the second round of CPEP meetings in June, 1996. As shown in Exhibit 4-1, a majority (71%) of the CPEP members who participated in the first round of CPEP meetings also attended the second round of meetings. However, due to scheduling conflicts and other reasons, not all of the original CPEP members were able to participate in Round II.[3] While the need for replacing members varied by CPEP, there were only two panels (CPEP 8: General Surgery; and CPEP 13: Cardiology) in which slightly less than half of the original CPEP members participated in the second CPEP meetings. (See Appendix IV.A. for the list of CPEP members who participated in the second round of CPEP meetings.) To fill vacancies, replacement CPEP members were selected from the CPEP nominee database (see Chapter 3.0). To the extent feasible, these replacements were selected from the same specialty, nominating society, and practice staff type.

In Round II, given that a wider range of services had to be profiled than the 229 reference services profiled in Round I, it was considered important to identify which CPEPs required input from subspecialties. Medical societies were asked to review the range of services in their primary CPEP to determine whether subspecialty input was required, and if so, to recruit these subspecialty participants. In many cases, the societies acknowledged that the clinical expertise embodied in the existing set of CPEP members was sufficient. Only six CPEPs required additional subspecialty clinical expertise (Appendix IV.A also includes a list of the subspecialty representation by CPEP).

3 Approximately 30 of the original CPEP members indicated that they were unable to attend the second round of panel meetings and therefore had to be replaced.

## Exhibit 4-1

### CPEP Member and Subspecialty Participation by Round

| | CPEP Members | | | Round II Number of SubSpecialty[a] Attendees |
|---|---|---|---|---|
| | Round I | Round II | % of Round I Attendees Participating in Round II | |
| CPEP 1: Integumentary and Physical Medicine | 14 | 12 | 71 | 1 |
| CPEP 2: Male Genital and Urinary | 7 | 6 | 86 | — |
| CPEP 3: Orthopaedics | 15 | 10 | 53 | — |
| CPEP 4: OB/GYN | 9 | 8 | 78 | 3 |
| CPEP 5: Ophthalmology | 10 | 10 | 80 | 1 |
| CPEP 6: Radiology | 15 | 15 | 93 | 1 |
| CPEP 7: Evaluation and Management | 17 | 14 | 76 | — |
| CPEP 8: General Surgery | 13 | 11 | 46 | 2 |
| CPEP 9: Otolaryngology | 12 | 9 | 67 | — |
| CPEP 10: Miscellaneous Internal Medicine | 13 | 11 | 69 | 1 |
| CPEP 11: Gastroenterology | 11 | 10 | 73 | — |
| CPEP 12: Cardiothoracic and Vascular | 10 | 7 | 70 | — |
| CPEP 13: Cardiology | 14 | 10 | 43 | — |
| CPEP 14: Anesthesiology/ Pathology | 12 | 12 | 92 | — |
| CPEP 15: Neurosurgery | 7 | 8 | 86 | — |
| **TOTAL** | **179** | **153** | **71** | **9** |

[a] Participation of subspecialists was at the expense of the medical society which sponsored the individual.

### 4.1.4 Preparing CPEP Members for Developing Resource Profiles for All Services

In the second round of CPEP meetings, the goal of the panels was to identify differences in resource requirements between the reference services and the rest of the services in the family at a more aggregate level than in the first round of CPEP meetings. To familiarize the CPEP members with this process, a briefing package (see Appendices IV.B and IV.C) was prepared which outlined the planned approach. In particular, the intent of the briefing package was to introduce the concept of grouping services according to "key drivers" of resource use.

"Key drivers" were defined as characteristics, relevant to resource use, that differentiate groups of services from the reference service within a family. For example, for some surgical service families, the number of post-discharge follow-up office visits was chosen by panelists as the key driver of practice expense differences. This observation guided the selection of sub-groups within these families, each of which contained services with the same number of post-discharge office visits. The resource profile for each sub-group was then defined to be the profile of the reference service, *plus (or minus)* the resources required to deliver the greater (lesser) number of post-discharge office visits. Examples of other key drivers that could affect resource use included the presence or absence of malignancy (e.g., more clinical time of an RN for counseling required when a malignancy is present) or the need for authorization (e.g., time of a billing clerk needed to authorize surgical procedures that would not be required for medical services). As part of the briefing package, CPEP members were asked to consider such factors that would distinguish sub-groups of services within families. The briefing package included information on each service that may have assisted CPEP members in identifying these key drivers (e.g., physician intra-service time, number of post-discharge office visits, global period).

In addition, as discussed above, Abt designed grids for profiling equipment and disposable supplies. The briefing package also included example supply and equipment grids so that CPEP members could familiarize themselves with this tool.

## 4.2 Conducting the Round II CPEP Meetings

The conduct of the second round of CPEPs followed a similar set of ground rules and guidelines that were used in the first round of meetings. In addition, another mock CPEP was held to finalize the profiling approach for all services.

### 4.2.1 Ground Rules

The ground rules (see Appendix IV.D) for the second round of meetings were essentially the same as those developed for the first round of CPEP meetings. These ground rules included descriptions of the roles of participants, the focus on practice expenses (rather than physician work), and the inclusion/exclusion guidelines. However, several additional guidelines were established related to the use of the reference services in profiling the rest of the services and to the role of subspecialists:

- Changes to input estimates for the reference services obtained during Round I were not made unless the entire CPEP unanimously agreed to the changes.

- Services could be 'moved' from one family to another family within a CPEP. However, CPEPs were discouraged from moving services from one CPEP to another.

- Using the 'key driver' concept, CPEP members were requested to focus on groups, or sub-groups, of services rather than on individual services for profiling. Profiling individual services was considered infeasible, given time constraints.

- Subspecialty representatives were expected to provide input on the relevant services within their areas of expertise.

### 4.2.2 Mock CPEP

As in Round I, a mock CPEP was held prior to the full round of panel meetings. In mid-May 1996, the Otolaryngology panel (CPEP 9) was convened as the official mock CPEP to test the feasibility of profiling labor, equipment, and supply resources for services in an entire CPEP within a two-day timeframe. Most of the panel members had participated in the first Otolaryngology CPEP in February. Several concepts were tested in this mock CPEP:

- Obtaining labor profiles first for all services in a family before obtaining the supply and equipment profiles was compared to profiling all three resource inputs for a service before proceeding to the next service. The panelists concluded that it was more efficient to develop complete resource profiles, rather than identify the labor requirements for all of the families first and then establish equipment and supply requirements.

- It was thought that the labor estimates might be validated by ranking the services according to their total time requirements. However, the mock panel did not think that the ranking of services by total time was a useful exercise.

- Profiling by two separate groups was tested: one group organized the services according to key drivers of resource use for a family; the other group itemized supply and equipment requirements. Both groups presented their groupings and lists to the other group for discussion and consensus. This process was successful in expediting the profiling process.

- Formulae to generate the labor profiles based on key drivers of resource use were developed and tested (e.g., basing the clinical time of an RN on the length of hospital stay during the G1 service period -- linking a 10 minute phone call by the RN to check on the progress of the patient) each day in the hospital. The use of formulae was determined to be feasible for some, but not necessarily all services.

The mock CPEP also identified valuable methods to improve the note taking and data entry process. In particular, "supply packs," pre-drafted lists of commonly used supplies for certain groups of services, were introduced as a tool to facilitate panel deliberations. Having a standard list of supplies for reference and, if needed, adjustment (by adding or deleting items) helped the panel identify the supply requirements for the services in each family. Using the data from the first round of CPEPs and clinical expertise, Abt developed "supply packs" for different groups of services (e.g., E&M supply pack) for use during the remainder of the CPEPs.

The mock CPEP demonstrated that, given appropriate guidance (e.g., formulae, supply packs), profiling the remainder of the services in each CPEP was feasible. Overall, this panel was able to provide resource profiles for all but four services assigned to CPEP 9. These four were subsequently profiled during conference calls. Because this panel completed its assignment using methods that were subsequently used in Round II by the other CPEPs, CPEP 9 was not reconvened.

**Exhibit 4-2**
**Round II**
**Number of Services Profiled by CPEP**

| | Unique Services | Total Services (including redundant services) |
|---|---|---|
| CPEP 1: Integumentary and Physical Medicine | 379 | 454 |
| CPEP 2: Male Genital and Urinary | 391 | 440 |
| CPEP 3: Orthopaedics | 1,262 | 1,404 |
| CPEP 4: OB/GYN | 215 | 254 |
| CPEP 5: Opthalmology | 321 | 362 |
| CPEP 6: Radiology | 615 | 715 |
| CPEP 7: Evaluation and Management | 129 | 216 |
| CPEP 8: General Surgery | 522 | 913 |
| CPEP 9: Otolaryngology | 610 | 735 |
| CPEP 10: Miscellaneous Internal Medicine | 193 | 259 |
| CPEP 11: Gastroenterology | 150 | 196 |
| CPEP 12: Cardiothoracic and Vascular | 973 | 667 |
| CPEP 13: Cardiology | 234 | 295 |
| CPEP 14: Anesthesiology/Pathology | 371 | 380 |
| CPEP 15: Neurosurgery | 386 | 495 |
| **TOTAL** | 6,251 | 7,282 |

### 4.2.3 Final Approach to Profiling All Services

The second round of CPEP meetings was held in Baltimore from June 3 through June 20, 1996. A total of 14 separate panels were convened. Panel service profile assignments ranged from approximately 200 to 1,400 HCPCS codes for which resource profiles had to be developed, as shown in Exhibit 4-2. Each meeting consisted of a two-day working session. As with the first round of CPEP meetings, the CPEP meeting schedule was arranged so that three CPEP panels met simultaneously during each two-day session.

There were four basic steps undertaken by each CPEP to develop resource profiles for all the services in the second round of CPEP meetings:

- Review the service periods;

- Review and validate the reference service profile, adding details needed for the supply and equipment profiles to be priced (e.g., quantities of supplies and type or brand of equipment);

- Arrive at consensus regarding the key drivers of resource use and group services within families according to the drivers; and,

- Develop the resource profiles for the services.

Each panelist was given a CPEP-specific data manual which included summaries of the reference service profiles developed during the first round of CPEP meetings and other useful information (1994 Medicare volume; percent of procedures performed in office; percent of total family charges; expected sites of service; global period; status code; number of post-discharge follow-up office visits; physician intra times [4]).

*Review Service Periods*

All Round II CPEPs began by reviewing the service period conventions used to develop the labor profile. Panelists were introduced to a major simplification developed by Abt staff in consultation with HCFA after Round I. Service periods used in the first round were consolidated into five distinct time periods (see Exhibit 4-3). The four-level service classification system (G, M, P, and Pa) was abandoned in favor of a simpler generic set of "G" services with the appropriate time periods. For *clinical labor*, the service periods were defined as follows:

- ***Pre-service period (G0)*** included clinical services provided within 24 hours prior to the procedure around which services are bundled. During the CPEP process, pre-service period times were collected for '000', '010', '090' and 'MMM' global period services.

- ***Procedure period (G1)*** included resources expended during the provision of the procedure (or service for E&M services) itself, regardless of the global period status code.[5] For global services, additional resources were included in the procedure period as defined below:

  — For services with '000' global periods, the procedure period included all related services on the day of the procedure.

  — For services with '010', '090', and 'MMM' global periods, the procedure period included any services or activities commencing with the performance of the procedure

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4 The post operative office visit and physician intra-time data were drawn from: Dunn, Daniel Ph.D. and Latimer, Eric Ph.D. *Derivation of Relative Values for Practice Expenses Using Extant Data*. April 1, 1996. HCFA Contract No. 500-92-0023, Harvard Subcontract to Rand Corporation. These data contain both Harvard study and AMA/RUC five year review values. The panels were presented with data from both the Harvard study and AMA/RUC for physician intra-times. For post-operative office visits, AMA/RUC five year review values were used where possible, and defaulted to the Harvard study values where no RUC 5 year review value existed. Both intra-time and post-operative office visit data were provided for reference only, and were changed in some cases based on panel consensus.

5 For E&M services, procedures without a global period, and pathology procedures, this was equivalent to the M1, P1, and Pa1 worksheets, respectively.

(including patient prep), and ending with the commencement of the first follow-up office visit after discharge. If the service was performed on an inpatient basis, the procedure period included the time associated with all services provided by practice staff before the patient was discharged from the hospital. For example, a '090' global service may have required phone calls from the practice nursing staff to the hospital nursing staff while the patient is still in the hospital.

- ***Post-service period (G1X)*** for clinical labor applied only to services with '010', '090', or 'MMM' global periods, and commenced with the first follow-up office visit after discharge and ended at the point defined by the global period (e.g., 10 or 90 days after the day of the procedure).

For *administrative* labor, service periods were defined as follows:

- ***Procedure period (G2)*** included administrative services preceding and contiguous to the procedure (or service for E&M services).[6] For global status codes that bundle the pre-service visit into the total payment, this encompassed administrative time associated with services provided in the 24-hour period prior to the provision of the procedure itself. For procedures with global periods of '010', '090', or 'MMM' performed in the hospital setting, the procedure period included all services provided until the patient was discharged and up until the first follow-up office visit after discharge.

- ***Post-service period (G2X)*** commenced with the first follow-up office visit after discharge for services with '010', '090', and 'MMM' global periods and ended with the expiration of the global period (e.g., 10 or 90 days after the day of the procedure).

**Exhibit 4-3**
**Round II**
**Service Periods for the Labor Profile**

<table>
<tr><th rowspan="2">Function</th><th colspan="3">CPEP Service Period</th></tr>
<tr><th>Pre-service</th><th>Procedure</th><th>Post-service</th></tr>
<tr><td>Clinical</td><td>G0</td><td>G1</td><td>G1X</td></tr>
<tr><td>Administrative</td><td colspan="2">G2</td><td>G2X</td></tr>
</table>

Review of these CPEP service period definitions re-acquainted the CPEP members with the labor profiling exercise.

6 For E&M services, procedures without a global period, and pathology procedures, this was equivalent to the M2, P2, and Pa2 worksheets, respectively.

*Review the Reference Service Profile*

Each panel next reviewed the appropriate reference service profiles. Wherever needed, panelists were asked to provide missing information on the supply and equipment reference service profiles and clarify specific staff types in the labor profile. In some cases, panels recommended changes to the reference service profile (for any of the three types of profiles). The recommendations were implemented only if there was unanimous agreement.

*Identify Key Drivers to Group Codes*

As discussed in Section 4.1.4, CPEP members were asked to group services within a family according to the key drivers of resource use. Using information from the data manuals, CPEP panelists were able to arrive at consensus on these key drivers and the associated sub-groups of service families. To facilitate the identification of these drivers, panelists were asked:

- Are the labor requirements for each service in this family the same as for the reference service?
- What characteristics differentiate these services from the reference service (e.g., clinical severity, number of post-discharge visits, type of equipment required) and how can these services be organized into sub-groups defined by homogeneous resource use?
- Can you estimate for each of the sub-groups (by staff type and function) the increase (or decrease) in the labor time required relative to the reference service?
- Can you identify for each of the sub-groups the items that should be added or eliminated from the reference service supply and equipment profiles for each of the sub-groups?

*Develop the Resource Profiles*

Once panelists had reacquainted themselves with the basic profiling methodology and had selected key drivers and subgroups, the CPEPs could begin profiling the services for each family assigned to the CPEP. There was no one standard approach to developing the final labor resource profiles. At least five approaches were used:

- Basing the labor profile for a given service(s) on the exact labor profile of the reference service in the family;
- Adding to or subtracting from the time of the reference service labor profile;
- Using a "mix and match" method, adding or subtracting time from specific components of different reference service profiles, regardless of family. For example, basing the pre-service (G0) labor on a reference service from one family and basing the procedure period (G1) on a reference service from another family;

- Using formulae to develop the labor profile, based on the key drivers of resource use (e.g., number of post-operative office visits, hospital length of stay) or on other factors (e.g., physician intra-service time). For example, to all the services in Family 1216 (Heart and Great Vessels) the panel added or subtracted 30 minutes of an RN or PA in the G1 period for each day added to, or subtracted from, the length of the hospital stay. The panel stated that each additional 3 days of length of hospital stay, beyond the first 3 days, required an additional 30 minutes of insurance and billing staff time in the G2 period to obtain insurer approval for the additional 3 days of stay.

- Developing the labor profile from "scratch", without basing the profile on any reference service profile.

The add/subtract method (based on the reference service labor profile and based on the "mix and match" method) was applied somewhat more frequently than the other approaches. Supplies and equipment were generally profiled by addition and deletion of items from the reference profiles. Profiling by formulae was less frequently used. Panels were more likely to apply formulae to *groups* of services when the services in the group were similar in terms of resource usage .

Although the goal was to profile *groups* of services, for the most part, profiling was conducted at the *service-level.* While panels grouped services according to key drivers of resource use (e.g., simple procedures, complex procedures), the panels ultimately profiled every service separately.

To facilitate the process, Abt prioritized the order of families to profile according to the following criteria (see Appendix IV.E for the prioritization lists used in the second round of CPEP meetings):

- The first family profiled should include one in which the reference service was profiled in the same setting (in- or out-of-office) as most of the other services in the family;

- The first family profiled should include a reference service which represented the majority of services in the CPEP (i.e., if most of the services in the CPEP were global services, the first family profiled included a reference service that was a global service);

- The first family profiled should be familiar to most of the CPEP participants (i.e., one that did not require subspecialty input);

- Related families should be ordered consecutively (e.g., Family 520: simple anterior segment eye procedures, followed by Family 524: moderate anterior segment eye procedures, followed by Family 528: complex anterior segment eye procedures); and,

- To avoid overwhelming the panel, families with a large number of services should not be profiled until participants had gained some experience with smaller families; large families were also not introduced at the end of the day, when fatigue could compromise panelists' ability to address larger and more complex tasks.

## 4.3 Followup CPEP Activities

Overall, the objectives of the second round of CPEP meetings were achieved. Resource profiles were developed for over 95% of the services. Follow-up included completing all outstanding profiles and subjecting all profiles to quality reviews. Time constraints and the large volume of data precluded a review and verification of the profiles by CPEP panelists after the Round II meetings.

### 4.3.1 Outstanding Services

At the conclusion of the second round of meetings, less than 5% of the 6,251 services had not been profiled. CPEP members were unable to profile some services for the following reasons:

- A service was generally performed by a specialty not represented on the given CPEP and required the input of a subspecialist also not represented at the panel;
- A service was performed by a different specialty and was referred to the appropriate CPEP;
- A service was obsolete; or
- A service was generally low volume and the CPEP members were unfamiliar with the procedure itself.

In addition, due to the time constraints and the complexity of some of the supply and equipment requirements for specific services, CPEP members were often unable to provide during the meetings the level of detail required (e.g., brand of equipment, quantity) to price each supply or equipment item. Several CPEPs made consensus decisions to allow volunteer panelists to complete "homework" assignments, which consisted of compiling listings of equipment and supplies for specific services. These "homework" assignments were mailed into Abt in the months following the second round of CPEP meetings. In cases where particular panelists completed homework assignments, the other panel members agreed to having that individual assume responsibility for providing the necessary information.

Abt Associates staff reviewed each profile to identify missing information, to determine not only which services were completely unprofiled, but also which services lacked one aspect of the profile (e.g., missing supply items or quantities) or equipment (missing brand/type or missing equipment items) data. This process took several months as Abt staff had to ensure that *all* items were identified and synthesized prior to contacting panel members to limit the number of followup contacts. In general, Abt staff achieved the objective of recontacting informants only once to secure missing or incomplete information.

Most of the unprofiled services were subsequently profiled in conference calls with CPEP members, profiled by one CPEP member and later discussed and approved by the remainder of the panelists, or referred to specific specialists recommended by panel members or societies. Three CPEPs were reconvened via conference call to profile 144 services not profiled during the panel meetings.[7] Individual

7 Conference calls were held with panelists from CPEP 1 (Integumentary and Physical Medicine); CPEP 7 (Evaluation and Management); and CPEP 6 (Radiology).

interviews with 13 physicians were held to followup on 106 services, which CPEP members were unable to profile (see Appendix IV.F for the list of services). Typically, the services requiring individual interviews were those that required subspecialty input.

Overall, only 24 services were profiled in neither the in-office nor the out-of-office setting. As shown in Exhibit 4-4, the services that were not profiled were spread across half of the CPEPs. Most of the 24 services for which profiles could not be obtained were low volume services (fewer than 10,000 performed in 1994).

After the followup process was complete, the statistics on codes profiled during Round II were:

- Of the 6,251 codes in the project scope, 6,227 had been profiled in at least one site by at least one CPEP

- Twenty-four codes had been profiled in neither site

- Of 12,502 (6,251 x 2) possible profiles in the in-office and out-of-office settings
  - — 8,233 service-site combinations had at least one profile
  - — 5,835 out-of-office services were profiled at least once
  - — 2,398 in-office services were profiled at least once
  - — 4,269 service-site combinations were deemed clinically unfeasible or uncommon by the CPEPs and were not profiled

- Including redundant assignments of services to multiple CPEPs:
  - — 7,782 codes were assigned to CPEPs
  - — 7,240 codes assignments were costed in at least one site
  - — 542 code assignments were not costed

- Taking into account both redundantly assigned codes, and in-office/out-of-office distinctions:
  - — 9,427 service-site combinations were profiled
  - — 9,087 of these were fully profiled
  - — 340 were partially profiled

- The total labor profile data points collected (non-missing values in labor detail file) was 605,523

- The total supply profile data points collected (non-missing values in supply detail file) was 859,419

- The total equipment profile data points collected (non-missing values in equipment detail file) was 44,656

## Exhibit 4-4
## Round II Services Not Profiled

| CPEP | Number of Services | HCPCS/ CPT[a] | Description | '94 Medicare Volume |
|---|---|---|---|---|
| 1 Integumentary and Physical Medicine | 1 | H5300 | Occupational Therapy (obsolete code) | 63,742 |
| 3 Orthopaedics | 3 | 26210 | Excision or curettage of bone cyst or benign tumor of proximal, middle, or distal phalanx of finger | 1,152 |
| | | 26130 | Synovectomy, carpometacarpal joint | 255 |
| | | 26135 | Synovectomy, metacarpophalangeal joint including intrinsic release and extensor hood reconstruction, each digit | 1,481 |
| 6 Radiology | 3 | 99185 | Hypothermia; regional | 319 |
| | | 38794 | Cannulation; thoracic duct | 2 |
| | | 78655 | Radiopharmaceutical identification of eye tumor | 13 |
| 8 General Surgery | 2 | 19396 | Preparation of moulage for custom breast implant | 1 |
| | | 38308 | Lymphangiotomy or other operations on lymphatic channels | 378 |
| 9 Otolaryngology | 2 | G0020<br>G0021 | Prepare face/oral prosthesis<br>Prepare orbital prosthesis | No volumes available |
| 13 Cardiology | 10 | 92990 | Percutaneous balloon valvuloplasty; pulmonary valve | 24 |
| | | 92992 | Atrial septectomy or septostomy; transvenous method, balloon, Rashkind type (includes cardiac catherization) | 8 |
| | | 92993 | Atrial septectomy or septostomy; blade method (Park septostomy) (includes cardiac catherization) | 60 |
| | | 92971 | Cardioassist-method of circulatory assist; external | 162 |
| | | Q0035 | Cardiokymorgraphy | 73 |
| | | 93740 | Temperature gradient studies | 1,042 |
| | | 93770 | Determination of venous pressure | 15,084 |
| | | 93720 | Plethysmography, total body; with interpretation and report | 9,494 |
| | | 93721 | Plethysmography, total body; tracing only, without interpretation and report | 1,163 |
| | | 93722 | Plethysmography; total body; interpretation and report only | 12,781 |
| 14 Anesthesiology/ Pathology | 3 | 88362 | Nerve teasing preparations | 273 |
| | | 99186 | Hypothermia; total body | 14 |
| | | 00806 | Anesthesia for laparoscopic procedures | 16,622 |

### 4.3.2 Data Entry and Verification

During the follow-up period, two major data-related tasks were undertaken: 1) entry of supply and equipment profiles; and 2) data cleaning and verification to ensure that the resource profiles developed during the second round of CPEP meetings were accurately captured and recorded.

*Supply and Equipment Profile Data Entry*

Since the supply and equipment profiles were hand-recorded during the CPEP meetings, data entry tools were developed to enter these profiles. The supply data entry tool was designed to accommodate the entry of the supply item and quantity, as well as the entry of any supply packs for each service. Similarly, the data entry tool for equipment included entry of the brand or type of equipment, as well as equipment trays or other types of composite or aggregate equipment profiles (e.g., exam lane, MRI room).

In order to enter efficiently each supply item and piece of equipment, an identification system was developed. A unique ID was assigned to each individual supply, representing not only the supply item itself, but in some cases, the quantity or unit of the supply (e.g., 9% saline, 250 ml has one ID; 9% saline, 1000 ml has another ID). Similarly, a unique ID was assigned to each piece of equipment, representing a specific brand and type of equipment. Separate IDs were also assigned to equipment that were composed of a composite or aggregate set of equipment (e.g., cataract tray, MRI room).

*Data Cleaning and Verification*

Given the enormous volume of information, combined with the speed with which the information was recorded during the CPEP meetings, Abt conducted a detailed and extensive review of every resource profile (labor, supply, and equipment) to verify that the information recorded on paper corresponded to the profiles entered into the data entry tools. Several steps were undertaken as part of this data cleaning and verification process, as described below.

A service-by-service verification for the over 6,000 codes profiled was performed between the estimates in the handwritten recorder notes and the estimates entered into the data entry tools, resulting in a review of every labor, supply, and equipment profile for each service by site. This review also consisted of standardizing recording conventions (e.g., staff types, supplies), identification of potential conflicts with Medicare policy for further review and resolution, designation of clinical overhead equipment, and other potential anomalies that required verification.[8]

Once the data-entered profiles were verified against the handwritten recorder notes, each resource profile in the database was subject to a diagnostic review to identify potential inconsistencies or outliers that required further verification. The diagnostic review included such checks as:

- Validating profiles with respect to site of service (e.g., services profiled only in the in-office setting would not have any estimates for the out-office setting for any of the labor, supply or equipment profiles);

8 Chapter 6.0 discusses the definitions of overhead clinical equipment and the methodology for determining which items of equipment were classified as overhead equipment.

- Verifying the consistency of the post-discharge follow-up office visits relative to the service category (e.g., typically global services with '010' or '090' day global periods would have post-service visits (G1.1 - G1.9); codes without a global period would not have post-service visits);

- Comparing the in- and out-office cost estimates derived from the resource profiles for the procedure (G1) period for services performed in both settings (e.g., for the procedure period, the cost of clinical labor for the in-office setting would typically be greater than that for the out-office setting, since staff from the out-office settings, such as a hospital, would be used when the service is performed in that setting).

Note that the results of these diagnostic checks did not necessarily imply that the data were inconsistent, but that further verification of the estimates may have been required.

A Notes file was prepared, containing information on the context for the resource estimates.[9] The notes are intended to support review of the data, particularly for those cases in which the resources profiled require specific explanation. For example, some services that are defined in the Medicare Fee Schedule with global period status code 'ZZZ' (the code is part of another service and falls within the global period for the other service) were judged by the panels to be performable as separate services. In these cases, a note was made to this effect, so as to clarify the presence of resources that would only occur for separately performable services. In another example, some direct practice resources profiled by the CPEPs occurred out of the physician's office (e.g., practice personnel used in non-office settings) on services profiled in out-of-office settings. To clarify the presence of clinical personnel time on codes profiled in these settings (some of which may have occurred in the office in phone discussions with patients), notes describing the function being profiled were included. Thus, the Notes file will help the user of the data to interpret the value contained in the profiles.

## 4.4 Resource Profiles

As described above, resource profiles were developed during the second round of CPEP meetings for over 6,000 services. Three types of profiles were developed: labor (clinical and administrative), supply, and equipment profiles for each service and for each site-of-service. These profiles are presented in separately bound appendices for each CPEP (see Appendices IV.G1 through IV.G15). Detailed descriptions of the data files for the labor (LABDET), supply (SUPDET), and equipment (EQPDET) profiles can be found in Chapter 7.0. Examples of labor, supply, and equipment resource profiles for CPT-4 29065 (application of casting plaster of a shoulder to hand) are shown in Exhibit 4-6.

### 4.4.1 Labor Profile

As shown in Exhibit 4-5, two different types of staff (RN/LPN and medical secretary/billing clerk) were required in the provision of this service. These two observations represent the details of the CPEP 7

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9 See the *CPEP Recorders' Notes File*, April 30, 1997.

(C 7) labor profile for this service. This service was profiled as part of service family 392, and was not a reference service (ISREF=0).

As an example, the first staff type, a registered nurse or licensed nurse practitioner (RN/LPN) has a unique staff identification code (7129).[10] The CPEP profiled the service in both the in-office and out-of-office settings (IN=Y, OUT=Y). The values in the subsequent columns indicate minutes of clinical and administrative time for this staff type during the different service periods as defined below:

G0_I: Clinical labor for the pre-service office visit when the service is provided in the in-office setting

G1_I: Clinical labor for the actual provision of the service in the in-office setting

G1X_I: Clinical labor for the post-service office visits when the service itself was provided in the in-office setting

G2_I: Administrative labor for the provision of the service in the in-office setting and for any pre-service visit

G2X_I: Administrative labor for the post-service office visits when the service itself was provided in the in-office setting

G0_O: Clinical labor for the pre-service office visit when the service is provided in the out-of-office setting

G1_O: Clinical labor for the actual provision of the service in the out-of-office setting

G1X_O: Clinical labor for the post-service office visits when the service was provided in the out-of-office setting

G2_O: Administrative labor for the actual provision of the service in the out-of-office setting

G2X_O: Administrative labor for the post-service office visits when the service was provided in the out-of-office setting

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10 The overall per-minute compensation rate calculated for this type of staff was $0.389. Chapter 5.0 discusses the methodology for pricing labor.

## Exhibit 4-5
## Example of Labor and Supply Profiles
## (LABDET and SUPDET)

LABOR

| CPEP | FAM | PROC CODE | IS REF | STAF TYPE | DESC | RATE | IN | OUT | GO_I | G1_I | G1X_I | G2_I | G2X_I | GO_0 | G1_O | G1X_0 | G2_0 | G2X_0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C7 | 392 | 29065 | 0 | 7129 | RN/LPN | 0.389 | Y | Y | 0 | 50 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| | | | | 7152 | Med Sec/ Billing | 0.250 | Y | Y | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 20 | 0 |

SUPPLY

| CPEP | PROCCODE | SUP_CODE | DESC | PRC_CNT | PRC_UNIT | PRICE | INQCNV | IN_COST | OUTQCNV | OUT_COST |
|---|---|---|---|---|---|---|---|---|---|---|
| C7 | 29065 | 11102 | Chux | 1.0 | Item | 0.050 | 1.00 | 0.050 | 0.00 | 0.000 |
| | | 11106 | drape, sheet | 1.0 | Item | 0.260 | 1.00 | 0.260 | 0.00 | 0.000 |
| | | 11107 | patient gown, disposable | 1.0 | Item | 0.570 | 1.00 | 0.570 | 0.00 | 0.000 |
| | | 11111 | exam table paper | 1.0 | Foot | 0.015 | 6.00 | 0.090 | 0.00 | 0.000 |
| | | 11302 | gloves, non-sterile | 1.0 | Pair | 0.120 | 2.00 | 0.240 | 0.00 | 0.000 |
| | | 32001 | stockingnet | 1.0 | Yard | 0.580 | 1.00 | 0.580 | 0.00 | 0.000 |
| | | 32008 | fiberglass roll, 3" | 1.0 | Item | 14.200 | 2.00 | 28.400 | 0.00 | 0.000 |

For this particular staff type (RN/LPN), 50 minutes of clinical labor were required during the in-office provision of the service (G1_I), and 3 minutes of clinical labor were required during the out-of-office provision of the service (G1_O).

The second staff type was a medical secretary or billing clerk (unique staff code 7152). As determined by the panel, a medical secretary (Med Sec/Billing) spends 20 minutes on administrative functions associated with the provision of the service, regardless of setting (G2_I and G2_O).

### 4.4.2 Supply Profile

Exhibit 4-5 also presents the supply profile for CPT code 29065. The panel reported seven types of supply items used in the provision of this service. For example, the panel specified that one Chux (unique supply code 11102) is required when the service is provided in the in-office setting (INQCNV). The panel also specified that none (0.00) of these items were used when the service was provided in the out-of-office setting (OUTQCNV). The remaining supply observations can be interpreted in a similar fashion. For example, the panel indicated that 6 feet of exam table paper (supply code 11111) is required in the provision of this service in the in-office setting.

### 4.4.3 Equipment Profile

Exhibit 4-6 presents the equipment profile for CPT code 29065. This service does not require any service-specific equipment, and does not therefore have any equipment in the service-specific equipment file (PXEQCAP). However, it does have the same overhead equipment as all services in CPEP 7, an exam table and a crash cart, which are displayed in the Exhibit.

## Exhibit 4-6
## Overhead Clinical Equipment
## (*OVEQCAP*)

| CPEP | PROC CODE | EQP_ CODE | DESC | PRICE | LIFE | INTRATE | CAPFRAC | ANNFACT | COST_MIN | IN | OUT | EQTI | OVEQ_I | EQTO | OVEQ_O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C 7 | 29065 | E11001 | exam table | 1360.00 | 15 | 0.110 | 0.13907 | 0.18907 | .001714 | Y | Y | 50 | 0.086 | 0 | 0 |
| | | E91002 | crash cart, no defibrilator | 1135.81 | 5 | 0.105 | 0.26718 | 0.31718 | .002402 | Y | Y | 50 | 0.120 | 0 | 0 |

# 5.0 Development of an Input Price Data Base

Having completed the CPEP resource profiling process, Abt staff prepared to compute direct practice costs by developing pricing methodologies and accessing available data on input prices. This chapter describes the development of an input price data base for labor, supplies, and equipment. Chapter 6.0 presents the methodology designed to calculate direct costs for labor, supplies, and equipment.

## 5.1 Development of Prices for Labor Resource Profiles

CPEP members identified approximately 100 types of support staff required to perform the clinical and administrative functions described in Chapters 3.0 and 4.0. Several steps were involved in the development of a wage rate data base:

- Identifying staff types for which wage data were required
- Selecting data source(s)
- Mapping staff types to occupations in data set(s)
- Converting wages into 1995 dollars

Each of these steps is described in the following sub-sections.

### 5.1.1 Identifying Staff Types

The CPEPs identified the specific types of clinical and administrative staff needed to provide MFS services. Although a core list of generic staff types was provided in the worksheets distributed before the first round of CPEP meetings, the panels elaborated on both the types and levels of staffing skills throughout both rounds of CPEP meetings. Occasionally, the panelists could not reach agreement on the staff type that typically performs a task. In those cases (representing a third of all staff types), a composite staff type was created that consisted of two or more possible persons capable of performing the job in question (e.g., RN/LPN). By the end of the second round of CPEP meetings, the CPEPs had finalized the list of staff types that were subsequently matched to wage rate data, in order to convert labor time profiles into labor cost estimates. Exhibit 5-1 displays the staff types used by each of the 15 CPEPs.

## Exhibit 5-1

## Staff Type Usage by CPEP

| Staff Type | CPEP 1 | CPEP 2 | CPEP 3 | CPEP 4 | CPEP 5 | CPEP 6 | CPEP 7 | CPEP 8 | CPEP 9 | CPEP 10 | CPEP 11 | CPEP 12 | CPEP 13 | CPEP 14 | CPEP 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Anesthesia Technician | | | | | | | | | | | | | | X | |
| Angio Technician | | | | | | X | | | | | | | | | |
| Audiologist | | | | | | | | | X | | | | | | |
| Billing/Rec/Secretary | X | | | | | | | | | | | | | | |
| CAT Scan Technician | | | | | | X | | | | | | | | | |
| COMT/COT/RN/CST | | | | | X | | | | | | | | | | |
| CST | | | | | | | | | X | | | | | | |
| Cardiac Sonographer | | | | | | | | | | | | | X | | |
| Cardiovascular Tech | | | | | | | | | | | | | X | | |
| Certified Retinal Angio | | | | | X | | | | | | | | | | |
| Clerk | | | X | X | | | | | | | | | X | X | |
| Client Service | | | | | | | | | | | | | | X | |
| Coder | | | | | | | | X | | | | | X | | |
| Counselor | | | | X | | | | | | | | | | | |
| Courier | | | | | | | | | | | | | | X | |
| Cytotechnologist | | | | | | | | | | | | | | X | |
| Dosimetrist | | | | | | X | | | | | | | | | |

CPEP 1 = Integ & Physical Medicine
CPEP 2 = Urology
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CPEP 4 = OB/GYN
CPEP 5 = Opthalmology
CPEP 6 = Radiology
CPEP 7 = Eval & Management
CPEP 8 = General Surgery
CPEP 9 = Otolaryngology
CPEP 10 = Misc Internal Medicine
CPEP 11 = Gastroenterology
CPEP 12 = Anesthes/Path
CPEP 13 = Cardiology
CPEP 14 = Anesthes/Path
CPEP 15 = Neurosurgery

## Exhibit 5-1 (Continued)

### Staff Type Usage by CPEP

| Staff Type | CPEP 1 | CPEP 2 | CPEP 3 | CPEP 4 | CPEP 5 | CPEP 6 | CPEP 7 | CPEP 8 | CPEP 9 | CPEP 10 | CPEP 11 | CPEP 12 | CPEP 13 | CPEP 14 | CPEP 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EEG Technician | | | | | | | | | | X | | | | | |
| EKG Tech/MA | | | | | | | | | | | | | X | | |
| EKG Tech/Med Tech | | | | | | | | | | | | | X | | |
| EKG Technician | | | | | | | | | | | | | X | | |
| Electron Microscopy Tech | | | | | | | | | | | | | | X | |
| Film Librarian | | | | | | X | | | | | | | | | |
| Flow Tech | | | | | | | | | | | | | | X | |
| Front Office Staff | | | | | | | | | X | | | | | | |
| Histotechnologist | X | | | | | | | | | | | | | X | |
| Insurance Billing Staff | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| LPN | | | | | | | | X | | | | | X | | |
| Lab Tech | | | | X | | | | | | | | | | X | |
| Lab Tech/Histotechnologist | | | | | | | | | | | | | | X | |
| Lab Tech/Med Tech | | | | | | | | | | | | | | X | |
| MRI Technician | | | | | | X | | | | | | | | | |
| MA/Clerk | | | | | | | | | | | | | | X | |

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CPEP 13 = Cardiology
CPEP 14 = Anesthes/Path
CPEP 15 = Neurosurgery

## Exhibit 5-1 (Continued)

## Staff Type Usage by CPEP

| Staff Type | CPEP 1 | CPEP 2 | CPEP 3 | CPEP 4 | CPEP 5 | CPEP 6 | CPEP 7 | CPEP 8 | CPEP 9 | CPEP 10 | CPEP 11 | CPEP 12 | CPEP 13 | CPEP 14 | CPEP 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Med Sec/Billing | | | | | | | X | | | | | | | | |
| Med Sec/Lab Tech | | | | | | | | | | | | | | X | |
| Med Sec/Rec/Sch Sec | | | | X | | | | | | | | | | | |
| Med Sec/Receptionist | | | X | | | | | | | | | | | | |
| Med Sec/Sch Sec | | | | | | | | | | | | | X | | |
| Med Sec/Transcriptionist | | | | X | | | | | | | | | | | |
| Medical Assistant | | | | X | | | | X | X | X | | X | X | | |
| Medical Records | | | | X | | | | | X | | | | X | | |
| Medical Secretary | X | X | X | X | | X | X | X | X | X | X | X | X | X | X |
| NP/PA | | | | | | | | | | | | X | | X | |
| Nuclear Cardiology Technician | | | | | | | | | | | | | X | | |
| Nuclear Medicine Technician | | | | | | X | | | | | | | | | |
| OBP (Ophthalmic Business Personnel) | | | | | X | | | | | | | | | | |
| OMP (Ophthalmic Medical Personnel) | | | | | X | | | | | | | | | | |
| OT Aid/Receptionist | X | | | | | | | | | | | | | | |
| Office Manager | | | | | | | | | | | | X | | | |

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## Exhibit 5-1 (Continued)

### Staff Type Usage by CPEP

| Staff Type | CPEP 1 | CPEP 2 | CPEP 3 | CPEP 4 | CPEP 5 | CPEP 6 | CPEP 7 | CPEP 8 | CPEP 9 | CPEP 10 | CPEP 11 | CPEP 12 | CPEP 13 | CPEP 14 | CPEP 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Optician/COMT | | | | | X | | | | | | | | | | |
| Orthoptist | | | | | X | | | | | | | | | | |
| PA | | | | | | | | | | | | X | X | | |
| Perfusionist | | | | | | | | | | | | X | | | |
| Physical Therapist | | | | | | | | | | X | | | | | |
| Physical Therapy Aide | X | | X | | | | | | | | | | | | |
| Physicist | | | | | | X | | | | | | | | | |
| Practice Administrator | | X | | | | X | | | X | X | | X | X | X | |
| Psychologist | | | | | | | X | | | | | | | | |
| RN | X | X | X | X | X | X | X | X | X | X | | X | X | X | X |
| RN-Cardiology | | | | | | | | | | | | | X | | |
| RN/Billing | X | | | | | | | | | | | | | | |
| RN/LPN | | | X | | | | X | | X | | | | X | | |
| RN/LPN/MA | | | | X | | | | | X | X | X | | | | X |
| RN/LPN/MA/Tech | X | | | | | | | | | | | | | | |
| RN/LPN/PA | | | | | | | | | | | | X | | | |
| RN/MA | X | | | X | | | | X | | | | X | | | |
| RN/Med Tech/MA | | | X | | | | | | | | | | | | |
| RN/NP | | | | | | | | | | | | | | X | |

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## Exhibit 5-1 (Continued)

### Staff Type Usage by CPEP

| Staff Type | CPEP 1 | CPEP 2 | CPEP 3 | CPEP 4 | CPEP 5 | CPEP 6 | CPEP 7 | CPEP 8 | CPEP 9 | CPEP 10 | CPEP 11 | CPEP 12 | CPEP 13 | CPEP 14 | CPEP 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| RN/NP/PA | | | X | | | | | | | | | | | | |
| RN/OCN | | | | | | | | | | X | | | | | |
| RN/Office Manager | | | | | | | | | X | | | | | | |
| RN/PA | | | | | | X | | X | | | | X | X | X | |
| RN/PA/Cast Tech | | | X | | | | | | | | | | | | |
| RN/Respiratory Therapist | | | | | | | | | | X | | | | | |
| RN/Tech | | | X | | | | | | | | | | | | |
| RN/Tech/PA | | | X | | | | | | | | | | | | |
| RN/Ultrasound Tech | | X | | | | | | | | | | | | | |
| Radiation Tech | | | | | | X | | | | | | | | | |
| Radiation Technical Therapist | | | | | | X | | | | | | | | | |
| Receptionist | X | X | X | X | | X | | X | X | X | | X | X | X | X |
| Registered Dietician | | | | | | X | | | | | | | | | |
| Sch Sec/RN/Rec | | | | | | | | | | | X | X | | | |
| Scheduling Secretary | | X | | X | | X | X | X | X | X | | X | X | | X |
| Scrub Nurse | | | | | | | | | | | | X | | | |
| Scrub Nurse/RN | | | | | | | | X | | | | | | | |
| Secretary (General) | | | | | | | | | | | | | X | | |

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## Exhibit 5-1 (Continued)

### Staff Type Usage by CPEP

| Staff Type | CPEP 1 | CPEP 2 | CPEP 3 | CPEP 4 | CPEP 5 | CPEP 6 | CPEP 7 | CPEP 8 | CPEP 9 | CPEP 10 | CPEP 11 | CPEP 12 | CPEP 13 | CPEP 14 | CPEP 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Social Worker | | | | | | | | X | | | | | | | |
| Speech Pathologist | | | | | | | | | X | | | | | | |
| Surgery Assistant | | | | | | | | | | | | | | | X |
| Tech Aide | | | | | | X | | | | | | | | | |
| Tech/MA | | | | | | | | | | | | | X | | |
| Technician | | | | X | | X | | | | X | | | X | X | |
| Transcriptionist | | | X | X | | | | X | X | | | | X | X | X |
| Ultrasound Tech/Sonographer | | | | X | | X | | | | | | | | | |
| Vascular Tech | | | | | | X | | | | | | | | | |
| X-Ray Technician | | X | | | | X | | | | | | | | | |

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CPEP 13 = Cardiology
CPEP 14 = Anesthes/Path
CPEP 15 = Neurosurgery

### 5.1.2 Selecting Data Sources

***Guiding Principles for Selecting Wage Data Sources***

Several principles guided the selection of the wage data sources:

- **Wages should be representative of staff employed within the health services industry.** Sources of wage data may represent a variety of employment settings: all industries, all health services, hospitals only, and physician offices only. Clearly, wages representative of pay in physician offices would be the most appropriate, however, it was not possible to obtain statistically significant estimates for the great majority of staff types for such a restricted universe. Therefore, in order to maximize the sample sizes for each occupation, thus increasing the likelihood of obtaining statistically significant wages, it was decided that the representation of the applied wages should not be restricted to the physician office setting. Instead, data that encompassed the wider universe of health services were sought. With one exception, all data sets utilized in this study provide wages that are drawn from the health services industry.

- **The data source(s) should provide valid and accurate wage estimates.** Every effort was made to verify the validity of the data being used. Where available, standard errors or confidence intervals (95%) were used to ascertain the data's statistical significance. Small data sets had a lower probability of providing statistically significant wage estimates and were, therefore, avoided. Also of importance were the data sets' sample universes, which had to be nationally representative.

- **Data source(s) should distinguish skill levels within occupations.** As was made apparent in the panel meetings, different physicians employ the same general staff type but some may require varying levels of skill. For example, all physicians may employ an RN, but some may require the services of an RN with a clinical specialty. A single average wage for an RN would not be sufficient in such cases.

- **When drawing upon multiple data sets for wage estimates, the comparability of the data sets must be determined.** Data sets had to be comparable in two ways. First, the definition of earnings had to be similar across data sets. Specifically, data sets were sought that could provide hourly wage estimates absent of tips, bonus, or overtime pay. If a data set did not provide straight-time earnings estimates, sufficient information to allow computation was required. Second, comparability of data drawn from different sample universes had to be ascertained. For example, one data set may provide wages representative of staff employed within health services while another data set may provide wages representative of only staff employed in hospitals. For this scenario, a difference in means test was not possible because one sample is a subset of the other. Comparability of the wages, therefore, was determined by a visual inspection of the wages in both settings combined with estimates on the numbers employed in each occupation and setting.

- **Measure of central tendency had to be the same across all data sets.**
All chosen data sets had to provide wage data using the same measure of central tendency (i.e., mean or median).

- **Accurate pricing of staff time would depend on the specificity of occupations contained within the data sets.**
Since some of the occupations identified by the CPEPs were relatively uncommon, Abt and HCFA sought data sets that provided earnings estimates for specialized health-related jobs as well as those more familiar.

***Description of Data Sources***

A number of external data sets were investigated. Three were selected to be the primary sources for pricing labor:

- The University of Texas Medical Branch (UTMB) Survey of Hospital and Medical School Salaries, 1994

- The Bureau of Labor Statistics (BLS), White Collar Pay (WCP) Survey of Service-Producing Industries, 1989 and the Occupation Compensation Survey (OCS), 1993

- The Current Population Survey (CPS), 1994

Exhibit 5-2 presents a summary of these data sets' characteristics.

**Exhibit 5-2**
**Labor Data Set Characteristics**

| | UTMB | BLS | CPS |
|---|---|---|---|
| Year | 1994 | 1989, 1994 | 1993 |
| Sample Universe | Hospitals and Medical Schools | Health Services Industries | User's discretion |
| Approximate Sample Size | 50 to 39,000 per occupation | 2 million total | 300,000 total |
| Pay reported | Annual | Monthly, weekly | Annual, weekly, hourly |
| Level of wage detail | Means, medians | Means | Individual |
| #Admin/Clerical Occupations | 9 | 14 | 13 |
| #Tech/Professional Occupations | 34 | 2 | 15 |
| #Nursing Occupations | 7 | 3 | 3 |

Another data set closely considered, but rejected, was SSTF-22. The SSTF-22 data set is a product of the 1990 census, providing average wages for 1989 that are representative of all industries. The data set has the advantage of a large sample but it did not have the ability to produce wages representative of the health services industry. The list of occupations within the data set matched those found in the CPS, so there was no advantage in terms of the number of occupations covered. Finally, the method used by the Census Bureau to obtain the earnings data resulted in average wage estimates that were in no way comparable to those reported by other data sets.

No single data set met all of the requirements for developing hourly wage estimates. All data sets investigated were either limited in the number of occupations for which wage salary information was available, were not nationally-representative, could not provide straight-time hourly wage estimates, or had sample sizes too small to yield valid estimates.

The three chosen data sets are all nationally representative and, together, cover a wide variety of occupations within the health services industries, as discussed below.

**UTMB**. The UTMB provides wage data for the greatest number of health-related occupations, with the sample universe being hospital and medical schools. UTMB provides clear descriptions of each occupation listed in the data. Appendix V.A presents these descriptions for a selection of the occupations in the data set. The UTMB data include annual salaries based upon a 40 hour work week. Average hourly wages are computed by dividing the given average annual salary by 2,080 hours (40 hours per week x 52 weeks per year). Since the average annual salaries presented by UTMB are based upon a 40 hour work week, the corresponding hourly wages are a fair approximation of average hourly earnings.[1]

**BLS**. The BLS data are derived from two separate surveys:

- the White Collar Pay Survey of Service-Producing Industries for 1989 and
- the Occupational Compensation Survey for 1994.

The White Collar Pay (WCP) survey provides wage data for many health-related occupations, such as RNs and technicians. The job titles are not as specific as those in the UTMB data but the wage data for some occupations are presented in levels that are defined according to skills required by the occupation. Because the White Collar Pay Survey is older, it was used as a source of wages for only a few types of medical technicians identified by the panelists.

In 1991, the BLS discontinued the White Collar Pay Survey[2] and replaced it with the Occupational Compensation Survey (OCS). The present version of the OCS does not provide wage information for many professional or technical occupations (such as technicians). The OCS, nevertheless, is a good

1 If the given annual or weekly salary is not necessarily representative of a 40-hour week but is simply labeled as "full-time," then taking the mean annual salary and dividing it by 2,080 will not be an exact representation of the mean hourly wage. But, if the distribution of hours worked by full-time individuals is tight (i.e., the variance is low), then the mean of all hourly wages can be approximated as the mean annual salary divided by 2,080.

2 1989 was the last year that the White Collar Pay Survey was completed for *service*-producing industries. The last published WCP Survey covered the goods-producing industries.

source of wage data for RNs, LPNs, and many administrative occupations. The latest available data from the OCS are for 1994. Like the WCP Survey, the wages for each occupation are delineated by level of responsibility. Appendix V.A also contains the BLS' definitions of occupations by skill level.

**CPS, 1993**. The CPS is a nationally representative monthly survey of approximately 50,000 households. The same household is surveyed monthly for 4 months, ignored for the next 8 months, and then surveyed again for the next 4 months. Persons surveyed during months 4 and 16 are part of the "outgoing rotation group." Each month, a core group of questions are asked as well as a set of supplemental questions. The focus of the supplement varies each month.

The main advantage of the CPS is that it provides individual-level data, as opposed to aggregated national averages. Hourly wages, therefore, can be defined as needed and obtained for multiple employment settings. The 1993 version of the CPS was chosen because that is the latest year for which an annual, as opposed to a monthly, version of the data is available. For an annual file, there are approximately 300,000 individual observations as compared to a monthly file that contains approximately 50,000 observations. This greatly increases the probability of obtaining statistically valid wage estimates for each occupation.

Unlike the UTMB and BLS data, the CPS data required some programming before hourly wage estimates could be obtained. The following criteria were applied to obtain hourly wage estimates from the CPS data:

*Exclusions*

- Observations with either missing wage data or with zero earnings were excluded.

- Outliers were eliminated by removing all observations whose wages fell below the 10th percentile or above the 90th percentile. No individual hourly wage was below the minimum wage for 1993.

*Inclusions*

- Only full-time workers (defined as 35+ hours per week) employed in the private sector were retained for the final data set.

- The extracted sample encompasses all health services, including hospitals. This provides the greatest number of occupations for which significant wage estimates could be obtained.

*Definitions and analytic conventions*

- Hourly wages were defined as either the reported hourly earnings or the reported weekly earnings divided by the usual hours worked per week, depending on how the individual chose to report his/her earnings.

- All estimates were weighted by the earnings weights provided by the CPS. The earnings weights sum to the total population.

- Following BLS conventions, statistical validity of each occupation's wage estimate was determined by the Relative Standard Error (RSE). RSE is computed as the weighted standard error divided by the weighted mean wage for each occupation. A given mean wage was considered to be statistically valid if 2*RSE was less than or equal to 7%. Any CPS wages determined to be statistically unreliable were not considered in subsequent pricing.

**Society Data**. Occasionally, the data sets above could not provide valid wage data for specialized occupations. In these few cases, it became necessary to find data outside of the three main sources. The following societies served as alternative sources of wage data:

- **The American Academy of Ophthalmology** provided the results of the *1994 American University of Personnel in Ophthalmology (AUPO) Administrators' Survey*, January 1995, Little Rock, Arkansas.

- **The American Association of Physicists in Medicine** provided wage data based upon their own *1995 Professional Information Survey.*

- **The American Psychological Association** provided wage data drawn from the results of their *1995 Survey of Salaries in Psychology*, February 1996, Washington, DC.

***Comparability of Data***

Both the BLS and the CPS data are representative of wages paid to workers in the health services industry while the UTMB data are representative of wages paid to workers in hospitals and medical schools. Since the data sets did not draw from the same sample universe, the need for an adjustment factor was investigated.

The wage data provided by the BLS made it possible to construct a "hospital wage adjustment factor" (HWAF) that could alter the UTMB data so that they were comparable to the BLS and CPS data. The HWAF was defined as the ratio of health services wages to hospital wages:

$$HWAF = \frac{W_{hs}}{W_{hosp}} ,$$

where $W_{hosp}$ represents the hospital wages and $W_{hs}$ represents wages within the health services industry, as published by the BLS. Therefore, given a wage drawn from a sample of hospitals, such as those provided by the UTMB data, and the HWAF for a particular staff type, the corresponding wage for the health services industry could be inferred.

After investigating the number of persons employed in various occupations within the health services setting and the hospital setting, it was decided that the HWAF was not necessary. According to the BLS data, the majority of persons employed in occupations priced with UTMB data (mainly technicians)

worked in hospitals.[3] This explains why initial calculations of the HWAF were very close to 1; UTMB wages already reflected the typical wage for health services workers for those occupations.

Appendix V.B contains the list of occupations found within the data sources, their associated wage rates, and their estimated total compensation.

### 5.1.3 Mapping Staff Types to Occupations and Wages

Staff types identified by the CPEP panels were mapped to the most appropriate occupation and wage rate in the available data sets. As discussed above, within the broad clinical and administrative classifications, there were two categories of staff types for which wages had to be determined: "individual staff types" and "composite staff types". Both categories contain staff types that represent a single staff person. The category of individual staff types contains all those for which the panelists could identify a single type of worker as being the "typical" person performing a given task. Composite staff types were constructed when a CPEP could not identify a single type of staff for a particular task and, instead, named two or more types that commonly do the job.

#### *Mapping Individual Staff Types*

Some general rules were developed in order to maintain consistency when mapping staff types named by the panelists to occupations listed within the available data. Often, the occupational definitions provided by the BLS and UTMB data were useful in determining an appropriate mapping. The general rules for mapping named staff types to occupations available in the data sets are outlined below:

1. **BLS data.** The BLS was the preferred data set for two reasons. First, the reputation of the BLS and the larger sample size of the data instilled greater confidence in the statistical significance of the wage estimates and the validity of the relative numbers of persons employed across skill levels within occupations. Second, the occupational descriptions by skill level provided by the BLS coupled with each staff types' duties as identified by the CPEPs allowed for careful mapping of the staff types to skill levels within the appropriate job. Even in situations where other data sets may have provided a more exact matching of job titles, the preference for the BLS data over other data sets persisted because of these precise descriptions of the occupations' duties at each skill level (see point 2 below for an exception to this rule).

2. **Mapping Criteria.** Two primary factors were considered in mapping the staff categories in the BLS data to the staff types described by the CPEPs. First, the tasks performed by the staff (as described by the CPEP) were carefully matched to the skill level descriptions from the BLS data. Second, the overall proportions of each staff type employed nationally were considered. The national proportions were useful when choosing between two skill level definitions for a particular staff type. In cases where more than one skill level could be interpreted as an appropriate match, the national proportions were consulted and used to

3 Table 7 in the 1989 report White-Collar Pay: Private Service-Producing Industries shows that 98% of all Medical Machine Operating Technicians are employed in the health services industries and 97% are employed by hospitals.

determine the more common skill level employed and, thus, the best possible mapping. For example, skill level definitions for LPN levels I and II both appeared to address the tasks performed by LPNs, as identified by the CPEPs. The national proportions, however, indicated a greater number of level II LPNs employed as compared level I LPNs. The result was a level II mapping for this staff type. Conversely, the national employment numbers were not as useful in determining a mapping when a given staff type's activities did not represent a significant portion of the duties performed by the personnel category overall. If, for example, the task being performed is done rarely (e.g., a highly specialized task) by an occupational category that overall is quite large (e.g., a highly specialized task) by an occupational category that overall is quite large (e.g., RNs), than the determination of an appropriate mapping based on matching of skills to what may be a small sub-category of the overall occupation (e.g., Level IV RN), rather than based on the national proportions within the larger occupational category, is appropriate.

3. **Technicians and Nurse Practitioners.** In the case of technicians and nurse practitioners, the more exact UTMB occupation definitions were generally preferred over the more general BLS definitions (listed as *Medical Machine Operating Technicians, levels I-IV and Registered Nurses, levels I-IV*). For example, UTMB's EKG Technician was chosen over the BLS' *Medical Machine Operating Technician, level I* for the named staff type EKG Technician. More recent wage data (for technicians) and more specific occupation titles and definitions made the UTMB data generally more desirable as a source of wage data. When there were no exact matches for a given technician in the UTMB or the CPS data, the BLS' *Medical Machine Operating Technicians* served as the appropriate mapping.[4] The following staff types were all mapped to particular levels of *Medical Machine Operating Technician:* Medical Tech, Med Tech, Tech, Technician, Angio Technician, Vascular Tech, Cardiovascular Tech, Anesthesia Technician. For the more specialized technicians, clinical input was sought to help determine the most appropriate level. Medical Tech, Med Tech, Tech, Technician, and Anesthesia Technician were all mapped to *level I* which indicated a staff person who performed standard tasks according to specific instructions. The remainder were mapped to *level III* which called for a person capable of using his/her own judgment in the performance and evaluation of complex examinations or treatments. As occurred with all data drawn in years prior to 1995, the wage data for *Medical Machine Operating Technicians* were trended forward.

4. **RNs and LPNs.** The skill levels within the BLS' occupational definitions served as a guide for mapping RNs and LPNs. The appropriate occupation level was determined according to the duties for each nurse, as indicated by the CPEP members. In general, when a panel named an RN as a staff type, the mapping chosen was the BLS' *RN level II.* However, if the panel specified that the task required the skills of a highly specialized RN, the mapping reflected that need. For LPNs, not only were their duties consistent with *level II LPNs*, but the relatively greater number of *level II LPNs* as compared to *level I LPNs* indicated that *level II* was more typical.

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4 One exception occurred with the staff type, Flow Tech. The tasks required of this staff type were consistent with those typically performed by a medical secretary, leading to a mapping to the BLS' *Secretary, level II.*

5. **Physician's Assistants** were generally mapped to UTMB's *Physician's Assistant*, with the exception of physician's assistants identified by members of CPEP 12 (Cardiothoracic Surgery) which were instead mapped to UTMB's *Surgeon's Assistant*. The report published by UTMB describes the Surgeon's Assistant as a Physician's Assistant with a specialty in surgery, trained to assist surgeons performing cardiovascular operations.

6. **Direct mapping not possible.** In addition to specialty technicians, there were other staff types that could not be exactly matched with occupations available in any of the data sets. For these staff types, mappings were generally completed according to the duties performed and the education and skills required of the staff types. In some cases, the relevant professional society was consulted in order to confirm a skill level and/or obtain an approximate wage, which was then used as a guide to choose a mapping to an occupation that represented a similarly paid and similarly skilled employee. Below are the staff types for which exact mappings were not possible:

   – **Medical Secretary, Scheduling Secretary, Surgery Coordinator, Transcriptionist**. All were mapped to one of four possible BLS *Secretary* levels. The reporting relationships within the typical physician's office combined with the duties and skills required of the identified staff types indicated the appropriate BLS level for each mapping (the reader is referred to the discussion in Appendix V.A relating to the classification of secretaries by level). Scheduling Secretary and Surgery Coordinator were mapped to *level I* while Medical Secretary was mapped to *level II* since the tasks required of a Medical Secretary required greater autonomy and experience. The duties of a transcriptionist did not fit the BLS description for a *level I* (or greater) mapping yet panelists clearly indicated a difference in the value of a transcriptionist versus a general secretary. Therefore, transcriptionist was mapped to *Secretary, level II*.

   – **Client Service, Coder, Courier, Medical Records, Insurance Billing Clerk, Billing Clerk**. All were mapped to particular levels of the BLS' *General Office Clerk*. Client Service, Insurance Billing Clerk, and Billing Clerk all appeared to require greater levels of autonomy than a basic clerical worker and clearly needed a familiarity with medical terminology used in patient records, thus leading to a *level III* mapping. Duties performed by a Coder appeared to be more repetitive, indicating that a *level II* mapping was more appropriate. A Courier required minimal skills to perform the tasks indicated by the panelists and was, therefore, mapped to *level I*. Finally, a staff type in charge of Medical Records performed duties more consistent with a *level IV General Office Clerk*, such as the maintenance of records and the need for some knowledge of the subject-matter.

   – **Practice Administrator, Office Manager**. This staff type were mapped to the CPS occupation *Manager, Medicine and Health*.

   – **Front Office Staff** was mapped to the BLS' *Receptionist*.

- **Optician**. Data on nationally representative wages for opticians were not available. Based upon a salary range reported in the BLS Occupational Outlook Handbook[5], *LPN, level II* was used as a proxy.

- **Physical Therapy Aide, Occupational Therapy Aide**. It was determined that physical therapy aides and occupational therapy aides were paid significantly more than the $7.89 per hour associated with the only obvious mapping, *Health Aides, except nursing* (CPS data). An *LPN level I* was used instead as a proxy for the wages earned by these aides since the level of education and training required was comparable.

- **Medical Assistant**. The training and skills required of a medical assistant matched closely those outlined for the BLS' *Nursing Assistant, level II.*

- **Counselor**. This staff type was associated with the provision of a single procedure. Information from a relevant organization indicated a wage similar to the wage for BLS' *RN, level II.*[6]

### *Mapping Composite Staff Types*

As described above, composite staff types consist of two or more persons identified as being capable of performing a given task. Each component of a composite staff type was mapped according to the rules outlined for the individual staff types.

Exhibit 5-3 lists the final mappings and the data source for each staff type. Appendix V.C provides greater detail on the mappings, showing the best match in each data set for each staff type.

**Exhibit 5-3**
**Staff Type Mappings**

| Named Occupation (a) | Hourly (b) Wage 1995$ | Mapped to Occupation | Data Source |
|---|---|---|---|
| Anesthesia Tech | 9.88 | Medical Machine Operating Technician, Level I | BLS |
| Angio Technician | 15.42 | Medical Machine Operating Technician, Level III | BLS |
| Audiologist | 18.05 | Audiologist | UTMB |
| Billing Clerk | 9.97 | General Office Clerk, Level III | BLS |
| Billing/Rec/Sec | 8.87 | General Office Clerk, Level III | BLS |
| | | Receptionist | BLS |
| | | Secretary, Level II | BLS |

5 *Health Technologists and Technicians*, reprinted from the Occupational Outlook Handbook, 1994-95 Edition, U.S. Department of Labor, Bureau of Labor Statistics, Bulletin 2450-9. Salary information printed in the Handbook cites the Opticians Association of America as the source.

6 Counselor is used in the provision of a spontaneous and therapeutic abortion. Information regarding a counselor's salary obtained from the National Abortion Federation.

**Exhibit 5-3 (Continued)**
**Staff Type Mappings**

| Named Occupation (a) | Hourly (b) Wage 1995$ | Mapped to Occupation | Data Source |
|---|---|---|---|
| CAT Scan Technician | 14.01 | Radiologic Technologist | UTMB |
| COMT/COT/RN/CST | 13.48 | Certified Ophthalmic Medical Technician | AUPO Administrator's Salary Survey |
| | | Certified Ophthalmic Technician | AUPO Administrator's Salary Survey |
| | | Registered Nurse, Level II | BLS |
| | | Surgical Technologist | UTMB |
| CST | 11.51 | Surgical Technologist | UTMB |
| Cardiac Sonographer | 17.09 | Ultrasound Technologist | UTMB |
| Cardiovascular Tech | 15.42 | Medical Machine Operating Technician, Level III | UTMB |
| Cert. Retinal Angiotech | 15.42 | Certified Retinal Angiographer | AUPO Administrator's Salary Survey |
| Clerk | 8.52 | General Office Clerk, Level II | BLS |
| Client Service | 9.97 | General Office Clerk, Level III | BLS |
| Coder | 8.52 | General Office Clerk, Level II | BLS |
| Counselor (1) | 18.54 | Registered Nurse, Level II | BLS and National Abortion Federation |
| Courier | 6.59 | General Office Clerk, Level I | BLS |
| Cytotechnologist | 18.23 | Cytotechnologist | UTMB |
| Dosimetrist | 21.96 | Dosimetrist | UTMB |
| EEG Technician | 12.43 | EEG Technician | UTMB |
| EKG Tech/MA | 8.04 | EKG Technician | UTMB |
| | | Nursing Assistant, Level II | BLS |
| EKG Tech/Med Tech | 9.40 | EKG Technician | UTMB |
| | | Medical Machine Operating Technician, Level I | BLS |
| EKG Technician | 8.96 | EKG Technician | UTMB |
| Elec. Microscopy Tech | 13.70 | Electron Microscopy Technician | UTMB |
| Film Librarian | 17.09 | Librarian | UTMB |
| Flow Tech (2) | 12.04 | Secretary, Level II | BLS |
| Front Office Staff | 8.04 | Receptionist | BLS |
| Histotech | 13.44 | Histology Technician | UTMB |
| Histotechnologist | 13.44 | Histology Technician | UTMB |
| Insurance Billing | 9.97 | General Clerk, Level III | BLS |
| LPN | 11.73 | Licensed Practical Nurse, Level II | BLS |
| Lab Tech | 12.65 | Medical Lab Technician | UTMB |
| Lab Tech/Histotech | 13.05 | Medical Lab Technician | UTMB |
| | | Histology Technician | UTMB |
| Lab Tech/Med Tech | 11.29 | Medical Lab Technician | UTMB |
| | | Medical Machine Operating Technician, Level I | BLS |
| MA/Clerk | 7.47 | Nursing Assistant, Level II | BLS |
| | | General Office Clerk, Level II | BLS |
| MRI Technician | 14.01 | Radiologic Technologist | UTMB |
| Med Sec/Billing | 10.98 | Secretary, Level II | BLS |
| | | General Office Clerk, Level III | BLS |
| Med Sec/Lab Tech | 12.34 | Secretary, Level II | BLS |
| | | Medical Lab Technician | UTMB |
| Med Sec/Recep | 10.01 | Secretary, Level II | BLS |
| | | Receptionist | BLS |
| Med Sec/Sch Sec | 10.72 | Secretary, Level II | BLS |
| | | Secretary, Level I | BLS |
| Med Sec/Transcript | 12.04 | Secretary, Level II | BLS |
| | | Secretary, Level II | BLS |
| MedSec/Rec/SchSec | 9.84 | Secretary, Level II | BLS |
| | | Receptionist | BLS |

## Exhibit 5-3 (Continued)
## Staff Type Mappings

| Named Occupation (a) | Hourly (b) Wage 1995$ | Mapped to Occupation | Data Source |
|---|---|---|---|
| | | Secretary, Level I | BLS |
| Medical Assistant | 7.12 | Nursing Assistant, Level II | BLS |
| Medical Records | 11.11 | General Office Clerk, Level IV | BLS |
| Medical Secretary | 12.04 | Secretary, Level II | BLS |
| NP/PA (CPEP 12 only) * | 21.17 | Nurse Practitioner | UTMB |
| | | Surgeon's Assistant | UTMB |
| NP/PA | 24.03 | Nurse Practitioner | UTMB |
| | | Physician's Assistant | UTMB |
| Nuclear Card. Tech. | 17.22 | Nuclear Medicine Technologist | UTMB |
| Nuclear Med Tech | 17.22 | Nuclear Medicine Technologist | UTMB |
| OBP (Ophthalmic Business Personnel) | 10.23 | | |
| Billing Staff | | General Clerk, Level III | BLS |
| Medical Secretary | | Secretary, Level II | BLS |
| Scheduling Secretary | | Secretary, Level I | BLS |
| Surgery Coordinator | | Secretary, Level I | BLS |
| OMP (Ophthalmic Medical Personnel) | 12.56 | | |
| LPN | | Licensed Practical Nurse, Level II | BLS |
| Ophthalmic Technician | | Ophthalmic Technologist | AUPO Administrator's Salary Survey |
| RN | | Registered Nurse, Level II | BLS |
| Tech | | Medical Machine Operating Technician, Level I | BLS |
| OT Aide/Recep (3) | 9.14 | Licensed Practical Nurse, Level I | BLS |
| | | Receptionist | BLS |
| Office Manager | 16.95 | Manager, Medicine and Health | CPS |
| Optician/COMT | 12.21 | Licensed Practical Nurse, Level II | BLS |
| | | Certified Ophthalmic Medical Technician | AUPO Administrator's Salary Survey |
| Orthoptist | 13.84 | Orthoptist | AUPO Administrator's Salary Survey |
| PA (CPEP 12) * | 18.10 | Surgeon's Assistant | UTMB |
| PA | 23.80 | Physician's Assistant | UTMB |
| Perfusionist | 31.76 | Clinical Perfusionist | UTMB |
| Phys. Ther. Aide (4) | 10.19 | Licensed Practical Nurse, Level I | BLS |
| Physical Therapist | 20.07 | Physical Therapist | UTMB |
| Physician Assistant (CPEP 12) * | 18.10 | Surgeon's Assistant | UTMB |
| Physician Assistant | 23.80 | Physician's Assistant | UTMB |
| Physicist | 42.52 | Physicist | AAPM Professional Information Survey |
| Practice Admin | 16.95 | Manager, Medicine and Health | CPS |
| Psychologist | 36.06 | Psychologist | APA Survey of Salaries in Psychology |
| RN | 18.54 | Registered Nurse, Level II | BLS |
| RNCard | 25.20 | Registered Nurse, Level IV | BLS |
| RN/Billing | 17.79 | Registered Nurse, Level II | BLS |
| | | General Clerk, Level III | BLS |
| RN/LPN | 17.09 | Registered Nurse, Level II | BLS |
| | | Licensed Practical Nurse, Level II | BLS |
| RN/LPN/MA | 13.92 | Registered Nurse, Level II | BLS |
| | | Licensed Practical Nurse, Level II | BLS |
| | | Nursing Assistant, Level II | BLS |
| RN/LPN/MA/Tech | 11.82 | Registered Nurse, Level II | BLS |
| | | Licensed Practical Nurse, Level II | BLS |

## Exhibit 5-3 (Continued)
## Staff Type Mappings

| Named Occupation (a) | Hourly (b) Wage 1995$ | Mapped to Occupation | Data Source |
|---|---|---|---|
| | | Nursing Assistant, Level II | BLS |
| | | Medical Machine Operating Technician, Level I | BLS |
| RN/LPN/PA (CPEP 12) | 17.13 | Registered Nurse, Level II | BLS |
| | | Licensed Practical Nurse, Level II | BLS |
| | | Surgeon's Assistant | UTMB |
| RN/MA | 14.32 | Registered Nurse, Level II | BLS |
| | | Nursing Assistant, Level II | BLS |
| RN/Med Tech/MA | 11.82 | Registered Nurse, Level II | BLS |
| | | Medical Machine Operating Technician, Level I | BLS |
| | | Nursing Assistant, Level II | BLS |
| RN/NP | 21.39 | Registered Nurse, Level II | BLS |
| | | Nurse Practitioner | UTMB |
| RN/NP/PA | 22.18 | Registered Nurse, Level II | BLS |
| | | Nurse Practitioner | UTMB |
| | | Physician's Assistant | UTMB |
| RN/OCN | 21.83 | Registered Nurse, Level II | BLS |
| | | Registered Nurse, Level III | BLS |
| RN/Office Manager | 18.36 | Registered Nurse, Level II | BLS |
| | | Manager, Medicine and Health | CPS |
| RN/PA | 18.80 | Registered Nurse, Level II | BLS |
| | | Physician's Assistant | UTMB |
| RN/PA (CPEP 12) | 18.49 | Registered Nurse, Level II | BLS |
| | | Surgeon's Assistant | UTMB |
| RN/PA/Cast Tech | 17.66 | Registered Nurse, Level II | BLS |
| | | Physician's Assistant | UTMB |
| | | Health Technologists/Technicians, nec | CPS |
| RN/Resp. Therapist | 18.49 | Registered Nurse, Level II | BLS |
| | | Respiratory Therapist | UTMB |
| RN/Tech | 14.19 | Registered Nurse, Level II | BLS |
| | | Medical Machine Operating Technician, Level I | BLS |
| RN/Tech/PA | 17.39 | Registered Nurse, Level II | BLS |
| | | Medical Machine Operating Technician, Level I | BLS |
| | | Physician's Assistant | UTMB |
| RN/Ultrasound Tech | 17.79 | Registered Nurse, Level II | BLS |
| | | Ultrasound Technologist | UTMB |
| Rad. Tech. Therapist | 17.75 | Radiation Therapy Technologist | UTMB |
| Radiation Tech | 14.01 | Radiologic Technologist | UTMB |
| Receptionist | 8.04 | Receptionist | BLS |
| Registered Dietician | 16.03 | Registered Dietician | UTMB |
| Sch Sec/RN/Rec | 12.04 | Secretary, Level I | BLS |
| | | Registered Nurse, Level II | BLS |
| | | Receptionist | BLS |
| Scheduling Secretary | 9.44 | Secretary, Level I | BLS |
| Scrub Nurse | 18.54 | Registered Nurse, Level II | BLS |
| Scrub Nurse/RN | 18.54 | Registered Nurse, Level II | BLS |
| | | Registered Nurse, Level II | BLS |
| Secretary | 12.04 | Secretary, Level II | BLS |
| Social Worker | 14.45 | Social Worker | CPS |
| Sonographer | 17.09 | Ultrasound Technologist | UTMB |
| Speech Pathologist | 18.40 | Speech Pathologist | UTMB |

## Exhibit 5-3 (Continued)
## Staff Type Mappings

| Named Occupation (a) | Hourly (b) Wage 1995$ | Mapped to Occupation | Data Source |
|---|---|---|---|
| Surgery Assistant | 14.32 | | |
| Certified First Assistant | | Surgical Technologist | UTMB |
| Certified Scrub Tech | | Surgical Technologist | UTMB |
| Certified Scrub Tech, First Assistant | | Surgical Technologist | UTMB |
| RN | | Registered Nurse, Level II | BLS |
| RN, First Assistant | | Registered Nurse, Level II | BLS |
| Tech Aide | 9.88 | Medical Machine Operating Technician, Level I | BLS |
| Tech/MA | 8.48 | Medical Machine Operating Technician, Level I | BLS |
| | | Nursing Assistant, Level II | BLS |
| Technician | 9.88 | Medical Machine Operating Technician, Level I | BLS |
| Transcriptionist | 12.04 | Secretary, Level II | BLS |
| Ultrasound Tech | 17.09 | Ultrasound Technologist | UTMB |
| Vascular Tech | 15.42 | Medical Machine Operating Technician, Level III | BLS |
| X-Ray Technician | 14.01 | Radiologic Technologist | UTMB |

(a) Named occupation reflects the staff types identified by the CPEPs.
(b) Hourly wages exclude fringe benefits.

Notes:
* For CPEP 12, Physician's assistant mapped to UTMB occupation "Surgeon's Assistant" with a 1995 hourly wage estimated as $18.09.
The UTMB report described the surgeon's assistant as a staff type specifically trained to assist the cardiac surgeon.
(1) RN Level II salary serves as a proxy for counselor salary. Guidance on appropriate salary provided by National Abortion Federation.
(2) Tasks performed by flow tech in the indicated procedure are consistent with those typically performed by a medical secretary; Secretary Level II therefore used as a proxy.
(3) Wage for physical therapy aide and occupational therapy aide approximated with the wage for an LPN, Level I; the level of education and training required for each occupation is similar.

### *Pricing Individual Staff Types*

Once a staff type had been successfully mapped to an occupation in one of the accepted data sets, pricing consisted of applying the hourly wage indicated by the chosen mapping. For a select few staff types where statistically valid wage data were unavailable and a reasonable proxy could not be identified in it 5.3-1 any of the three data sets, wage data had to be obtained from other sources. The following staff types were priced using a data source other than the BLS, UTMB, or CPS data:

- **Orthoptist, Certified Retinal Angiotech, Ophthalmic Technician, Certified Ophthalmic Medical Technician, Certified Ophthalmic Technician**. Wages for these staff types were obtained from the *1994 AUPO Administrator's Salary Survey*.

- **Physicist**. Salary for a physicist obtained from the *American Association of Physicists in Medicine Professional Information Survey, 1995*. The estimated hourly wage is an average of the reported annual salaries for certified and non-certified medical physicists.

- **Psychologist**. The estimated salary for a psychologist was provided by the American Psychological Association and is based upon the results of the survey, *Salaries in Psychology, 1995*. The hourly wage represents the median earnings of Ph.D. clinical psychologists in a group or private practice.

### *Pricing Composite Staff Types*

Prices for composite staff types were achieved in two steps. First, the individual components were priced as described above. Next, three options were considered for the second stage of pricing composite staff types:

*Option A*: Compute the average salary of the individual components.
*Option B*: Compute a weighted average salary of the individual components.
*Option C*: Apply the salary of the lowest-skilled individual capable of performing the job.

*Option A (Average Salary).* Using an average wage would impact practices differently, depending on their ability to alter their staff configurations. Assuming that larger practices hire a number of staff types at varying skill levels while smaller practices hire just one or two persons at a higher skill level, then taking the average wage across all persons capable of doing a task could benefit the large practices and harm the smaller practices. To illustrate the potential consequences, consider the case of the composite staff person RN/LPN/MA. If the national average wage for an RN is \$18, an LPN is \$11 per hour, and a medical assistant is \$10 per hour, then the composite staff person would be assigned an average wage of \$13 per hour.[7] Faced with this wage rate, the larger practice could hire a medical assistant at \$10 per hour to perform as many tasks as possible, thus making \$3.00 per hour profit. The smaller practice, however, may not be able to afford to keep a range of skilled staff on hand and may have to let an RN do most of the work, at a cost of \$18 per hour, thus losing \$5.00 per hour.

*Option B (Weighted Average)* takes a similar approach but also considers the likelihood of employing a particular staff type. In this case, weights would be based upon the number of persons in each occupation relative to the number of all named personnel. Using the same composite staff type as an example, the composite wage would be computed as follows:

$$\left(\frac{1}{N_{RN}+N_{LPN}+N_{MA}}\right) \times [N_{RN}W_{RN} + N_{LPN}W_{LPN} + N_{MA}W_{MA}] ,$$

where N represents the number of individuals employed in that profession nationwide. Suppose that the proportions of RNs, LPNs, and MAs are .30, .40, and .30, respectively.[8] Then, the composite wage for an RN/LPN/MA would be estimated as \$12.80. In this case, the weighted average wage would be very close to the average wage computed above. Assuming the same hiring constraints faced by practices, the effect would be less of a gain for the more flexible practices (e.g., larger) and a larger penalty imposed upon the more constrained practices (e.g., smaller). Overall, the impact of using a weighted average as compared to a straight average would depend on the relative number of persons employed within each occupation under consideration. While it is not known whether the proportions in overall employment match the proportions used for the specialities which developed the profile, these weights should in general produce more accurate estimates.

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7 The indicated wage rates are hypothetical.

8 These are hypothetical proportions. Accurate numbers can be obtained from the U.S. Census.

*Option C (Lowest Skilled Staff)* could have an even greater effect on the smaller offices, assuming the same hiring constraint. Using this pricing methodology would allow the more flexible office to, at best, break even by keeping a medical assistant on hand. The smaller office, however, may not have enough work to keep such an employee busy and would be forced to allow someone more expensive to perform fairly simple tasks. Continuing with the above example, if the practice keeps an LPN on staff, then the penalty to them would be $1 per hour. But, if the practice must use an RN for even the simplest tasks, then the cost differential for this type of practice would be $8 per hour.

**Exhibit 5-4**

**Weights Applied To Composite Staff Types**

| Composite Staff Type | Census Job Titles | Weights |
|---|---|---|
| RN/MA | Registered Nurses | 5196.7 |
| | Nursing Aides and Orderlies | 3030.03 |
| RN/LPN | Registered Nurses | 5196.7 |
| | Licensed Practical Nurses | 1386.5 |
| RN/LPN/MA | Registered Nurses | 5196.7 |
| | Licensed Practical Nurses | 1386.5 |
| | Nursing Aides and Orderlies | 3030.03 |
| RN/Resp. Therapist | Registered Nurses | 5196.7 |
| | Respiratory Therapists | 23.93 |
| RN/LPN/PA | Registered Nurses | 5196.7 |
| | Licensed Practical Nurses | 1386.5 |
| | Physician's Assistants | 281 |
| RN/Billing | Registered Nurses | 5196.7 |
| | Billing Clerks | 476.48 |
| Billing/Rec/Sec | Billing Clerks | 476.48 |
| | Receptionists | 3272.8 |
| | Secretaries | 3769.75 |
| RN/Office Manager | Registered Nurses | 5196.7 |
| | Managers, Medicine and Health | 628.75 |
| MA/Clerk | Nursing Aides and Orderlies | 3030.03 |
| | General Office Clerks | 1113.83 |

It was decided that using the wage associated with the lowest skilled staff capable of performing the job carried too high a penalty for practices unable to employ a variety of personnel. Options A and B were viewed as being more favorable for the smaller practices and, therefore, were selected as the methods to follow for pricing composite staff types. For most composite staff types, a straight average wage was computed among all the components. When data were available on the number of persons employed for all components of a composite staff type, a weighted average of the wages associated with each component was computed instead. Weights were based upon 1990 Census figures for the total number of full-time equivalent (FTE) persons employed within the physician office setting, by occupation.[9] The accuracy of the weighted wage estimates rests on the assumption that the national proportions of the individual components are similar to the proportions that exist within the typical practice setting profiled by the CPEP. Below is a list of the composite staff types for which weighted average wages were estimated. The table shows the Census job titles associated with each component of the composite staff type as well as the number of FTE persons employed in the physician office setting.

### 5.1.4 Conversions

***Constant 1995 Dollars***

Wages for each data set were converted into 1995 constant dollars using the Employment Cost Index for Wages and Salaries in Private Health Services Industries.[10] The index yielded the following multipliers for each data set:

| | |
|---|---|
| BLS-Occupational Compensation Survey, 1994 | 128.4 / 125.4 = 1.024 |
| BLS-White Collar Pay Survey, 1989 | 128.4 / 103.5 = 1.241 |
| University of Texas, Medical Branch, 1994 | 128.4 / 125.4 = 1.024 |
| Current Population Survey, 1993 | 128.4 / 122.6 = 1.047 |
| AUPO Administrators' Survey for 1994 | 128.4 / 125.4 = 1.024 |
| American Association of Physicists in Medicine, 1995 | 128.4 / 128.4 = 1.000 |
| Salaries in Psychology, 1995 | 128.4 / 128.4 = 1.000 |

The reader is referred to Exhibit 5-3 for a complete list of the 1995 hourly wage rates for each staff type.

***Total Compensation***

The next step was to convert the hourly wages to hourly total compensation costs. Total compensation, in addition to covering the wage cost, includes the employers' cost of providing fringe benefits such as

9 The number of full-time equivalent employees represents the number of workers the occupation would sustain if every person worked 40 hours per week. For example, if there were two persons who worked 30 hours per week then, together, they would be measured as 1.5 full-time equivalent workers. Census data were used to obtain weights because, for a few common staff types, the 1990 census could provide estimates of the number of workers employed in the physician office setting. BLS data could not provide employment numbers for physician offices.

10 As published in the Bureau of Labor Statistics News, various years, United States Department of Labor, Washington, DC 20212. Seasonally unadjusted indices for private, health services industries were applied (seasonally adjusted indices were not available for health services industries).

sick leave, vacation pay, and medical insurance. The relationship between total compensation (TC), wages (W), and benefits (B) can be characterized as:

$$TC = W + B \rightarrow TC = W \times (1 + \frac{B}{W})$$

Estimates of employer costs of providing such non-monetary compensation were obtained from BLS estimates of Employer Costs for Employee Compensation in the Private Health Services Industries.[11] The costs were then used to compute the benefits multiplier needed to convert wages to total compensation. This benefits multiplier was calculated as:

$$\begin{aligned} \textit{Benefits Multiplier} &= 1 + \frac{\textit{Avg Cost per Employee of All Benefits}}{\textit{Avg Wage Rate}} \\ &= 1 + \frac{\$4.82}{\$13.17} \\ &= 1.366 \end{aligned}$$

Total compensation estimates were then obtained by multiplying each hourly wage by 1.366. Finally, total compensation per hour was divided by 60 to obtain total compensation per minute, which was then applied to the labor times reported by the CPEP panelists. Appendix V.C includes the wage and total compensation rates applied to each staff type identified by the CPEPs. Exhibit 5-5 shows an example of the wage rate for a histotechnologist (staff type code 1017), reported in the labor wage pricing file, WAGEDAT. This staff type has a total *per-minute* compensation rate of $0.306.

**Exhibit 5-5**

**Example Observation from Labor Wage Pricing File (WAGEDAT)**

| STAFTYPE | DESC | RATE |
|---|---|---|
| 1017 | Histotechnologist | 0.306 |

## 5.2 Collection of Supply Prices

Once the CPEPs identified the supplies that are typically used for each service, Abt staff obtained prices for each of roughly 630 supply items. Supplies, as noted earlier, were defined as disposable medical supplies purchased and provided by the practice and are not separately reimbursable.

11 As printed in Table 26 of the *Employment Cost Indexes and Levels, 1975-95*, U.S. Department of Labor, Bureau of Labor Statistics, October 1995, Bulletin 2466.

### 5.2.1 Issues in the Collection of Supply Prices

*Nomenclature* proved to be the first challenge in developing a supply price list. Different CPEPs often used different names for the same supply item; alcohol swabs, for example, were listed under a dozen names, such as alcohol skin preps, alcohol pads and alcohol wipes. The necessary first step was therefore to create a classification system for supplies and assign a unique identifying number to each one. If a supply was produced in different sizes and the price varied with the size (e.g., 3" vs. 4" elastic bandage), then each size was listed separately and prices were obtained for each size.[12]

Although variation in supply prices were found, list prices were identified. Three major reasons for this variation included:

- ***Different kinds of the same supply were available.*** For pricing purposes, supply items were defined following the direction of the panels. Some CPEPs, for example, use both sterile and non-sterile gloves, and these items were therefore priced separately (i.e, sterile gloves are 89 cents a pair; non-sterile gloves are 12 cents.) But there also exist different kinds of non-sterile gloves: ambidextrous or bidextrous, powdered or not, with or without beaded cuffs, and of different thicknesses. The choice among these kinds often reflects personal preference or a decision based on price or other factors unrelated to the specific service for which the gloves are used. Often, panel members did not specify the kind of non-sterile gloves. An average price for non-sterile gloves was selected rather than attempting to price each kind separately.

- ***For the same supply, different manufacturers sell at different prices.*** Wherever possible, prices were sought for supplies made by leading manufacturers, so that the prices would reflect brand names commonly used.

- ***The same manufacturer will sell supplies through different channels.*** One manufacturer's goods may be sold through different distributors, or even through retail outlets such as pharmacies. Therefore, price determination focused on the source that a typical physician practice would rely on. For many supplies, this source was a major distributor of a wide range of medical supplies. In other cases, the physician practice would typically obtain the supply directly from the manufacturer.

- ***The same supplier will sell at different prices to different customers.*** Actual transaction prices may vary with the area of the country, the size of the buyer or the amount of effort that buyers put into negotiating prices. In general, hospital chains and other large purchasers can be expected to receive lower prices than large group practices, which in turn would receive lower prices than small practices. In particular situations, however, it was found that small but aggressive practices obtained lower prices than much larger organizations.

  Because of the substantial variation in price discounts, Abt was forced to obtain list prices rather than transactions prices. List prices are far more available from catalogs and

12 Supply descriptions are as described either by the CPEPs, or by the written or verbal information used to determine the supply price.

suppliers than transactions prices. Almost without exception, suppliers were unwilling to provide average transactions prices; and, in many cases they were reluctant to provide even the list prices.

### 5.2.2 Sources of List Prices

In obtaining supply prices, three different sources were generally used. The first source, published catalogs, served as the major source of price information:

- ***Published catalogs.***[13] Catalogs were useful for the most common supplies. Panel members were asked to recommend catalogs and other price sources that were commonly used in their field, and to bring sample catalogs with them to the second round of panel meetings. Catalogs were also obtained directly from suppliers or other sources, often on the recommendation of CPEP members.

  For general supplies such as gowns, drapes, bandaging material and syringes, catalogs and other references from companies such as Baxter Healthcare Corp., Fisher Scientific, Darby Drug Co. and Pearson Medical Supply Co. were used. For supplies specific to medical specialties, comprehensive catalogs such as the one published by Western Optical in ophthalmology were available. Many prices for pharmaceuticals were found in the *1996 Drug Topics Red Book.*

  Supplies listed in more than one catalog often had similar prices. However, in cases where prices differed substantially, an average figure or the price from the most widely-used catalog was selected (as recommended by CPEP members).

- ***Suppliers.*** For many specialized supplies (e.g., pH electrode, used for testing gastric juices), catalogs are not generally available, either because suppliers provide them to customers only or because they are not published at all. In these cases suppliers were contacted directly, to request a catalog, a price list or a verbal quotation of the list price. Suppliers' willingness to cooperate varied considerably, but in many cases, suppliers quoted representative price.

- ***CPEP members.*** Where prices were unavailable in either the catalogs or from suppliers, CPEP members were asked to provide prices from their own catalogs, price lists or price quotations from their suppliers. CPEP members were asked to provide prices that represented the cost of the supply to a typical physician practice.

### 5.2.3 Defining Units of Supply

Since different services require different quantities of a given supply item, it was necessary to express prices on a per-unit basis that could be aggregated to calculate the cost of that supply for a particular service. For discrete items, prices were expressed in terms of the smallest quantity that would likely be used in providing a service, e.g., one pair of gloves, one suture, one catheter, 250 ml of intravenous fluid.

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13 See Appendix VI. for a list of all the catalogs that were used in obtaining supply price information.

For items with continuous quantities, prices were expressed in units of convenience that varied from item to item: one liter of oxygen, 30 ml of lidocaine jelly, one foot of exam table paper.

Although prices were reported by CPEP members in small units, the prices were calculated using purchase quantities that the typical practice would buy. The price of a pair of non-sterile gloves, for example, was expressed as 12 cents a pair. Since gloves are typically bought by the case, this figure was calculated by dividing the price of a case of gloves ($60) by the number of boxes in a case (10) and the number of pairs of gloves in a box (50).

### 5.2.4 Reconciling Supply Units and Prices

In order to compute supply costs for each supply item, it was necessary to reconcile the units of supply identified by CPEP panel members with the units, and their associated prices, obtained from other sources. Examples include obvious required conversions, such as feet to inches, ml to ounces, etc. However, more complex cases called for reconciliation as well. As an example, a panel provided an estimate of 1 roll of tape for a procedure. Secondary sources showed tape priced at $0.015 per 6 inches. The panel's estimate of 1 roll had to be converted into 360 inches, which represents 60 6-inch units, at a total cost of $0.90. Individually, these conversions required little effort or imagination. However, each required conversion had to be evaluated and addressed as a unique case.

Appendix IV.G16 includes the supply prices for each supply items identified by the CPEPs. Exhibit 5-6 presents an example of the supply price for a biohazard bag (supply ID 11101) reported in the supply pricing file (SUP_PRC). The unit priced is a single bag (PRC_CNT=1.00, PRC_UNIT=item), with a price of $0.25. The source of this information was Baxter.

**Exhibit 5-6**
**Example Observation from Supply Pricing File**
**(SUP_PRC)**

| SUP_CODE | DESC | PRC_CNT | PRC_UNIT | PRICE | SOURCE |
|---|---|---|---|---|---|
| 11101 | bag, biohazard (5 gallon) | 1.00 | item | 0.25 | Baxter |

## 5.3 Collection of Equipment Purchase Prices

A basic feature of the project design is the application of externally obtained secondary price data to the resource profiles generated by the CPEPs. Costs could then be estimated by applying national price estimates to the typical resource profiles generated by the CPEPs.

It proved to be impossible to identify a nationally representative source of equipment price data based on actual purchase transactions due to several factors. First, data from the manufacturer's side is highly fragmented due to the diverse clinical nature of over 6,000 services, and the tendency of manufacturers to be focused on specific clinical areas or sub-areas. Second, manufacturers were, in general, unwilling to share information about transaction prices. Third, data on the purchasers' side is also fragmented. There are large purchasing organizations that purchase equipment for a wide clinical scope. However, the

transaction prices for these cooperatives are at the low end of the scale. Furthermore, these organizations' do not have data in a form that lends itself to easy summarization. After extensive investigation, it was clear that use of these sources was infeasible within the budget and time constraints of the project. As a result of the problematic nature of obtaining transaction data, list prices were collected. This may tend to overestimate the central tendency of equipment prices and costs.

Abt Associates obtained prices for 334 equipment items. In some cases, minor durable items, each of which cost less than $500, were aggregated into single items whose cost exceeded $500. For example, the clinical panels defined a surgical tray as one piece of equipment. Even though the individual instruments on the tray cost less than $500 each, they were included because the tray as a whole cost more than $500 and the tray would be maintained, stored and used as a unit.

Equipment was sometimes aggregated even if individual items cost more than $500. The panels defined 12 "rooms" and eight "lanes" of equipment used for some services. For example, the radiology panel defined a "basic radiography room" as a single equipment item that comprised the equipment necessary for a range of simple x-rays. An alternative would have been to price each item within the room individually. In adopting the concept of the room, the panels recognized that the room is typically used as an indivisible unit. Even if a piece of equipment within the room is not being used for, say, an ankle x-ray, it is still unavailable for other uses. "Lanes" reflect a similar grouping of equipment that is used for some services, primarily for ophthalmic equipment such as an examination lane. In some cases price data was obtained for individually identified items and added together into a single price; in others an overall price was obtained for the collection of items. In all cases these aggregated equipment "items" contain only equipment; they do not contain the building infrastructure.

The overall approach was the same as the approach for supplies: to seek the price of the most common kind of a particular piece of equipment, as made by a leading manufacturer and sold through the usual distribution channel to a typical physician practice. In many cases, the variance in prices was greater than the variance for supplies. Since prices were being obtained for equipment that cost more than $500, almost by definition there were fewer transactions and more individual pricing by manufacturers. While examination beds, heart monitors, personal computers and so forth are common purchases, for many other pieces of major equipment there are only a few dozen purchases a year, and sometimes fewer than that.

Prices of equipment varied for four reasons:

- *Different features of the same basic piece of equipment.* Panel members provided guidance as to when two items were sufficiently different in kind that two separate items of equipment should be defined and priced. For example, panel members differentiated between three-lead and 12-lead heart monitors.

- *For the same piece of equipment, different manufacturers will sell at different prices.* For most items, including cardiac monitors, there were only a few manufacturers, so this source of variation was less important than in the case with supplies.

- *The same manufacturer will sell equipment through different channels.* Direct sales from the manufacturer are common, especially for the more expensive items. This fact often eliminated one source of price variation, although it also made it more difficult to obtain

prices. Where there were different distributors of a particular manufacturer's equipment, prices that would reflect purchases made by typical physician practices were sought.

- *The same supplier will sell at different prices to different customers.* As with pricing supplies, list prices rather than transactions prices were sought, on the grounds that list prices were more readily available, more verifiable and more likely to reflect prices paid by smaller buyers. Although the magnitude of some equipment prices resulted in large discounts in terms of dollars, the percentage differences were more modest, especially since each piece of equipment is amortized across a number of services.

The first choice was to obtain prices from catalogs and similar publications. Appendix VI.A contains a listing of the equipment and supply catalogs from which prices were obtained. These sources were most useful for the most common items. For more specialized items, the supplier was contacted directly. In many cases the suppliers were fully cooperative. For 132 items, it was not possible to obtain prices from suppliers and, instead, clinical panel members provided the needed information. As was true with supplies, panel members were asked for prices that would represent what a typical physician practice might pay. Panel members were relied on most often for equipment that was rare or unusual equipment, so for most CPT codes the equipment costs are based on prices obtained from suppliers directly or through catalogs. For a list of the purchase prices obtained for different services, please see Appendix IV.G16.

Exhibit 5-7 below presents a single sample observation from the global equipment pricing file EQP_PRC.

**Exhibit 5-7**
**Example Observation from Equipment Pricing File**

| EQP_CODE | DESC | PRICE | LIFE | SOURCE |
|---|---|---|---|---|
| E13124 | Flexible Laryngoscope | 5080.00 | 3.0 | Welch-Allyn |

This observation identifies the price for the equipment item with equipment code E13124, a flexible laryngoscope. The item was found to have a price of 5,080.00 and a useful life of 3.0 years. The source of this information was Welch-Allyn.

# 6.0 Development of Direct Cost Estimates

Chapter 5.0 described the methods used to create a database of input prices for labor, supplies, and equipment to be used to convert the resource profiles developed by the CPEPs into direct costs. This chapter addresses estimation of service specific direct costs, which requires the following steps:

- Converting labor time estimates into direct labor costs using the wage rate data;
- Converting supply item profiles into supply costs using the supply prices;
- Applying a methodology to the equipment profiles and equipment prices to arrive at service-specific equipment cost estimates; and
- Summing the labor, supply, and equipment cost estimates to arrive at total direct costs.

All of these steps except the calculation of equipment costs are straightforward arithmetic computations. The labor and supplies profiled by the CPEPs are strictly variable costs which can be computed by simply multiplying the price of the input (e.g., the wage rate) times the quantity of the input (e.g., the labor time). Clinical equipment costs are fixed over some range of output, and increase as a step function as additional machine capacity is required. Thus the equipment costs are not purely variable costs, and a solution to the problem inherent in allocating machine costs to the performance of a specific service (as required for a fee schedule payment system) is more complicated. This chapter addresses all four of the steps outlined above, but the majority of the discussion describes the approach undertaken to estimate service-specific equipment costs.

## 6.1 Development of Service-Specific Labor Cost Estimates

As described in Chapter 5.0, for each staff type profiled by the CPEPs, a wage rate was determined. For each service profiled, the CPEPs itemized the number of minutes spent by each staff type for each service period. For example, if for a minor surgical procedure with a global period of 10 days an RN spent 10 minutes in a pre-procedure office visit, 45 minutes to assist with the in-office procedure, and 15 minutes for a post-procedure follow-up office visit, the total RN time for the procedure would be 70 minutes. The total labor cost for a service was computed by performing the following steps:

- Sum the number of minutes across all the service periods for the service for each staff type;
- Multiply the total number of minutes by the wage rate for each staff type to determine the total cost for each staff type; and
- Sum the costs across all the staff types used for a procedure to arrive at total labor costs.

If a service was profiled in both the in-office and out-of-office settings, this calculation was repeated for each setting to determine the total labor cost for that setting. In addition, since labor times were tracked

separately for administrative and clinical functions, cost estimates were calculated for each of these two functional sub-categories for each site of service.

## 6.2 Development of Service-Specific Supply Cost Estimates

The process for calculating service-specific supply costs is analagous to that used for labor. Supply price data were collected and mapped to specific supply items, as described in Chapter 5.0. As noted in Chapters 3.0 and 4.0, supplies were captured in total for a service across all of the CPEP service periods, without capturing the distinct quantities used within each service period. The total supply cost for a service was computed by performing the following steps:

- Convert the supply quantity for each item into units which matched the unit of the price obtained (e.g., convert a quantity expressed in ounces into gallons if the supply item was typically purchased in gallons and a price per gallon was obtained);

- Sum the quantities of a specific supply type for the entire service if necessary;

- Multiply the total quantity of the item by the supply price to determine the total cost for each supply type; and

- Sum the costs across all the supply types used for a procedure to arrive at total supply costs for the service.

If a service was profiled in both the in-office and out-of-office settings, this calculation was repeated for each setting to determine the total supply cost for that setting.

## 6.3 Development of Service-Specific Equipment Cost Estimates

Equipment costs are a relatively small fraction of overall practice expenses for most medical practices. At the same time, the analytical issues associated with producing per-service equipment costs are far more complicated than for labor and supplies. As a result, this discussion of equipment pricing contains the following:

- *Methodology.* An extended derivation and discussion of the methodology used for the calculation of service-specific equipment costs;

- *Example.* An example is developed to illustrate the concepts described in the methodology discussion;

- *Data Sources.* Chapter 5.0 described the collection of equipment purchase price data. A description of the data sources used for the additional variables which are required to implement the methodology is also included.

- *Sensitivity Analysis.* A discussion of the sensitivity of the equipment cost estimates to key variables. As will be discussed, data limitations required the use of assumptions and proxy data for some aspects of the calculations. In general, the calculated equipment costs are insensitive to the values of variables within reasonable ranges.

- *Detailed Description of Data Elements.* The implementation of the equipment pricing methodology required the development of a data file containing the basic input variables, and intermediate calculated variables necessary to calculate service-specific costs. This discussion is presented to aid in understanding the relationship between the methodology and its implementation in the data files.

### 6.3.1 Methodology

There are a number of ways that the equipment portion of service-specific practice costs can be estimated. The basic problem that must be addressed by each approach is the allocation of a fixed capital expenditure (i.e., a one time expenditure for an item used over multiple years) to each of multiple procedures requiring the use of the capital equipment, each of which have different volume levels. In a true economic sense, equipment is a joint cost which cannot be allocated according to cost differences, since the costs do not vary with output (at least over some range of volume). However, to conform to the MFS' procedure level coding system, a method of allocation must be devised. Essentially all of the analytical issues to be addressed in the procedure-level pricing of equipment are related to the allocation method.

In this discussion, assume the following notation:

$T$ = Useful years of life for a piece of equipment

$V$ = Lifetime maximum volume for a piece of equipment

$C_0$ = Purchase price of the equipment

$q_i$ = Annual volume for procedure i

$p_i$ = The computed procedure level equipment price (i.e., equipment cost for purpose of computing relative values) for procedure i

$m_i$ = The number of minutes of equipment time used to perform procedure i

$n$ = The total number of different procedure codes performed using a piece of equipment

*Useful Life vs. Maximum Use*

One issue to address at the outset is whether fixed equipment costs should be allocated over a fixed period of elapsed chronological time, or over a fixed quantity of equipment usage time. That is, it must be determined whether to treat equipment as having a useful life, that is a maximum number of years of

usefulness, or a maximum number of uses or "hours of use[1]." The *maximum number of uses approach* assumes that a piece of equipment will wear out after a certain number of hours of use, regardless of the amount of chronological time that has passed. The operative assumption underlying this approach is that machines need to be replaced only because they wear out, and that the wear is a direct function of the hours of use. If it is assumed that equipment has a maximum number hours of use, and that there is an average time per use, then one very simple method of computing a useful life would be to divide the purchase price by the maximum number of total uses:

$$p_i = \frac{C_0}{V} \tag{1}$$

In this case, all procedures performed on a machine are assumed to contribute equally to total equipment cost, so that all procedures performed on the equipment have the same $p_i$. This calculation can be modified to weight the individual $p_i$'s by the relative time requirements for procedure *i*:

$$p_i = \frac{m_i}{\left(\frac{\Sigma m_i}{n}\right)} * \frac{C_o}{V} \tag{2}$$

That is, the price for each use is modified by the minutes required to perform the procedure, relative to the average number of minutes for all procedures performed on the equipment. Formulation (2) will produce prices that are directly proportional to the number of minutes required for each procedure code.

The *useful life approach* assumes that a machine will no longer be useable after a certain number of years pass, regardless of how often it was used during the time period (at the limit, even if the use is zero). There are two possible operative assumptions underlying this approach—equipment either becomes technologically obsolete over a defined time period, or equipment deterioration is a simple function of time, regardless of use. In either case, the average practice would need to replace the equipment after the useful life has passed. A simple calculation of equipment cost based on useful life would be:

$$p_i = \frac{C_0}{(T * \Sigma q_j)} \tag{3}$$

That is, the per procedure cost is the purchase price divided by the total lifetime volume on the machine for all services that can be performed on the machine. This is similar to (1) above, except that the lifetime volume in (3) is computed from the useful life and annual volumes—a reflection of the difference in assumptions about what drives the need to replace equipment. Again, this expression can be modified to reflect differences in the equipment time across procedures:

$$p_i = \frac{\frac{m_i q_i}{(\sum m_j q_j)} * \left(\frac{C_o}{T}\right)}{q_i} \tag{4}$$

1 It is possible to take into account both per use wear and obsolescence over time. Data limitations make this infeasible.

That is, the procedure level equipment cost is a fraction of annualized equipment cost, where the fraction is the total time required for procedure i ($m_i q_i$) divided by total time the equipment is used for all procedures. The per-procedure cost is arrived at by dividing by the procedure-specific annual volume $q_i$. This expression can be reduced to the following:

$$p_i = m_i \frac{C_0}{(T \sum m_j q_j)} \tag{5}$$

This expression shows that the equipment cost per procedure is equal to the minutes per procedure ($m_i$) times the cost per minute (total lifetime cost $C_0$ divided by the total lifetime minutes $T \sum m_j q_j$).

The maximum usage approach has the virtue of simplicity. However, the useful life approach has been adopted for two important reasons:

- First, the maximum use approach displays curious economic properties. Expressions (1) and (2) essentially treat equipment as a variable cost that is incurred each time the equipment is used. Average cost does not depend on volume, and thus there are no economies of scale. This is implausible. While it is true that the fee schedule requires a single price to be calculated, that price has an implicit choice of efficiency level, whether it is explicitly recognized or not. The useful life approach (as expressed in (3) and (4) above and elaborated on below) computes an average cost that is based on an explicit assumption about efficiency.

- Second, and most compelling, no information on total number of uses is available, whereas information on useful life is available[2]. Because of this, useful life appears to be the only alternative that can be supported by available data.

In one sense, the useful life approach does take into account more than just obsolescence. The source of useful life data ". . . represents a consensus among experienced representatives . . . based on a combination of average utilization, manufacturers guidelines, and/or anticipated technological factors affecting the useful lives of the asset."[3]

The discussion below assumes that the useful life approach is applied.

### *Choosing a Basis for Allocation*

Since a useful life approach results in a fixed capital cost for a given period, it requires that annual volume be part of the algorithm used to allocate the fixed cost to specific procedures. As is clear in (3) above, volume could be used to allocate cost, without taking into account the differences in time per procedure. However, this lacks the intuitive appeal of allocating a greater amount of per-procedure cost to services which require a longer use of the equipment, which occurs when both time per procedure and volumes for each procedure are taken into account, as in expression (4) above.

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2 *Estimated Useful Lives of Depreciable Hospital Assets*, Revised 1993 Edition, American Hospital Association.

3 *Ibid.*, p. vii.

An example will illustrate the limitations of using volume alone as the allocation factor. If two procedures with equal annual volumes are performed on a piece of equipment, and procedure A takes three times as long as procedure B, allocating according to time per procedure and volume results in a per-procedure equipment cost three times as high for A as for B. Allocating according to volume only would result in an equal cost for both procedures.

Rewriting (4) more generally: (6)

$$p_i=\frac{[a_i*\frac{C_o}{T}]}{q_i}$$

where $a_i = (m_iq_i/\sum m_jq_j)$ in expression (4). The factor $a_i$ in expression (4) allocates annual equipment cost ($C_0/T$) to procedure i based on the fraction of total equipment time used by procedure i. This fraction reflects the volume of procedures performed on the equipment and the time per procedure for i. Expression (3), in which volume alone is used to allocate cost, is equivalent to expression (5) where $a_i$ is equal to 1 for all i.

*Maintenance Costs*. In the design of the practice expense study, maintenance costs for clinical equipment were included in the definition clinical equipment costs.[4] Thus, these costs need to be treated as part of direct equipment costs for the determination of service-specific costs. Expression (4) above can be modified to incorporate maintenance costs (note that the term $a_i$ is expanded):

$$p_i=\frac{m_iq_i}{(\sum m_jq_j)}*[\frac{C_o}{Tq_i}+\frac{c_t}{q_i}] \qquad (7)$$

where $c_t$ is the annual maintenance cost for the equipment in year t, and $Tc_t$ is the lifetime maintenance cost.

Similarly, expression (5) can be modified as:

$$p_i=m_i[\frac{C_0}{(T\ \sum m_jq_j)}+\frac{c_t}{\sum m_jq_j}] \qquad (8)$$

Summing over all procedures will recover total equipment and maintenance costs.

***Interest Expense/Opportunity Cost***

The formulation shown in expression (8) ignores a significant element of practice expense for equipment: the opportunity cost of the capital invested in the equipment. This can be seen clearly if the three major options for financing a piece of capital equipment are considered:

4 See the *Report on the Survey of Practice Costs*, April 30, 1997.

- *Loan*. If a practice borrows the money for the purchase of equipment, it must pay the interest expense on the loan. This is a legitimate practice expense that would be shown on the income statement of a practice.

- *Lease*. If a practice leases equipment, the lease payments reflect the purchase price of the equipment, and the interest expense for the capital purchase of the equipment. The full lease payment (including the interest) is a legitimate practice expense.

- *Purchase*. If the physician purchases the equipment outright, then the physician loses the income that he/she could have earned on the capital if it had been invested in, for example, in U.S. Treasury Bills or mutual funds. This opportunity cost is no different than the interest on a loan or lease payment. All three represent the cost (more precisely, the price) required to obtain the capital to finance the equipment.

There is a relatively simple modification to expression (8) that can be made to allow for the interest expense, which can be arrived at via a derivation using the basic principles of corporate finance. As noted in previous research for HCFA[5], a price that reflects interest/opportunity cost can be computed if the net present value of an investment in the technology is set equal to zero and the expression is solved for p:

$$NPV=-C_o+\sum_{t=o}^{T}[\frac{p_tq_t-c_t}{(1+r)^t}]=0$$

where r = the interest rate or opportunity cost of capital. If p, q, and $C_t$ are time invariant, then this can be simplified as follows:

$$NPV=-C_o+(pq-c)\Sigma[\frac{1}{(1+r)^t}]$$

Since NPV is constrained to equal zero:

$$C_o=(pq-c)\Sigma[\frac{1}{(1+r)^t}]$$

Letting R stand for the summation term and rearranging:

$$p=\frac{C_o}{qR}+\frac{c}{q}$$

Generalizing this to the case of multiple procedures for a piece of equipment, and using the same allocation approach as above:

$$p_i=\frac{m_iq_i}{(\sum m_jq_j)}*[\frac{C_o}{q_iR}+\frac{c}{q_i}] \tag{9}$$

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5 Pauly, M.V. and Highland, J.P., "Diagnostic Tests, Technical Component: Provider Volume Patterns," DHHS #99-C-99169/5-02, October 31, 1990.

This can also be expressed in a form similar to (8) as:

$$p_i = m_i\left[\frac{C_0}{(R\ \sum m_j q_j)} + \frac{c_t}{\sum m_j q_j}\right] \tag{10}$$

Note that this expression is exactly the same as the expression that did not consider the opportunity cost (8, above), except that "R" replaces "T". That is, expression (10) shows that one can use exactly the same calculation, except that the useful life of the equipment is, in effect, discounted to reflect the opportunity cost of capital.

***Machine-Volume Relationship***

A fundamental issue that must be faced in implementing the foregoing is the lack of data relating volume to specific pieces of equipment. Even if a good sample of practice-specific service mix and cost data were available, the number of each type of machine that a practice owns would not be known. There is no known extant data source that can provide information on this relationship. This constraint has significant implications for this method of computing equipment costs, since it requires an assumption of both a maximum production per machine, and of a percentage of that maximum production at which the machine operates. In the following, it is assumed that:

- Practices operate a fixed number of hours per week (e.g,. 50)
- Machines operate at a fixed percentage of capacity, that is, they are in use a fixed percentage of the practice's hours (assumed here to be 70%).

Applying these assumptions means that there are a fixed number of minutes per week, per year, and per equipment lifetime that a machine is assumed to be in use. Reviewing expression (10) in light of this shows that the term $\sum m_j q_j$, is fixed so that the cost per procedure depends only the minutes per procedure:

$$p_i = m_i\left[\frac{C_0}{(R\ \sum m_j q_j)} + \frac{c_t}{\sum m_j q_j}\right] \tag{10}$$

To reflect this constraint, $M = \sum m_j q_j$ can be defined when the capacity assumptions apply, so that (10) can be re-written:

$$p_i = m_i\left[\frac{C_0}{MR} + \frac{c_t}{M}\right] \tag{11}$$

That is, both the lifetime cost and the lifetime available time have been fixed, producing a constant cost per minute. This means that, given the useful life, purchase price, and maintenance costs for a piece of equipment, the per service cost for any one service depends only on the minutes of time required for that service. This point is critical:

> *Service volume data is not useful for the calculation of per-service equipment costs without practice-level data on the number and type of machines.*

Such data are not available. Thus, the computation for equipment prices that was implemented to produce the direct cost estimates for the project is based on the approach captured in expression (11), which assumes a fixed number of total lifetime operating minutes occurring during the useful life of the equipment.

Expression (11) can be re-expressed as:

$$p_i = m_i \left[ \frac{\frac{C_0}{R} + c_t}{M} \right] \tag{12}$$

Put into words, this is can be expressed in a simplified way as:

$$\frac{Cost}{Procedure} = \frac{Minutes}{Procedure} \cdot \frac{Cost}{Minutes}$$

***Multiple Equipment Items***

To arrive at the final formula used to compute equipment prices, one additional issue also needs to be considered. Some services require more than one piece of equipment. Expression (11) defines the per-service equipment costs for the case of one piece of equipment per service. Generalizing (11) to allow for the possibility of multiple pieces of equipment per service:

$$p_i = \sum_j \left[ m_{ij} \left[ \frac{C_{0j}}{MR_j} + \frac{c_{tj}}{M} \right] \right] \tag{12}$$

where the j subscript indexes the pieces of equipment used for each service i. This simply takes the per-service cost from expression (11) for each piece of equipment used to deliver the service, and adds them together to get the total per-service equipment cost.

The foregoing describes the reasoning why, given the constraints imposed by a fee schedule that pays a single price for a single service, and the available data, expression (12) was used to compute service level equipment costs. In particular, recognizing the true economic opportunity cost of capital is important, and failing to do so would exclude loan interest payments and other similar costs from the practice expense measurement.

Modifying the simplified "in words" expression above to account for multiple equipment items, and making it somewhat more precise for each service i and equipment j:

$$Equipment\ Cost_i = \sum_j \left[ \frac{Minutes_{ij}}{Procedure_i} \cdot \frac{Annualized\ Equipment\ Cost_j}{Annual\ Machine\ Minutes_j} \right] \tag{13}$$

The discussion in Section 6.3.5 will decompose the elements of this expression into their fundamental forms, and describe how the components are contained in the equipment data files.

### 6.3.2 Example

A numeric example will illustrate the method displayed in expression (10). The example below assumes the following:

- Practices operate 50 hours per week
- Machines operate at 70% of capacity (i.e., the machine is in use 70% of the time the machine is in use)
- The cost of capital (i.e., interest cost of a loan) is a function of the amount and duration of the loan (see discussion below for more details)
- Maintenance costs are 5% of purchase price annually

Assume that there are three pieces of equipment, E1, E2, and E3, as shown in Exhibit 6-1.

**Exhibit 6-1: Price and Useful Life Data**

| Equipment | Purchase Price | Useful Life | Interest Rate | Annual Maint. |
|---|---|---|---|---|
| E1 | $10,000 | 12 years | 11.0% | $500 |
| E2 | $25,000 | 8 years | 11.0% | $1250 |
| E3 | $500,000 | 5 years | 9.5% | $25,000 |

From these data, the cost per minute can be calculated. For equipment E1, $R = \Sigma[1/(1.11)^{12}] = 6.492$. Under the assumptions used in this example, $M = 60$ minutes per hour $\times$ 50 hours per week $\times$ 70%$\times$ 50 weeks per year = 105,000 minutes per year of available equipment time, and $c_t = \$500$.

The equipment mapping data from the CPEPs are also available, as displayed in Exhibit 6-2.

**Exhibit 6-2: Input Matrix from CPEPs**

| | E1 | E2 | E3 |
|---|---|---|---|
| P1 | X | | X |
| P2 | X | | |
| P3 | X | | |
| P4 | | X | |
| P5 | | X | X |

For those services which use equipment, the performance of a service has been linked to the time of the staff type associated with the service (e.g., the radiology tech for x-ray services), where the time period is the procedure period in most cases (CPEP Worksheets G1, P1, or M1; see Chapter 3 for definitions of

these worksheets) [6]. Applying this information to Exhibit 6-2 produces equipment times for each service for each piece of equipment, as shown in Exhibit 6-3:

**Exhibit 6-3: Time Required for Each Service from CPEP Labor**

| | E1 | E2 | E3 |
|---|---|---|---|
| **P1** | 7 | | 240 |
| **P2** | 15 | | |
| **P3** | 8 | | |
| **P4** | | 30 | |
| **P5** | | 15 | 90 |

From these data, equipment prices can be calculated. The minutes per service for P1 is 7, thus using formula (11):

$m_i$ = 7
$C_0$ = \$10,000
$c_t$ = \$500
M =105,000

Therefore,

$p_i$ = \$0.136

Exhibit 6-4 below shows the prices calculated for each equipment-service combination, and the total calculated per-service equipment cost for each service.

**Exhibit 6-4: Computed Per Service Cost**

| | E1 | E2 | E3 | Total Service |
|---|---|---|---|---|
| **P1** | \$0.136 | | \$354.784 | \$354.920 |
| **P2** | \$0.291 | | | \$0.291 |
| **P3** | \$0.155 | | | \$0.155 |
| **P4** | | \$1.745 | | \$1.745 |
| **P5** | | \$0.873 | \$133.044 | \$133.917 |

The price calculated in each row of the "Total Service" column corresponds to expression (12) above. That is, it represents the per-service equipment cost for service P1. Under the assumptions that are

6 See section 6.3.3 for a more detailed discussion of equipment times.

imposed in the absence of machine-volume data, these same prices will be calculated regardless of any assumptions about the service mix of the practice.

These prices will recover the total equipment and maintenance costs. Under the assumptions of this example, any mix of services which meets the 70% capacity constraint will produce these same prices. For equipment E1 (and the other pieces as well), the total annual minutes available is 105,000 minutes as shown above. The annual capitalized cost for the equipment is $2,040.27, which is the annual maintenance of $500, plus the annualized purchase price, taking into account the opportunity cost of capital ($10,000 divided by the "R" defined above, which is 6.492). Exhibit6-5 shows that the calculated prices recover the annualized capital equipment purchase and maintenance.

**Exhibit 6-5: Annual Total Equipment Volumes and Costs for E1**

| Service | Minutes | Price | Volume | Minutes x Volume | Price x Volume |
|---|---|---|---|---|---|
| P1 | 7 | $0.136 | 834 | 5838 | $113.44 |
| P2 | 15 | $0.291 | 1694 | 25,410 | $493.75 |
| P3 | 8 | $0.155 | 9219 | 73,752 | $1,433.09 |
| TOTAL | | | | 105,000 | $2,040.27 |

This would be true for any service mix of the three services that produces a total time of 105,000 at the specified per service times.

### 6.3.3 Sources of Data

In Chapter 5.0 the collection of equipment purchase price data was discussed. In Section 6.3.1 the methodology used to compute service-specific equipment costs was derived, and in 6.3.2 a hypothetical example to illustrate the method was developed. As these preceding sections make clear, a number of data elements beyond equipment purchase price are necessary to calculate service-specific equipment costs. In this section we describe the data sources for the variables used to calculate the service-specific equipment costs

Information about the type of equipment used to provide each service was obtained from the CPEPs. The CPEPs were instructed to identify clinical equipment items, where equipment was defined as a reusable item with a purchase price greater than $500. Several of the data elements were initially identified for collection during the CPEP process (hours per week used, weeks per year used, total annual services, annual maintenance costs), but were dropped when it was determined in the first round of CPEPs that the panelists were not able to provide estimates of the typical values for these items.

*Equipment-to-Service Mapping*

In the example above, Exhibit 6-2 displayed a hypothetical equipment matrix. This matrix simply showed which pieces of equipment are required for the performance of each service and, conversely, which services are performed on each piece of equipment. The data for the actual mapping of equipment to services was obtained, for each of the services in the project scope, during the CPEP meetings. For each service, the panels were asked to identify which pieces of equipment were required to perform the service (see Chapter 4.0, for a discussion of the CPEP panel process). The equipment pricing algorithm described in Section 6.3.1 was used to estimate allocated, service-specific costs for each equipment item associated with a service by the CPEPs.

Two types of equipment were distinguished: service-specific equipment and overhead equipment.

- *Service-specific equipment* is defined as equipment used for a specific sub-set of services within a specialty (e.g., a stress-test treadmill for a cardiology practice), as defined by the CPEPs during the profiling of each individual service.

- *Overhead equipment* is defined as equipment which is used for all services provided, or, which is difficult or impossible to attribute to specific services. For example, an exam table may be used for all services in some practices and a crash cart must be available for all patients in the event that it may be needed, even though many practices will never have occasion to use it. These items were identified at the conclusion of each CPEP meeting. In some cases, equipment was reclassified from service-specific to overhead (see below).

Each service-specific equipment item was mapped to and had its costs allocated to the set of codes which were identified by the CPEP as requiring the equipment. The mapping for overhead equipment was generally made to each code in the CPEP that profiled the overhead equipment. For example, an exam chair was an overhead equipment item in the CPEP 9, Otolaryngology. This rule worked well when the various specialty and/or sub-specialty practices represented on a CPEP used the same overhead equipment items. This was true in all CPEPs except CPEP 1, which had representatives from podiatry, dermatology, and physical therapy practices, among others. These practices use different overhead equipment items. Fortunately, the services that each type of practice provides were grouped into specific family groupings, which made it straightforward to allocate the overhead items identified by each practice type to a specific sub-set of families within CPEP 1. In effect, there were smaller "sub-CPEPs" embedded within the CPEP1 grouping of families. The equipment items in question were treated as overhead rather than service-specific equipment because they met the same criteria for overhead equipment applied to the other CPEPs (see second bullet above). Since some of the overhead items were in all of the sub-groupings (exam table, crash cart), they were allocated to all the services in CPEP 1.

Different equipment time rules were also used for overhead equipment and service-specific equipment. This is discussed below under "Equipment Times."

In some cases a group of related services require the use of a general equipment type common to the group, but the specific equipment features required varied from one service to the next. For example, many ultrasound services can be performed on a "plain vanilla" ultrasound machine, while certain specialized services are typically performed using machines with color doppler capabilities. In situations

of this type, the specialized equipment is mapped only to those services which require its specific features. Services that can be provided using more basic equipment were linked to the more basic equipment.

The equipment-to-service mapping generated by the CPEPs were modified in a small number of cases in one of three ways:

- *Items costing less than $500.* These were dropped from the equipment list. The CPEPs were instructed to include in their equipment definition only those items costing more than $500. Subsequent pricing by Abt Associates (see discussion under next heading) determined that some items did not meet the threshold. Only items with prices over $500 were included in the calculations of practice expenses on a code-specific basis; items costing less than $500 (e.g., a stethoscope) are captured in estimates of overhead expenses to be allocated in separate analysis carried out by HCFA.

- *Overhead vs. Service-Specific Equipment.* In a few cases, service-specific equipment was reclassified as overhead equipment, when it became clear after a review of the data that an item was used for virtually all of the services covered by the CPEP.

- *Clinical equipment used in non-office settings.* In some cases, the CPEPs profiled use of clinical equipment in non-office settings, either because it was deemed typical for the physician to bring equipment to non-office settings, or because the it was typical for the practice to pay for equipment in the non-office setting [7]. Most of the clinical equipment identified by the CPEPs was equipment located in the office of a physician practice, and was identified as a required input for the in-office profile. In all cases where equipment was used in a non-office setting, the equipment is not included in the resource profile and cost estimates contained in the primary CPEP-specific data files. The equipment and its mapping to services is contained in the auxiliary file OUTEQCAP, discussed in more detail in Chapter 7.0. These items are not currently includable in the practice expense component of the Medicare Fee Schedule.

The situations in which costs were not included for equipment taken out of the office are shown in Exhibit 6-6.

***Interest Rates***

The equipment costing algorithm requires the specification of an interest rate or, more precisely, "cost of capital." This is a rate which ideally reflects the true, risk-adjusted opportunity cost of the investment in the clinical equipment. One would like to have a nationally representative sample of data containing loan rates and length of loan for physician practices. Apparently, no such data exist.

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7 This should not be confused with cases where the code was costed as "out-of-office" but equipment was used in the post-operative office visits. In those cases, equipment costs were included.

**Exhibit 6-6**

**Codes Contained in OUTEQCAP**

| CPEP | Equipment | Codes |
|---|---|---|
| 5- Ophthalmology | designed for vision loupe | 65270, 67830, 67840, 67850, 67875, 67880, 67914, 67921, 67930, 68115, 68400, 68420, 68820, 68825, 67801, 67805, 67923, 67935, 68340, 68510, 68525, 68530, 68770, 68830, 67916 |
| | minor instrument pack | 67710, 67715, 67825, 67922, 68100, 68110, 68135, 68440, 68705 |
| | cataract tray | 65280, 65400, 65426, 65850, 65865, 65870, 65875, 65880, 65920, 65930, 66150, 65155, 66160, 66165, 66170, 66172, 66185, 66250, 66635, 66680, 66740, 66830, 68362 |
| | diamond knife, cataract tray | 65235, 66983, 66984, 66985, 66986 |
| | diamond knife, pachometer | 65775 |
| 7 - Evaluation and Management | pentium computer | 90900, 90902, 90904, 90906, 90908, 90910, 90911, 90915 |
| | developmental testing instrument - average | 95881, 99178 |
| | neurobehavioral status instrument - average | 95882, 95883 |
| 9 - Otolaryngology | soft tissue tray | 30000, 30020 |
| | septoplasty tray | 30125,30430, 31020, 31030, 31032 and all codes in F912 performed out of office |
| | surgical loupe | 30000, 30020, 30310, 30430, 30930, 31020, 31030, 31002, 31032 and all codes in F 932 and 936 performed out of office |
| | mastoid tray | All codes in F 920 performed out of office |

**Exhibit 6-6**

**Codes Contained in OUTEQCAP**

| CPEP | Equipment | Codes |
|---|---|---|
| 12 - Cardiothoracic and Vascular | surgical loupes | All codes in CPEP performed out of office, except F 704, 724, 728 |
| | heart/lung machine | All codes in CPEP performed out of office, except F 704,724,708, 812, 816, 1060 |
| 14 - Anesthesia/Pathology | anesthesia machine | All anesthsia codes beginning with zero performed out of office, and code 36620 |
| | doppler | 00210, 00216, 00218, 00350, 00562, 00604 |
| | cardiac output SO2 monitor | 00500, 00540, 00544, 00546, 00548, 00560, 00562, 00580, 00770, 00792, 00794, 00796, 00866, 00868 |
| | transesophogeal echo probe (TEE) | 00560, 00562, 00580, 00770 |

Proxy data was developed based on prevailing loan rates for small businesses. Information was obtained from the Small Business Administration, and from a number of national and regional lending institutions. From these sources we gathered information on the usual rate charged to small businesses. These rates were expressed as a margin over the prime rate, and were all similar in structure and rate level. Lenders vary the rate according to the length of loan and amount financed. Exhibit 6-7 displays the four interest rates identified and used in our analysis.

**Exhibit 6-7**

**Interest Rate Data**

| | Loan Period < 7 Years | Loan Period ≥ 7 years |
|---|---|---|
| Amount ≥ $25,000 | 9.5% | 10.0% |
| Amount < $25,000 | 10.5% | 11.0% |

*Sources:* Prevailing prime rate from the *Wall Street Journal*, December 12, 1996. Margins over prime obtained from the Small Business Administration, and national and regional lending institutions.

In the application of this data to the equipment algorithm, equipment was categorized into one of these four categories based on the purchase price and useful life of the equipment. Thus, equipment with a useful life less than 7 years costing more than $25,000 was assigned an interest rate of 9.5%.

As with other loans, large loans paid back over short time frames receive the best interest rates, and small loans over long time frames pay higher interest rates. It may be that physician practices are lower risk than the average small business, although the lending institutions we contacted indicated that they would not have a different rate for a medical practice. This approach equates useful life with loan duration, and equipment purchase price with loan amount. While this is not likely to be the typical structure of the loan agreement, estimation of the full opportunity cost is accomplished by using the useful life and full purchase price (see the discussion in 6.3.1), and in any case equipment costs are not sensitive to small variations in these factors.

### *Useful Life*

Useful life data for clinical equipment was obtained from data published by the American Hospital Association[8]. These data "represent a consensus among experienced representatives of leading appraisal companies, hospitals and hospital construction firms, and suppliers familiar with the various assets." There does not appear to be a similar source of published information specific to medical offices. However, the AHA data were developed ". . . based on a combination of average utilization, manufacturers' guidelines, and/or anticipated technological factors affecting the useful life of the asset." Presumably only the average utilization aspect of these considerations would differ between hospitals and

8 *Estimated Useful Lives of Depreciable Hospital Assets*, American Hospital Publishing, Inc., 1993.

physician practices. On average, it is likely that physician offices have lower volumes per machine than hospitals. If useful lives are understated due to the lower utilization in physician offices, the effect would be to overstate the estimates of per-service equipment cost. However, large practices are likely to use machines at a volume level more comparable to hospital levels. Small practices, then, may be the most likely to "benefit" from the use of hospital useful lives. However, due to the inherent averaging of the Medicare Fee Schedule, the lower machine volumes produced by small practices (e.g., an EKG machine in a solo internist's office) make them more likely to be below the average utilization level, and thus above the average cost computed with the equipment algorithm. The relative degree of these two factors in small practices is unknown, but the lower cost stemming from long useful lives will to some degree offset the higher cost stemming from low volume levels.

*Maintenance*

Maintenance contracts for equipment are typically priced on an annual basis as a percentage of the purchase price for the equipment. The published sources from which we obtained many of the equipment prices does not contain pricing information for services contracts. Based on previous research, it was assumed that the average annual maintenance percentage is 5% of the purchase price.[9]

*Equipment Times*

The equipment pricing algorithm described in Section 6.3.1 results in an assignment of equipment cost to services that can be summarized as "cost per minute times number of minutes." Thus the relative relationship of the minutes of equipment usage across services will be directly proportional to the relative relationship of equipment cost estimated across those services. Explicit equipment use times could not be collected during the CPEP meetings due to the time constraints inherent in developing detailed profiles for an average of over 400 services per CPEP. However, the CPEPs did collect detailed staff time data, and it is this data that is the basis for the allocation of equipment costs to services.

The use of staff time estimates to approximate equipment use times required the development of default rules which could be used to apply specific periods of staff time to the equipment use times. The default rule chosen for service-specific equipment was the largest staff time estimate from the "G1" or procedure period (see Chapter 3 for a discussion of worksheet periods and their definitions). For example, if an x-ray required 3 minutes of a medical assistant and 12 minutes of a radiology technician during the procedure period (that is, not including pre- and post- service activities), the equipment use time for the x-ray room would be 12 minutes. The default rule was used for the majority of services requiring equipment.

There were, however, many services for which the default rule was not appropriate. For example, a service might be personally performed by the physician, in which case the physician intra-period times that are the basis for the Medicare Fee Schedule physician work data were used. Or, it may have been that two staff of the same type were present for the entire service. In this case, the time of only one of the staff was used. The data for all services were reviewed to assess the appropriateness of the default rule, and to establish a basis for and time values for the exceptions. Either through the default rule or the

9 Pauly, M.V., et.al., "Methods for Pricing the Technical Component of Diagnostic Tests," Leonard Davis Institute of Health Economics, University of Pennsylvania, HCFA Cooperative Agreement No. 99-C-99169/5-01.

exception process, time data from the CPEP process were used to define equipment times for all services identified by the CPEPs as requiring equipment for their performance. These time estimates were then used to generate the service-specific equipment cost estimates.

A different staff time rule was used to allocate overhead clinical equipment. It is assumed to be in use, in effect, for all services at all times. As a result, the rule used took the largest staff time from each period during which a patient is physically in the physician's office (as opposed to at an out-of-office site such as a hospital). Time for the procedure period for out-of-office services were not included, while time for post-operative visit services in the office were included. This approach treats overhead clinical equipment in a way that assumes it is in use at all times, thus, the equipment costs are spread across more services, but more thinly due to the different utilization percentage assumed (see discussion directly below).

*Capacity/Total Utilization Level*

As described in Section 6.3.1, the average volume performed on each type of equipment is not known. The methodology developed draws on several assumptions which together define a total number of possible machine minutes per year. The available minutes are defined by:

$$(Minutes\ per\ Year) = (Weeks\ per\ Year)\cdot(Hours\ per\ Week)\cdot(Minutes\ per\ Hour)$$

It is a given that there are 60 minutes in an hour, and it was assumed that practices are open 50 weeks per year, and 50 hours per week, which results in 150,000 minutes per year of potential machine use.

An assumption regarding the "utilization percentage" for the machine was developed in consultation with HCFA. For service-specific equipment this percentage was assumed to be 70%, so that machines were assumed to be in use for 105,000 of the available 150,000 minutes per year. This assumption is not empirically based due to the previously described lack of data relating machines to machine volumes. As it is, it can be thought of as a normative efficiency standard. Regardless of the level of the standard, if it were to be implemented in policy, its implication would be that equipment utilized at a level below the standard would receive (in a relative sense) less than its costs for the equipment, while equipment used at a rate higher than the standard would be rewarded with a price higher than its average cost. This is always true when a fixed, regulated per-service price is set for a technology with increasing returns to scale. The specific level of the standard will change the proportion of practices operating above and below their average cost per service.

For clinical overhead equipment, the utilization percentage was assumed to be 100%, which produces a lower per service cost than lower utilization assumptions would produce. In effect, clinical overhead equipment is "in use all of the time," so it is allocated across the larger number of services it is associated with in the equipment to procedure mapping described above.

### 6.3.4 Sensitivity of Results to Specific Factors

It is important to address the issue of the sensitivity of the equipment cost allocation to changes in the various parameters that drive the results. A quick inspection of expression (13) above makes clear the functional relationship between cost and the parameters. Specifically, the dependence of cost on the determinants of the total yearly machine use minutes (weeks per year, hours per week, utilization percentage) is a simple inverse relationship. Holding all other factors constant, if any of these parameters were doubled (thereby doubling the effective number of useful minutes available in a year), the calculated cost would be halved, since the same annual cost is being allocated over twice as many minutes. Conversely, if any of these parameters were halved, the calculated cost would double.

So, for example, had it been assumed that the service-specific usage rate was 100% rather than 70%—which amounts to increasing the utilization percentage by a factor of 10/7, or 1.43—all the calculated service-specific costs would have been 7/10, or 70%, of their present value. As a general rule, given a cost based on a particular utilization percentage $USAGE_0$, the corresponding cost using a different utilization percentage $USAGE_1$ will always be the original cost times $USAGE_0/USAGE_1$.

To illustrate this example concretely, consider the terminology in Exhibit 6-8, and data presented in Exhibits 6-9 and 6-10 below. Exhibit 6-9 lists the service-specific equipment for the CPEP 2 costing of service 50557 using a utilization percentage of 70%. Exhibit 6-10 presents the same information, computed instead using a utilization percentage of 50%. It will be noted that each cost value in Exhibit 6-10 is 0.7/0.5=1.4 times the corresponding cost in Exhibit 6-9. Notice that this also applies to the service totals shown in these figures: to two decimals, 1.4×\$8.18 = \$11.45.

The situation is analogous with weeks per year and hours per week: if the full 52 weeks per year had been assumed rather than 50 (i.e., an increase by a factor of 52/50, or 1.04), all calculated service-specific costs would have been 50/52, or 96%, of their present values.

Variations in the maintenance rate can best be described as increasing or decreasing the annual cost by a fixed amount. The purchase price times the maintenance percentage represents the total annual maintenance cost, which is already annualized.

Sensitivity of cost to the interest rate is a more complicated case. Because it occurs in the cost equation in a non-linear term, it is difficult to distill analytically the dependence. However, an empirical analysis does provide useful insight. Exhibit 6-11 illustrates the *scaling effect* on allocated cost that would result for different interest rates, assuming a constant 5% maintenance rate. Note that there are different lines for different useful lives (the figure includes lines for lives of 3 to 10 years). The vertical axis represents the *cost scaling factor*.

For the purpose of an example, consider the top line in the graph, which corresponds to a useful life of 3 years. At 5% interest rate, it has a value of about 0.42; at 10%, its value has increased to about 0.46. This means that, with all other assumptions held constant, if the allocated cost with an interest rate (INTRATE) of 5% were \$0.42, the corresponding cost with an interest rate (INTRATE) of 10% would be \$0.46. Or, restated, the cost at INTRATE=10% would be 0.46/0.42 = 1.1 times whatever the cost was at INTRATE=5%. The analogous values for the 10-year line (0.17 and 0.22) indicate that, for equipment with 10 years of life, the cost at INTRATE=10% would be 0.22/0.17 = 1.29 times whatever the cost was at INTRATE=5%. As one would intuitively expect, the proportional impact on cost of an increased interest rate increases with useful life.

## Exhibit 6-8

## Procedure-Specific Clinical Equipment Profile Variable Names

| | |
|---|---|
| PROCCODE: | The HCFA Common Procedure Coding System (HCPCS) Code for the specified service. |
| IN: | For the specified service, this variable indicates whether the service was profiled for the "in-office" location. |
| OUT: | For the specified service, this variable indicates whether the service was profiled for the "out-office" location. |
| EQTI: | The estimated total number of minutes that the equipment was assumed to be used for the service when provided in the in-office setting. |
| EQTO: | The estimated total number of minutes that the equipment was assumed to be used for the service when provided in the out-of-office setting. |
| PXEQ_I: | The allocated cost, in dollars, of all service-specific equipment assigned by the CPEP with the provision of this service in the office. |
| PXEQ_O: | The allocated cost, in dollars, of all service-specific equipment assigned by the CPEP with the provision of this service out of the office. |
| CODE: | Alphanumeric code for a unique type of equipment, as assigned by Abt Associates Inc. |
| DESC: | Description of the clinical equipment $500 or more. |
| LIFE: | The estimated useful life of the equipment, in years. |
| PRICE: | The purchase price of the equipment. |
| CPEP: | The Clinical Practice Expert Panel (abbreviated CPEP) that provided the estimates for the associated service. |
| USAGE: | The proportion of the time the equipment is used by practice staff. |
| HRSWK: | Hours per week for which the office is assumed to be open. |
| WKSYR: | The number of weeks per year that the office is assumed to be in operation. |
| INTRATE: | The interest rate used to calculate the annualized opportunity cost (CAPFRAC) of the item of equipment. |
| MAINT: | The amount of, as a proportion of the equipment purchase price (PRICE), which is assumed to be required to maintain the equipment in working condition. |
| MINS_YR: | The number of minutes per year that the equipment is assumed to be in use. |
| CAPFRAC: | Factor used to inflate the capital acquisition cost to reflect the cost of capital over time. |
| ANNFACT: | Factor to multiply by the equipment purchase price, PRICE, to obtain the total annualized cost of the equipment. This factor incorporates both the inflation of cost due to the cost of capital over time (e.g., loan interest payments) and the annual maintenance cost expressed as a percentage of acquisition cost. |
| COST_MIN: | The estimated cost per minute of use of the equipment for the service. |

## Exhibit 6-9

**Sample Equipment Listing, *USAGE* = 50%**

| PROCCODE | IN | OUT | EQTI | EQTO | PXEQ_I | PXEQ_O | CODE | DESC | LIFE | PRICE | CPEP | USAGE | HRSWK | WKSYR | INTRATE | MAINT | MINS_YR | CAPFRAC | ANNFACT | COST_M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50557 | Y | Y | 190 | | $8.25 | $0.00 | E13117 | cystoscope, flexible | 3 | $7,760.00 | C 2 | 50.0% | 50 | 50 | 5.34% | 0.05 | 75,000 | 0.36955 | 0.41955 | $0.043 |
| 50557 | Y | Y | 190 | | $1.81 | $0.00 | E13122 | light source | 3 | $1,700.00 | C 2 | 50.0% | 50 | 50 | 5.34% | 0.05 | 75,000 | 0.36955 | 0.41955 | $0.009 |
| 50557 | Y | Y | 190 | | $0.70 | $0.00 | E30008 | electro-surgical device | 7 | $1,225.00 | C 2 | 50.0% | 50 | 50 | 5.34% | 0.05 | 75,000 | 0.17496 | 0.22496 | $0.003 |
| 50557 | Y | Y | 190 | | $0.70 | $0.00 | E30010 | liquid nitro tank w/Cryoc | 10 | $1,529.00 | C 2 | 50.0% | 50 | 50 | 5.34% | 0.05 | 75,000 | 0.13165 | 0.18165 | $0.003 |
| | | | | | $11.45 | $0.00 | | | | | | | | | | | | | | |

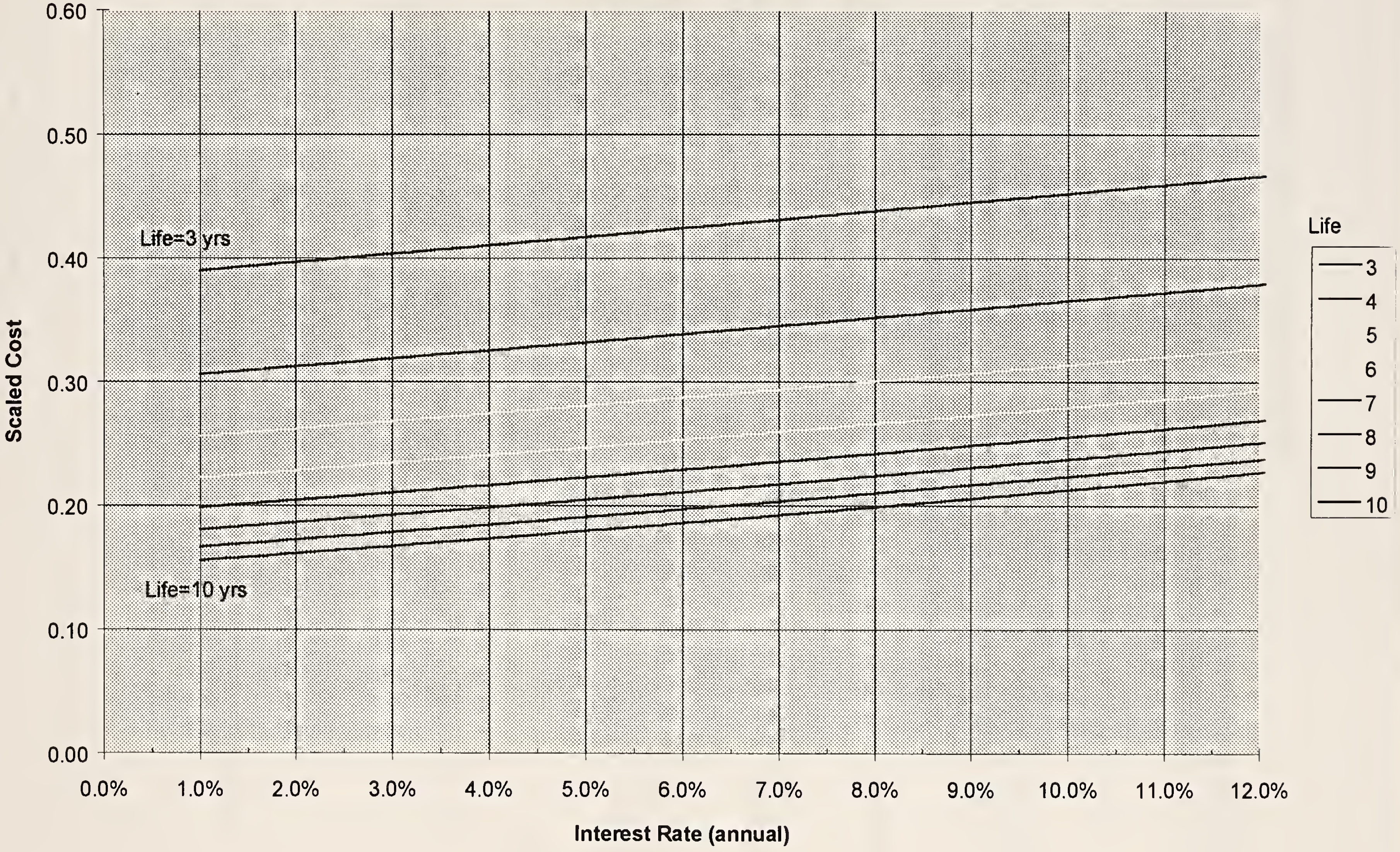
## Exhibit 6-10

**Sample Equipment Listing, *USAGE*=70%**

| PROCCODE | IN | OUT | EQTI | EQTO | PXEQ_I | PXEQ_O | CODE | DESC | LIFE | PRICE | CPEP | USAGE | HRSWK | WKSYR | INTRATE | MAINT | MINS_YR | CAPFRAC | ANNFACT | COST_M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50557 | Y | Y | 190 | | $5.89 | $0.00 | E13117 | cystoscope, flexible | 3 | $7,760.00 | C 2 | 70.0% | 50 | 50 | 5.34% | 0.05 | 105,000 | 0.36955 | 0.41955 | $0.031 |
| 50557 | Y | Y | 190 | | $1.29 | $0.00 | E13122 | light source | 3 | $1,700.00 | C 2 | 70.0% | 50 | 50 | 5.34% | 0.05 | 105,000 | 0.36955 | 0.41955 | $0.006 |
| 50557 | Y | Y | 190 | | $0.50 | $0.00 | E30008 | electro-surgical device | 7 | $1,225.00 | C 2 | 70.0% | 50 | 50 | 5.34% | 0.05 | 105,000 | 0.17496 | 0.22496 | $0.002 |
| 50557 | Y | Y | 190 | | $0.50 | $0.00 | E30010 | liquid nitro tank w/Cryoc | 10 | $1,529.00 | C 2 | 70.0% | 50 | 50 | 5.34% | 0.05 | 105,000 | 0.13165 | 0.18165 | $0.002 |
| | | | | | $8.18 | $0.00 | | | | | | | | | | | | | | |

Exhibit 6-11

**Scaling Effect of Assumed Interest Rate on Cost (by Useful Life)**
**Assumes Maintenance Rate (MAINT) = 5%**
**(For interest rates 1% to 12%)**



### 6.3.5 Detailed Description of Equipment Cost Files

The equipment costs contained in the CPEP data files were generated using the methodology described in this chapter. As noted, the implementation of this method differs between service-specific and overhead equipment in two ways:

- *Utilization rate.* Service-specific cost estimates assume a 70% utilization rate, while overhead equipment assumes a 100% utilization rate.

- *Time per service.* Service-specific equipment times are generated from estimates of the time the equipment is used (usually during the "G1," "P1," or "M1" period of the service for in-office settings)[10], whereas overhead equipment is assumed to be in use during the whole service time (for the periods in which the patient is physically in the office).

Two intermediate equipment capital cost data sets, PXEQCAP and OVEQCAP, document explicitly the allocation of service-specific and overhead capital equipment costs, respectively.[11]

This section describes in detail the data and the calculations that were used in computing the capital equipment cost allocations, and explains how they correspond to the values provided in the intermediate capital equipment data sets PXEQCAP and OVEQCAP.

The general approach used to allocate equipment cost to a particular service is to determine the *annual per-minute cost* of the equipment, estimate the *number of minutes* the equipment is used for that service, and then multiply those two numbers to yield the *per-service cost* for that particular service. To see this, recall expression (11) from Section 6.3.1:

$$p_i = m_i\left[\frac{C_0}{MR} + \frac{c_t}{M}\right] \tag{11}$$

Making this more precise, and reflecting those (relatively uncommon) situations in which one service uses multiple pieces of equipment for each service i and equipment j:

$$Equipment\ Cost_i = \sum_j \left[\frac{Minutes_{ij}}{Procedure_i} \cdot \frac{Annualized\ Equipment\ Cost_j}{Annual\ Machine\ Minutes_j}\right]$$

The following discussion will decompose the elements of this expression into their fundamental forms, and tie the forms to specific data elements in OVEQCAP and PXEQCAP.

10 See Chapter 3.0 for a discussion of the different worksheet types.

11 An overview and description of all the CPEP files is contained in Chapter 7.0. Detailed information on the files can be found in *CPEP Direct Practice Costs Database Documentation*, April 30, 1997.

*Determination of Minutes per Service: Variables EQTI, EQTO, and TEXCEP*

The value of $\frac{Minutes}{Proc}$ was determined systematically from the labor profile provided by the CPEP for the service. The following rules were used:

***Service-specific equipment***. For service-specific equipment allocation, times were based largely on default rules, with exceptions when the default did not accurately measure the equipment time required. The default time used for in-office equipment cost was the maximum staff-specific G1 in-office time. The default time for out-of-office was zero, based on the fact that the great majority of out-of-office services do not use equipment paid for by the practice. The default rule is best illustrated by example. Assume the following hypothetical detail staff time data for service 12345:

| CPEP | HCPCS | StafType | G0_I | G1_I | G1x_I | G0_O | G1_O | G1x_O |
|---|---|---|---|---|---|---|---|---|
| C 1 | 12345 | RN | 12 | 45 | 30 | 12 | 20 | 20 |
| C 1 | 12345 | PA | 0 | ***50*** | 10 | 0 | 0 | 0 |
| C 1 | 12345 | Tech | 0 | 15 | 0 | 0 | 0 | 0 |

The highlighted time value is the one that would be used by the default rule. In this case, the greatest in-office G1 time of 50 minutes belongs to the PA, so the in-office equipment time assumed would be 50 minutes. The basic premise of this rule is that the equipment in a room will be unavailable for other uses as long as the room is occupied, even if the equipment is not in use the entire time the room is occupied. The assumed out-of office time is zero.

The default rule was designed to determine a reasonable upper-bound estimate for the time the equipment was used. In some cases, however, the default times were not appropriate. These cases include, among others, situations in which the equipment was used in a separate room for only a specific portion of the intra-service time, or situations in which the equipment was explicitly used during the post-op visits (such cases often justify allocating equipment cost to the out-of-office setting as well). In such cases, exceptions were made, and the equipment usage times were instead specified explicitly. These cases are indicated by a value of "1" in the TEXCEP field of the service-specific intermediate capital data set (PXEQCAP). If the default rule was used to determine the time, TEXCEP has a value of "0".

The in-office and out-of-office service-specific usage times are contained in the PXEQCAP dataset in variables EQTI and EQTO, respectively.

***Overhead equipment***. For overhead equipment allocation, the time used for in-office was the sum of the maximum staff-specific G0 time, the maximum staff-specific G1 time, and the maximum staff-specific G1X time. The time used for out-of-office was the sum of the maximum staff-specific G0 time and the maximum staff-specific G1X time; G1X time is not considered because that portion of the service occurred out of the office. Again, these rules are best demonstrated through an example. Assume again the following **hypothetical** detail staff time data for service 12345:

| CPEP | PROCCODE | StafType | G0_I | G1_I | G1x_I | G0_O | G1_O | G1x_O |
|---|---|---|---|---|---|---|---|---|
| C 1 | 12345 | RN | ***12*** | 45 | ***30*** | ***12*** | 20 | ***20*** |
| C 1 | 12345 | PA | 0 | ***50*** | 10 | 0 | 0 | 0 |
| C 1 | 12345 | Tech | 0 | 15 | 0 | 0 | 0 | 0 |

The highlighted time values represent those that would be used by the rule.

In this example, the maximum staff-specific in-office G0, G1 and G1X times are 12, 50, and 30 minutes, corresponding to the RN, the PA, and the RN, respectively. (Note that these times do not necessarily correspond to the same staff type in each of the three procedure periods.) The in-office overhead equipment cost would therefore be allocated based on a time of 12+50+30 = 92 minutes. The corresponding maximum staff-specific out-of-office G0 and G1X times (recall that G1 time is not considered for the out-of-office overhead equipment allocation) are 12 and 20 minutes, both corresponding to the RN. The out-of-office overhead equipment cost would therefore be allocated based on a time of 12+20 = 32 minutes.

The rule illustrated was applied without exceptions.

***Determination of Cost per Minute: Variable COST_MIN***

To determine the value of:

$$\frac{\textit{Annual Cost}}{\textit{Minutes per Year}}$$

one needs the annualized cost of the equipment (the numerator) and the number of minutes assumed in a year of usage (the denominator). In the intermediate capital equipment data sets, the annual cost per minute for a piece of equipment is found in variable COST_MIN. The calculation of the components of this expression follows.

***Annual Cost: Variables CAPFRAC, ANNFACT, INTRATE, LIFE, PRICE, MAINT.*** The annual cost is based on the capital acquisition cost of the equipment, its useful life, and the assumed annual maintenance cost associated with its upkeep, which in keeping with standard maintenance contract arrangements we have expressed as a fixed percentage of the acquisition cost.

To put the total acquisition cost in annualized terms, one could simply divide the cost by the useful life. However, it is necessary to consider not just the actual capital outlay, but also the effects of time on its real value. Whether the capital is borrowed or paid up front, there is some time-associated cost, either in the form of interest on the loan, or in the form of lost opportunity for investment of the capital. This effect is modeled by computing the fixed annual payment which, at the assumed annual rate of return over the useful life of the equipment, and it would exactly match the future value of the capital as a conservative, fixed-income investment over the useful life of the equipment.

Interest rates typical of small-business loans have been assumed. The rates used were based on both the amount and duration (i.e., useful life) of the equipment being financed, following the assumptions that short-term loans and loans for large amounts will have a more favorable rates than long-term loans for small amounts. (A more detailed discussion of this issue can be found in Section 6.3.3.)

The annualized capital payment can be found using the expression

$$\frac{C_0}{\sum_{t=1}^{L} \frac{1}{(1+r)^t}}$$

For example, assume that $C_0$ (acquisition cost) is \$10,000, $L$ (useful life) is 5 years, and $r$ is 10.5%. Simply dividing cost by useful life yields an annual cost of \$2,000. However, applying the above formula yields an annualized capital cost is \$2,671.75. It can be shown that the future value of five annual investments of \$2,671.75 earning 10.5% is \$16,474.47, which is equivalent to the future value of a lump-sum investment of \$10,000 earning 10.5% over 5 years [(\$10,000) $(1.105)^5$=\$16,474.47]. The consideration of the "cost of capital" effect in this example therefore increases the actual annualized cost by \$671.75 over the simpler assumption of \$2,000.

The annual **maintenance cost** is expressed as a percentage of acquisition cost. Subject to refinement of the estimate, annual maintenance cost is assumed to be 5% of the acquisition cost, which are common terms of a maintenance contract. Since this is an expense that is paid out in each of the years in which it is incurred, no time-value adjustment needs to be made. Continuing with the previous example, the corresponding annual maintenance cost would be (0.05)(\$10,000) = \$500.

The total **annual cost** is the sum of the annualized capital cost and the annual maintenance cost, and can be expressed as

$$\frac{C_0}{\sum_{t=1}^{L} \frac{1}{(1+r)^t}} + C_0 \cdot (\textit{Maintenance Rate}) \ , \quad or \quad C_0 \cdot [\frac{1}{\sum_{t=1}^{L} \frac{1}{(1+r)^t}} + (\textit{Maintenance Rate})]$$

The summation term in the denominator can effectively be regarded as a *deflated useful life*, representing the number of years over which a simple annualization would yield the "correct" annual cost. (This term corresponds to $R$ in expression (11)).

Finally, it can be shown (e.g., by induction) that for any positive integer $L$, the summation $\sum_{t=1}^{L} \frac{1}{(1+r)^t}$ is equivalent to the simpler, algebraic expression $\frac{1 - \frac{1}{(1+r)^L}}{r}$ .

This observation presents the expression for the annualized cost in a more convenient form, without a series:

$$\frac{C_0}{\left(\frac{1-\frac{1}{(1+r)^L}}{r}\right)} + C_0 \cdot (Maintenance\ \ Rate)\ ,\quad or\quad C_0 \cdot \left[\frac{1}{\left(\frac{1-\frac{1}{(1+r)^L}}{r}\right)} + (Maintenance\ \ Rate)\right]$$

or, finally,

$$C_0 \cdot \left[\frac{r}{\left(1-\frac{1}{(1+r)^L}\right)} + (Maintenance\ \ Rate)\right]$$

In the intermediate capital equipment files, the value of the term

$$\frac{r}{1-\frac{1}{(1+r)^L}}$$

(which represents the fraction of the capital acquisition cost that is allocated to each year) is contained in variable CAPFRAC, while the value of the full quantity in square brackets in the preceding expression (the overall annualizing factor) is contained in variable ANNFACT.

In the intermediate capital equipment data sets, the interest rate $r$ is found in variable INTRATE, the useful life $L$ is found in variable LIFE, the capital acquisition cost $C_0$ is found in variable PRICE, and the maintenance rate is found in variable MAINT.

***Minutes per Year: Variables WKSYR, HRSWK, USAGE.*** To determine the number of minutes per year of usage, one simply needs to make certain assumptions about the hours of availability and the usage rate during those hours. In our allocations, we have calculated the number of useful minutes per year as follows:

$$(Minutes\ \ per\ \ Year) = (Weeks\ \ per\ \ Year) \cdot (Hours\ \ per\ \ Week) \cdot (Minutes\ \ per\ \ Hour) \cdot (Usage\ \ Rate)$$

In terms of the intermediate capital dataset variables, this would be expressed as

$$MINS\_YR = WKSYR \cdot HRSWK \cdot 60 \cdot USAGE$$

Note that the 60 minutes per hour is treated as an invariant constant and is not itself included as a variable in the data sets.

For **service-specific** equipment cost computations, the following values were assumed for these parameters:

WKSYR = 50
HRSWK = 50
USAGE = 0.7 (70%)

For **overhead** equipment cost computations, the following values were assumed for these parameters:

WKSYR = 50
HRSWK = 50
USAGE = 1.0 (100%)

All of the elements that contribute to the capital cost allocation calculation have now been covered. In the intermediate capital equipment data sets, one may notice that many of the variables retain a single value throughout the dataset. This is correct, as the same values were assumed for these parameters for all cases.

***Calculation of Costs for One Service and One Piece of Equipment: PXEQ_I and PXEQ_O.***

The final, allocated service-specfic equipment costs are contained in variables PXEQ_I and PXEQ_O. The in-office equipment cost PXEQ_I can be thought of as simply COST_MIN multiplied times EQTI, and PXEQ_O as COST_MIN multiplied times EQTO. A similar calculation is made for the overhead equipment variables. Expressing the computation of PXEQ_I with the full cost allocation formula, expressed in detail in terms of the variables in the intermediate capital equipment data sets, is as follows (this example uses the service-specific, in-office case):

$$PXEQ\_I = EQTI \cdot \left( \frac{1}{WKSYR \cdot HRSWK \cdot 60 \cdot USAGE} \right) \cdot PRICE \cdot \left( \frac{INTRATE}{1 - \frac{1}{(1+INTRATE)^{LIFE}}} + MAINT \right) \quad (13)$$

***Calculation of Total Equipment Costs on the PROCSUM File***

To determine the total service-specific equipment costs for one CPT code on the file containing direct cost estimates, PROCSUM,[12] (continuing with the in-office example), the PXEQ_I variable from the intermediate file is summed across all records for that CPT code in the PXEQCAP file. In other words, the costs associated with each of the service-specific pieces of equipment used to provide the service are summed to arrive at the PEQP_I variable on the PROCSUM file.

Similarly, to determine the total overhead equipment costs for one CPT code on the PROCSUM file (continuing with the in-office example), the PXEQ_I variable from the intermediate file is summed across all records for that CPT code in the OVEQCAP file. In other words, the costs associated with each of the pieces of overhead equipment are summed to arrive at the OVEQ_I variable on the PROCSUM file.

***Example Observation***

Exhibit 6-12 below presents example observations from PXEQCAP, OVEQCAP, and OUTEQCAP. (Although OUTEQCAP is an auxiliary, global file, its strong similarity to PXEQCAP and OUTEQCAP makes its discussion here appropriate.) The following discussions indicate how these observations should be interpreted, in the context of the methodology described above.

12 Chapter 7.0 contains a detailed description of the PROCSUM file and other CPEP datafiles.

## Exhibit 6-12: Capital Equipment Sample Observations

### Procedure-Specific Clinical Equipment
### *(PXEQCAP)*

| CPEP | PROCCODE | EQP_CODE | DESC | PRICE | LIFE | INTRATE | CAPFRAC | ANNFACT | COST_MIN | IN | OUT | EQTI | PXEQ_I | EQTO | PXEQ_O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C 7 | 29700 | E30022 | cast cutter | 1295.00 | 7.0 | 0.105 | 0.20880 | 0.25880 | .003192 | Y | Y | 25 | 0.08 | 0 | 0 |

### Overhead Clinical Equipment
### *(OVEQCAP)*

| CPEP | PROCCODE | EQP_CODE | DESC | PRICE | LIFE | INTRATE | CAPFRAC | ANNFACT | COST_MIN | IN | OUT | EQTI | OVEQ_I | EQTO | OVEQ_O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C 7 | 29065 | E11001 | exam table | 1360.00 | 15 | 0.110 | 0.13907 | 0.18907 | .001714 | Y | Y | 50 | 0.086 | 0 | 0 |
| | | E91002 | crash cart , no defibrilator | 1135.81 | 5 | 0.105 | 0.26718 | 0.31718 | .002402 | Y | Y | 50 | 0.120 | 0 | 0 |

### Out-of-Office Clinical Equipment
### *(OUTEQCAP)*[a]

| CPEP | PROCCODE | EQP_CODE | DESC | PRICE | LIFE | INTRATE | CAPFRAC | ANNFACT | COST_MIN | IN | OUT | EQTI | PXEQ_I | EQTO | PXEQ_C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C 5 | 65155 | E72007 | Cataract Tray | 11261.33 | 4.0 | 0.105 | 0.31889 | 0.36889 | 0.03956 | N | Y | . | . | 110 | 4.352 |

[a] Not included in the total costs in PROCSUM.

*PXEQCAP*: The sample observation from PXEQCAP represents the service-specific equipment detail for the CPEP 7 (C 7) profile of service 29700.

The panel specified that a single type of procedure-specific equipment was used—a cast cutter (DESC), which has equipment code E30022 (EQP_CODE). The price of this piece of equipment is $1,295.00 (PRICE), and it has a useful life of 7.0 years (LIFE). The interest rate (INTRATE) used in the cost allocation was 0.105 (i.e., 10.5%), and the computed allocation parameters CAPFRAC and ANNFACT had values of 0.20880 and 0.25880, respectively. The allocated per-minute usage cost (COST_MIN) was computed to be $0.003192. The panel profiled this service in both the in-office and the out-of-office settings (IN=Y, OUT=Y). The equipment usage time assumed for the in-office setting (EQTI) was 25 minutes, which results in an in-office allocated usage cost (PXEQ_I) of $0.08. The equipment usage time assumed for the out-of-office setting (EQTO) was 0 minutes, which results in an out-of-office allocated usage cost (PXEQ_O) of $0.00.

*OVEQCAP*. The sample observation from OVEQCAP represents the overhead equipment details for the CPEP 7 (C 7) profile of service 29065. There are two observations, corresponding to the two different types of overhead equipment that were specified in the profile.

The first observation corresponds to an exam table (DESC), which has an equipment code (EQP_CODE) of E11001. The price of this piece of equipment is $1,360.00 (PRICE), and it has a useful life of 15 years (LIFE). The interest rate (INTRATE) used in the cost allocation was 0.110 (i.e., 11.0%), and the computed allocation parameters CAPFRAC and ANNFACT had values of 0.13907 and 0.18907, respectively. The allocated per-minute usage cost (COST_MIN) was computed to be $0.001714. The panel profiled this service in both the in-office and the out-of-office settings (IN=Y, OUT=Y). The equipment usage time assumed for the in-office setting (EQTI) was 50 minutes, which results in an in-office allocated usage cost (OVEQ_I) of $0.086. The equipment usage time assumed for the out-of-office setting (EQTO) was 0 minutes, which results in an out-of-office allocated usage cost (OVEQ_O) of $0.00.

*OUTEQCAP*. The sample observation from OUTEQCAP represents the out-of-office, auxiliary equipment detail for the CPEP 5 (C 5) profile of service 65155 (a different service is used in this example because only a small subset of all services have equipment in this category). The panel specified that a single type of equipment was occasionally taken along to the out-of-office setting—a Cataract Tray (DESC), which has equipment code E72007 (EQP_CODE). The price of this item is $11,261.33 (PRICE), and it has a useful life of 4 years (LIFE). The interest rate (INTRATE) used in the cost allocation was 0.105 (i.e., 10.5%), and the computed allocation parameters CAPFRAC and ANNFACT had values of 0.31889 and 0.36889, respectively. The allocated per-minute usage cost (COST_MIN) was computed to be $0.003192. The panel profiled this service in only the out-of-office settings (IN=N, OUT=Y). The equipment usage time assumed for the out-of-office setting (EQTO) was 110 minutes, which results in an out-of-office allocated usage cost (PXEQ_O) of $4.352. Since the panel did not profile this service for the in-office setting, both the in-office equipment usage time (EQTI) and the in-office allocated usage cost (PXEQ_I) have missing values (indicated by ".").

To include the costs for this category of equipment in the total service costs, the values of PXEQ_I and PXEQ_O would be added to the current values of the same variables in the PROCSUM file for the corresponding observation (CPEP=C 5, PROCCODE=65155). The TOTEQPI, TOTEQPO, TOT_I and

TOT_O variables on that observation in PROCSUM would then need to recomputed to reflect this additional equipment cost.

## 6.4 Total Direct Cost Estimates

The preceding three sections described the methods used for calculating service-specific labor, supply, and equipment costs. To arrive at total direct costs, these three components must be added up. The individual cost components, the total direct costs, and various direct cost sub-totals, are presented in the file PROCSUM[13].

The PROCSUM file contains the direct costs implied by the CPEP profiles for all services that were profiled. The costs are provided separately by resource category (labor, supplies, equipment) and site of service (in-office vs. out-of-office), as well as in more aggregated form by site of service. Exhibit 6-13 below presents a single sample observation from PROCSUM.

The following discussion describes how direct costs were calculated by indicating how this PROCSUM observation should be interpreted.

This record represents direct cost estimates based on the CPEP 7 (C 7) profiles for HCPCS service 29065. The service was profiled by the CPEP as part of service family 392 (variable FAM), and the service was not a reference service (ISREF=0). Zero (0) post-operative office visits (POVIS) were assumed in the panel's profile. The CPEP profiled the service in both the in-office and out-of-office settings (IN=Y, OUT=Y).

The total direct costs (i.e., labor, supplies and equipment) for each site of service are contained in the following variables:

| | | |
|---|---|---|
| TOT_I | ($54.846) | The total direct costs for the *in-office* setting |
| TOT_O | ($6.167) | The total direct costs for the *out-of-office* setting |

Other variables provide a more detailed breakdown of these values by resource category, as discussed below. As would be expected, the total direct cost for each site of service is equal to the sum of the appropriate component costs.

### 6.4.1 Labor Costs

Six different variables contain information about the labor costs, at two different levels of aggregation.

13 This file and all of the CPEP data files are described in Chapter 7.0.

## Exhibit 6-13: Example Observation of Total Costs (PROCSUM)

| CPEP | PROCCODE | FAM | ISREF | POVIS | IN | OUT | TOTLABCI | TOTLABAI | TOTLABI | SUPP_I | PXEQ_I | OVEQ_I | TOTEQPI | TOT_I | TOTLABCO | TOTLABAO | TOTLABO | SUPP_O | PXEQ_O | OVEQ_O | TOTEQPO | TOT_O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C 7 | 29065 | 392 | 0 | 0 | Y | Y | 19.450 | 5.000 | 24.450 | 30.190 | 0.00 | 0.206 | 0.206 | 54.846 | 1.167 | 5.000 | 6.167 | 0.000 | 0 | 0 | 0 | 6.167 |

The lowest level of aggregation indicates total labor costs by site of service (in-office vs. out-of-office) and labor category (clinical vs. administrative). There are four possible combinations of these values, and therefore four variables, as follows:

| | | |
|---|---|---|
| TOTLABCI | ($19.450) | The total costs for *clinical* labor for the *in-office* setting |
| TOTLABAI | ($5.000) | The total costs for *administrative* labor for the *in-office* setting |
| TOTLABCO | ($1.167) | The total costs for *clinical* labor for the *out-of-office* setting |
| TOTLABAO | ($5.000) | The total costs for *administrative* labor for the *out-of-office* setting |

The higher level of aggregation represents total labor costs by site of service (in-office vs. out-of-office). There are two possible sites of service, and therefore two variables:

| | | |
|---|---|---|
| TOTLABI | ($24.450) | The total costs for *all* labor (clinical and administrative) for the *in-office* setting |
| TOTLABO | ($6.167) | The total costs for *all* labor (clinical and administrative) for the *out-of-office* setting |

It should be noted that the latter two values are simply the sums of the corresponding elements among the former four values.

### 6.4.2 Supply Costs

Supply costs are provided as total supply costs by site of service. There are therefore two variables, corresponding to the two possible sites of service, as follows:

| | | |
|---|---|---|
| SUPP_I | ($30.190) | The total costs for all supplies used in the *in-office* setting |
| SUPP_O | ($0.000) | The total costs for all supplies used in the *out-of-office* setting |

### 6.4.3 Equipment Costs

Equipment costs are contained in six variables corresponding to two levels of aggregation.

The lowest level of aggregation indicates equipment costs by equipment category (service-specific vs. overhead) and site of service (in-office vs. out-of-office). There are four possible combinations of these values, and therefore four variables:

| | | |
|---|---|---|
| PXEQ_I | ($0.00) | The total *service-specific* equipment costs for the *in-office* setting |
| PXEQ_O | ($0) | The total *service-specific* equipment costs for the *out-of-office* setting |
| OVEQ_I | ($0.206) | The total *overhead* equipment costs for the *in-office* setting |

| | | |
|---|---|---|
| OVEQ_O | ($0) | The total *overhead* equipment costs for the *out-of-office* setting |

The next level of aggregation represents total equipment costs (i.e., service-specific and overhead) by site of service, in the following two variables:

| | | |
|---|---|---|
| TOTEQPI | ($0.206) | The total equipment costs for the *in-office* setting |
| TOTEQPO | ($0) | The total equipment costs for the *out-of-office* setting |

It should be noted that the latter two values are simply the sums of the corresponding elements among the former four values.

# 7.0 CPEP Database Documentation

This chapter provides technical information on the CPEP Direct Practice Cost Database ("CPEP Database"), derived from the estimates by the CPEPs. The database contains estimates of service-specific labor, equipment and supply resources ("resource profiles") developed by CPEPs, as well as direct practice costs computed from these profiles, for each of 6,251 Medicare Fee Schedule services for 1995.

Complete documentation of the CPEP data includes the *User's Guide for the CPEP Direct Practice Costs Data Base*[1] and two related documents:

- *Data Dictionaries*[2] for each of the database files, containing file overviews, record layouts, and codebooks and

- *CPEP Recorders' Notes*[3], containing information which provides context for the data in the CPEP database files. Such information could not be reflected *per se* in the data, and is intended to support subsequent review of the data.

Careful review of all three of these documents is critical to understanding the data files, as well as for performing any analysis or adjustments to the data.

## 7.1 CPEP Data Files

The calculation of total direct practice costs requires the user to combine data from all of the primary CPEP files. Exhibit 7-1 relates the files and file types to data flows required to calculate costs.

- Labor staff types must be matched against the staff types in the wage data, so that staff-specific time profiles can be converted into cost profiles. The costs for each staff type can then be summed to get the total labor direct cost for a service.

- Supply types must be matched against the supply price data, so that supply items can be converted into supply costs. The costs for each supply item used to provide a service can then be multiplied by the quantity of supply required, and the results can be summed to get the total supply direct cost for a service.

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1 *User's Guide for the CPEP Direct Practice Costs Data Base*, Abt Associates Inc., April 30, 1997.

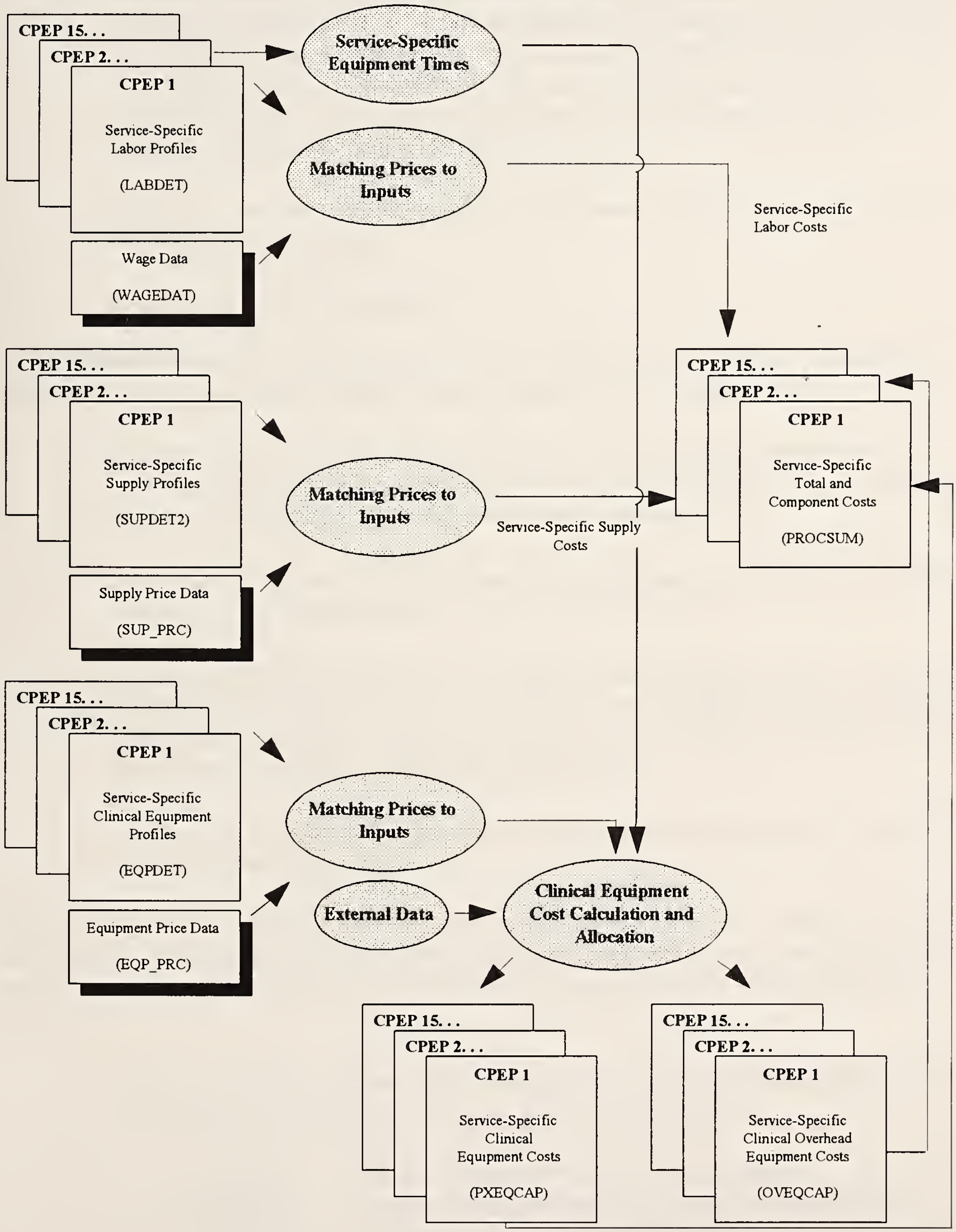
2 *CPEP Direct Practice Costs Database Documentation*, Abt Associates Inc., April 30, 1997.

3 *CPEP Recorders' Notes*, Abt Associates Inc., April 30, 1997.

**Exhibit 7-1**

**CPEP Direct Practice Costs Database File Relationships**

**(Primary Files Only)**



- Equipment types must be matched against the equipment price data, and then the equipment costing algorithm developed by Abt (which requires labor as well as equipment data) must be run to generate the service-specific equipment cost estimates. The algorithm allocates a per-minute machine cost to services based on the number of minutes of labor for the relevant staff type. The default rule used in this assignment was the longest clinical staff time in the G1 period. Exceptions were made in cases for which the default rule was not appropriate (e.g., if the service was performed by the physician without clinical staff support). After computing equipment costs in this way, the costs for each equipment item can then be summed to get the total equipment direct cost for a service.

- For each service, the total labor, supply, and equipment costs must be summed to determine the total direct practice costs.

### 7.1.1 Overview of the CPEP Database

The CPEP data files are the product of the processes described in Chapters 2 through 6, and consist of four types of files related to direct practice expenses for each of the services included in this project:

- *Resource profiles.* The resource profile files contain the CPEPs' estimates of input quantities required to provide each service. Three types of resource profiles are available: labor minutes, supply item quantities, and required equipment usage.

- *Input prices.* The input price files contain data on wage rates, supply prices, and equipment prices. Data were compiled from a variety of sources (see below).

- *Service-specific direct practice costs.* The service-specific direct practice cost files contain the direct practice costs of each service (resulting from the application of prices to the resource profiles for labor, supplies and equipment). For equipment, useful life and other data collected outside the CPEP process were also used.

- *Auxiliary files.* Auxiliary files are available which document various aspects of the CPEP data development process.

The resource profile files and the service-level direct cost files are *CPEP-specific*. There are 15 files for each CPEP-specific file type, one for each CPEP. The input price files are *global*, with one file only for each file type. These files are summarized below, and the primary files are depicted graphically in Exhibit 7-1.

- *Primary Global files.* Primary global files represent *master* files that are applicable to all CPT-4 codes across all CPEPs. There are three primary global files:

  — WAGEDAT: Provides wage information for each staff type
  — SUP_PRC: Provides pricing information on each type of supply item
  — EQP_PRC: Provides pricing information on each type of equipment item

  There are also two auxiliary global files:

— EXPSITES: For all CPT-4 codes addressed by the project, the settings in which each service was expected to be profiled, based on Medicare administrative data

— OUTEQCAP: For those CPEPs indicating use of equipment paid for by the practice in non-office settings, this file contains information about these equipment items. This file has the same format as PXEQCAP (see below).

- *Primary CPEP-specific detail files*: These files represent *CPEP-specific* detailed files regarding the labor, supply, and equipment resources required in the direct provision of each CPT-4 code assigned to the CPEP. In all, there are six files per CPEP:

— LABDET: Details the labor resource estimates and per-minute wage rates

— SUPDET2: Details the supply item and quantity resource estimates

— EQPDET: Details the service-specific equipment items required to provide each service (data for overhead types of equipment are contained in the OVEQCAP file, below)

— PXEQCAP: Details the factors used in allocating service-specific clinical equipment costs to each service using the equipment

— OVEQCAP: Details the factors in allocating clinical overhead equipment costs to all services in the entire CPEP[4]

— PROCSUM: Contains the estimated service-specific direct costs (labor, supplies and equipment) for each CPT-4 code by site of service (in- and out-office).

There is one auxiliary CPEP-specific file, SERVPT. Each of these files is summarized below. The Data Dictionary[5] contains file- and variable-specific details, including file record layouts, sort order details, and codebooks for variables in each file.

### 7.1.2 Global Files

Five global files apply to *all* CPEPs; as such, there is a single version of each file (in contrast to the fifteen versions of each of the CPEP-specific files). Three of the five files (WAGEDAT, SUP_PRC, and EQP_PRC) are master files used in the direct calculation of the total service cost estimates. Exhibit 7.2 summarizes key information about each global file. A brief description of each file follows.

4 The one exception to the allocation occurs for CPEP 1, in which clinical overhead equipment is allocated to specific families that pertain to only one of the several specialty areas in the CPEP (e.g., physical therapy). See Chapter 6.0 for further details.

5 See the *CPEP Direct Practice Costs Database Documentation*, Abt Associates Inc., April 30, 1997.

**Exhibit 7-2: Global Files**

| *Filename* | *Unit of Observation* | *Number of Observations* | *Number of Variables* | *Brief Description* |
|---|---|---|---|---|
| WAGEDAT | Staff type | 207 | 3 | Wage information for each staff type |
| SUP_PRC | Supply Item Code | 630 | 6 | Pricing information for each supply item |
| EQP_PRC | Equipment Item Code | 334 | 5 | Pricing information for each equipment item |
| EXPSITES | CPT-4 Code | 6251 | 6 | Expected sites of service to be profiled for each CPT-4 code |
| OUTEQCAP | CPT-4 Code-Equipment Code | 1689 | 22 | Equipment cost information for out-of-office equipment |

***Primary Global Files***

*WAGEDAT*

This file contains the total compensation rates (including fringe) and descriptions for staff types reported by each CPEP. National wage data were obtained from the Bureau of Labor Statistics and other sources, as discussed extensively in Chapter 5.0. The file contains one record for each staff type that appears in the labor detail datasets (LABDET.T01 - LABDET.T15).

*SUP_PRC*

This file contains the prices, units and sources of price information for disposable supply items identified by the CPEP members as required for the direct provision of each service. Supply prices were collected from a variety of sources, including catalogs, manufacturers' representatives, and individual CPEP members, as discussed in Chapter 5.0. The file contains one record for each supply item that appears in the supply detail files (SUPDET2.T01 - SUPDET2.T15).

*EQP_PRC*

This file contains the price, useful life and source of price information for each piece of clinical equipment (service-specific and overhead) reported by CPEP members. The collection of equipment price data was discussed in Chapter 5.0. Equipment prices were collected from a variety of sources, including catalogs, manufacturer's representatives, and individual CPEP members. (Note that the CPEP database defines equipment as items with acquisition costs of $500 or more.) Each record represents an equipment item. Each equipment item has been assigned a unique identification code. The file contains one record for each equipment item that appears in the equipment detail datasets (EQPDET.T01 - EQPDET.T15, PXEQCAP.T01 - PXEQCAP.T15, and OVEQCAP.T01 - OVEQCAP.T15., and OUTEQCAP).

***Auxiliary Global Files***

*EXPSITES*

This file contains code-specific information on the percentage of services performed in the office and the percentage of services performed out-of-the office. The file is based on 1994 Physician and Supplier Procedure Summary Master File data. This information provided guidance to the panels regarding the expected site(s) in which to profile the service. A given service was recommended for profiling if it was performed 10 percent or more of the time in a given setting. CPEP panels, however, overrode this guideline based on their clinical judgment and practice experience regarding the site-of-service, and in some cases either did not profile a service in a setting suggested by the data, or profiled the service in a setting not suggested by the data.

*OUTEQCAP*

This file contains data pertaining to service-specific equipment costs, in those cases where the CPEPs indicated that they pay for equipment used in the procedure period in the out-office settings. This file contains records for all such cases, for all of the CPEPs in which they occurred. The costs detailed in this file are *not* included in the costs summarized in the PROCSUM file since these costs are not includable under the practice expense component of the MFS. The file contains data elements and computed variables generated by the methodology used to allocate service-specific clinical equipment costs to a single service. Each record represents a unique CPT-4 code/equipment item. Only services having such equipment are included in the file.

### 7.1.3 CPEP-Specific Files

Each CPEP has six detail files identifying the specific resource estimates for each service assigned to the CPEPs. Exhibit 7-3 summarizes key information about each of the six types of files. Each type of file is sorted by CPT-4 code (PROCCODE), with a secondary sort dependent on the file. Each of the CPEP-specific detail files contains at least one record for each CPT-4 code assigned to the CPEP (regardless of whether any data could be collected on the code).

***Primary CPEP-Specific Files***

As described in Chapters 3 and 4, many services were assigned to more than one CPEP. As a result, each CPEP-specific file contains some services that can also be found in other CPEP-specific files. Records without data were retained in each file based on the assignment made before the CPEP meetings, regardless of whether the CPEP actually profiled the service.

*LABDET*

This type of file contains the detailed labor inputs, indicating the labor time required for each type of staff. Each record represents a unique CPT-4 code/staff type combination (i.e., there can be multiple records for a given CPT-4 code, but each record represents a different staff type for that CPT-4 code).

**Exhibit 7-3: CPEP-Specific Detail File Types**

| *Filename* | *Unit of Observation* | *Number of Variables* | *Brief Description* |
|---|---|---|---|
| LABDET.*Tnn* | CPT-4 Code - Staff Type | 19 | Detailed labor resource estimates by staff type for each CPT-4 code |
| SUPDET2.*Tnn* | CPT-4 Code - Supply Code | 11 | Detailed supply estimates for each CPT-4 Code, with cost information added |
| EQPDET.*Tnn* | CPT-4 Code - Equipment Code | 4 | Detailed service-specific equipment estimates for each CPT-4 code |
| PXEQCAP.*Tnn* | CPT-4 Code - Equipment Code | 22 | Detailed service-specific equipment estimates for each CPT-4 code, with cost information on individual equipment as well as capital calculations |
| OVEQCAP.*Tnn* | CPT-4 Code - Equipment Code | 21 | Detailed overhead equipment estimates for each CPT-4 code with cost information on individual equipment as well as capital calculations |
| PROCSUM.*Tnn* | CPT-4 Code | 36 | Service-specific master costs with labor, equipment and supply profiles incorporated for each CPT-4 Code |

*n* = (.T01 - .T15). For example, the 15 LABDET files are uniquely named LABDET.T01, LABDET.T02,...LABDET.T15.

The labor estimates are expressed in minutes. This type of file includes the labor times for clinical and administrative activities for CPEP service periods (G0, G1, G1X, G2, G2X) for each unique type of staff involved in the provision of a given service.[6] Each record includes separate labor estimates for the in- and out-of-office settings. The per-minute total compensation rate (RATE) has been added to the record (from the WAGEDAT file).

SUPDET2

This type of file contains details for each of the disposable supply items identified by the CPEPs as required to provide each service. Each record represents a unique CPT-4 code/supply item combination (i.e., there can be multiple records for a given CPT-4 code, but each record represents a different supply item for that CPT-4 code). Each record includes the type of supply item, as well as information required to determine the total costs for the supply item (e.g., quantity, price per unit). The quantities and costs for each supply item reflect the total required across the CPEP service periods (i.e., pre-service period + procedure period + post-service period). The SUPDET2 file for a given CPEP has at least one observation for every service code that was assigned to the CPEP, whether or not it was ultimately profiled by the CPEP.

6 See Chapter 3.0 for definitions of the CPEP service periods.

*EQPDET*

This type of file details each clinical equipment item identified by the CPEPs as required to provide each service, (overhead clinical equipment items are contained in the OVEQCAP files.)[7] The files include equipment with a purchase price of $500 or more; items identified by the CPEPs that were subsequently priced at less than $500 are not included in the data files. Each record represents a unique CPT-4 code/equipment item (i.e., there may be multiple records for a given CPT-4 code, but each record represents a different equipment item for that CPT-4 code). The EQPDET file for a given CPEP has at least one observation for every service code that was assigned to the CPEP, whether or not it was ultimately profiled by the CPEP.

*PXEQCAP*

This type of file represents a set of data pertaining to service-specific equipment costs. It contains data elements and computed variables generated by the methodology used to allocate service-specific clinical equipment costs to a single service. The files include equipment with a purchase price of $500 or more; items identified by the CPEPs that were subsequently priced at less than $500 are not included in the data files.[8] Each record represents a unique CPT-4 code/equipment item (i.e., there may be multiple records for a given CPT-4 code, but each record represents a different equipment item for that CPT-4 code).

In addition to all of the variables in EQPDET, PXEQCAP includes the data, calculation factors and intermediate values for components of formulas necessary to estimate the following:

- The total equipment cost over the life of the equipment;
- The annualized cost of the equipment, including maintenance and financing costs;
- The cost per minute for using the machine; and
- The equipment cost for the specific service.

Variables reflecting assumptions related to the total hours of operation of the equipment, loan interest rates, maintenance costs, and the percent of equipment capacity are included, as are data on purchase price and useful life. As discussed in detail in Chapter 6.0, the equipment costing algorithm allocates a per-minute machine cost to services based on the number of minutes of labor for the relevant staff type. The default rule used in this assignment was the longest clinical staff time in the G1 period. Exceptions were made in cases for which the default rule was not appropriate (e.g., if the service was performed by the physician without clinical staff support), as indicated by the TEXCEP variable. The PXEQCAP file for a given CPEP has at least one observation for every service code that was assigned to the CPEP, whether or not it was ultimately profiled by the CPEP.

7 Chapter 6.0 explains in detail the difference between service-specific and overhead clinical equipment.

8 Some re-usable items costing less than $500 are part of "trays" of related items used at the same time, which in aggregate cost more than $500. These were included in the capital file (PXEQCAP).

*OVEQCAP*

This type of file represents a set of data pertaining to overhead equipment costs (see Chapter 6.0 for a detailed discussion). The files contain data elements and computed variables generated by the methodology used to allocate clinical overhead equipment costs to specific services. (Items identified by the CPEP as service-specific equipment are contained in the PXEQCAP files.) The files include equipment with a purchase price of $500 or more; items identified by the CPEPs that were subsequently priced at less than $500 are not included in the data files. Each record represents a unique CPT-4 code/equipment item (i.e., there may be multiple records for a given CPT-4 code, but each record represents a different equipment item for that CPT-4 code).

The calculation of overhead equipment cost at the service level uses the same algorithm used to generate the PXEQCAP file. It is different only in that it assumes equipment is 100% utilized, and it allocates equipment time based on labor times for all service periods during which the patient is physically present in the office. The files include variables analogous to those in PXEQCAP, except that they lack the TEXCEP indicator, since there are no exceptions to the overhead allocation rule. (Note that there is no analog of EQPDET for overhead equipment; the OVEQCAP files represent the sole source of overhead equipment data.) Specifically, these files include the data, calculation factors and values for components of formulas necessary to estimate the following:

- The total equipment cost over the life of the equipment;
- The annualized cost of the equipment, including maintenance and financing costs;
- The cost per minute for using the machine; and
- The equipment cost for the specific service.

Variables reflecting assumptions related to the total hours of operation of the equipment, loan interest rates, maintenance costs, and the percent of equipment capacity are included, as are data on purchase price and useful life. The OVEQCAP file for a given CPEP has at least one observation for every service code that was assigned to the CPEP, whether or not it was ultimately profiled by the CPEP.

*PROCSUM*

This type of file contains the estimated service-specific direct costs (labor, supplies and equipment) for each CPT-4 code by site of service (in- and out-of-office). The unit of observation is the CPEP-specific CPT-4 code. There is exactly one observation for each service the CPEP was asked to profile; this observation contains profile data for both sites of service. Services that were assigned to but not profiled by the CPEP have values of "N" (not profiled) for both the IN and OUT site of service indicator variables.

This type of file includes the components of the total direct costs, including: total labor costs, total clinical staff costs, total administrative staff costs, total disposable clinical supply costs, total clinical equipment costs, total service-specific clinical equipment costs, and total overhead clinical equipment costs, as well as detailed information on the separate clinical and administrative labor costs within each of the CPEP service periods (G0, G1, G1X, G2, and G2X).

All of the cost (labor, supply, equipment) values in PROCSUM were arrived at by aggregating the respective detail files to the level of the linking key (i.e., CPEP-PROCCODE) and incorporating these results into the single corresponding record on PROCSUM. Total direct cost for each service was computed by calculating and summing costs across: all staff types for both clinical and administrative functions (derived from data in LABDET and WAGEDAT); all supply items (derived from data in SUPDET2 and SUP_PRC); and all equipment items, including service-specific and clinical equipment overhead costs (derived from data in EQPDET, PXEQCAP, OVEQCAP, and EQP_PRC). The primary cost variables (i.e., CG0_I, CG1_I, CG1X_I etc. for labor; SUPP_I for supplies; and PXEQ_I and OVEQ_I for equipment) were computed by aggregating the in- and out-of-office costs in the various detail files by CPEP-PROCCODE. The secondary cost variables on PROCSUM (e.g., TOTLABCI, TOTLABAI, TOTEQPI, TOTLABI, TOT_I) were computed by summing the appropriate primary and/or secondary cost variables.

In addition to containing the aggregated direct cost results from the detail files, PROCSUM also serves as a CPEP-specific service-level master dataset for the service profiles. Among the relevant information contained in PROCSUM are variables indicating:

- which site(s) of service were profiled by the CPEP (IN and OUT);
- whether the service was a reference service (ISREF);
- the Medicare global period status code from the 1995 MFS (GLOBAL);
- whether (as occurred in a small number of cases) some of the CPEP's time estimates were edited after the CPEP meetings (TIMEDEL);[9] and
- the number of post-operative office visits (POVIS) that the panel assumed in profiling the service.

Some of these indicators (notably the IN and OUT variables) are duplicated on some of the detail datasets, but in other cases they can be determined from other variables in the record. The IN and OUT variables are useful indicators of which sites were profiled and which records could be expected from the detail data. For example, variables referring to the in-office setting will be blank when IN = "N." When working with detail files that do not contain these indicators, the variables itemized above should be incorporated into the analysis to ensure that data are considered in a proper context. The PROCSUM file for a given CPEP has at least one observation for every service code that was assigned to the CPEP, whether or not it was ultimately profiled by the CPEP.

9 For example, a CPEP may have inadvertently applied a formula to generate insurance billing staff time to add-on codes (global status code = "ZZZ") that already have billing time counted in a related code.

*Auxiliary CPEP-specific File*

*SERVPT*

This file is a log of the data entry options used during the second round CPEP meetings. For the second round of CPEP meetings, Abt developed a PC-based data entry tool to enable the CPEP recorders to perform real-time entry of CPEP estimates developed during the meetings. The tool facilitated fast, accurate data entry of information that would be needed to later develop the final time estimates for the 6,000+ HCPCS/CPT-4 codes profiled during the panel meetings. Data collected by the data entry tool were used in a series of processing steps which culminated in the production of the detailed labor estimates contained in the Labor Detail (LABDET) file. A small subset of items from the data entry tool tables were also extracted and copied to the CPEP Data Entry Log Extract file, which contains a record of the type of data entry option chosen for each code profiled. It is not possible to interpret a relationship between the method chosen to data enter the time estimates and the reasoning process used by the CPEPs. As a result, no conclusions about the underlying logic used by the CPEPs should be drawn from the data contained in the SERVPT file. The file contains information reflecting the method of data entry chosen; it does not convey any information about why a particular set of values were copied or why particular CPT-4 codes were chosen to serve as the basis for adjustments.

*CPEP Recorders' Notes*

The *CPEP Recorders' Notes* contains information providing context for the data in the CPEP database files. Such information could not be reflected *per se* in the data. *This document is a cornerstone for obtaining a complete understanding of the data files.* Because of the need for the databases to support various analyses planned by HCFA in its process of developing practice expense relative values, the Notes files were created to assist users in understanding the data.

The notes are specific to each CPEP and are structured in three categories:

- *CPEP-level notes* describe specific conventions or formulae adopted by the CPEP. For example, the notes may indicate that a CPEP used the number of post-operative visits in a formula to generate staff times for post-surgical office visits for all of its 90 day global codes.

- *Family-level notes* provide similar information that applies only to that specific family of services.

- *Service-specific notes* provide a variety of explanatory information. For example:

  — Notes are present if the data in the data files may seem inconsistent or inaccurate when taken at face value. For example, notes are present when a panel provided an estimate that is in conflict with the global period status code contained in the Medicare Fee Schedule (such as treating a 90 day global service as a ZZZ code).

— Notes are also present when there was uncertainty about the includability of a resource in the practice experience component of the MFS.

## 7.2 Technical User Notes

### 7.2.1 Using the Data Files

*File Relationships and Linkages*

Exhibit 7-4 contains a graphical representation of the linkages needed among the various types of CPEP-specific and global files in order to develop summary/aggregate values. In most cases, the variable CPEP is only needed as a linking variable if data have been combined across CPEPs; it is not necessary if files for only one of the CPEPs are to be linked. The exception to this is the OUTEQCAP file, which requires both CPEP and PROCCODE for all links.

In Exhibit 7-4, arrows with two points ( ↠ ) represent a one-to-many relationship. The variables listed alongside the connecting line represent the variable(s) that define the link. For example, for every CPEP-PROCCODE combination in PROCSUM, there can be multiple (i.e., one or more) records occurring in LABDET with the same CPEP-PROCCODE combination. These multiple records would be distinguished by the different values of the STAFTYPE field, which is the italicized variable indicated in parentheses next to each detail file. Note that the existence of a one-to-many relationship does not *require* that there be multiple detail records, but indicates that there *may* be multiple detail records. In fact, there may well be only a single detail record. However, there will always be at least one detail record for any CPEP-PROCCODE combination occurring in PROCSUM. The exception to this is the arrow with a dashed line, which indicates that there may be zero or more detail records (this occurs only with the file OUTEQCAP).

Arrows with a single point ( → ) represent a one-to-one relationship. The variables listed alongside the connecting line indicate the variable(s) that define the link. For example, for every record in LABDET, there exists exactly one record in WAGEDAT with a matching value of STAFTYPE. Unlike the one-to-many relationships, the "linked-to" files (e.g., WAGEDAT) essentially represent "lookup" files.

*Assignments of Services to Multiple CPEPs: Linking Across CPEP-Specific Datasets*

Of the 6,251 CPT-4 services within the scope of this study, over 1,000 were assigned to be profiled by more than one CPEP. It is important to bear this in mind when working with the datasets, and to not overlook the CPEP variable in any linkages across the physically distinct CPEP-specific datasets.

The CPEP-specific datasets are physically distinct datasets. However, certain analyses might require the concatenation of data from two or more CPEPs. To avoid possible errors in linking, PROCCODE and CPEP records should be uniquely defined by the combination of both CPEP and PROCCODE (though when working with one CPEP at a time, omitting the CPEP variable will not alter the results).

*Variables Appearing on More Than One File*

Users are cautioned that links such as those illustrated in Exhibit 7-4 would need to be re-applied should any of the data in the global files be changed as part of a subsequent analysis. With the exception of the link between EQPDET and EQP_PRC, files involved in the one-to-one links pictured in Exhibit 7-4 are partially redundant with regard to their contents. For convenience, some or all of the link has already been performed (i.e., some of the variables in the "linked-to" datasets already exist in the "linked-from" datasets. Examples of this include:

- The RATE variable, whose values in the WAGEDAT dataset have also been included in the LABDET datasets;

- The PRICE and LIFE variables, whose values in the EQP_PRC dataset have also been included in PXEQCAP and OVEQCAP datasets;

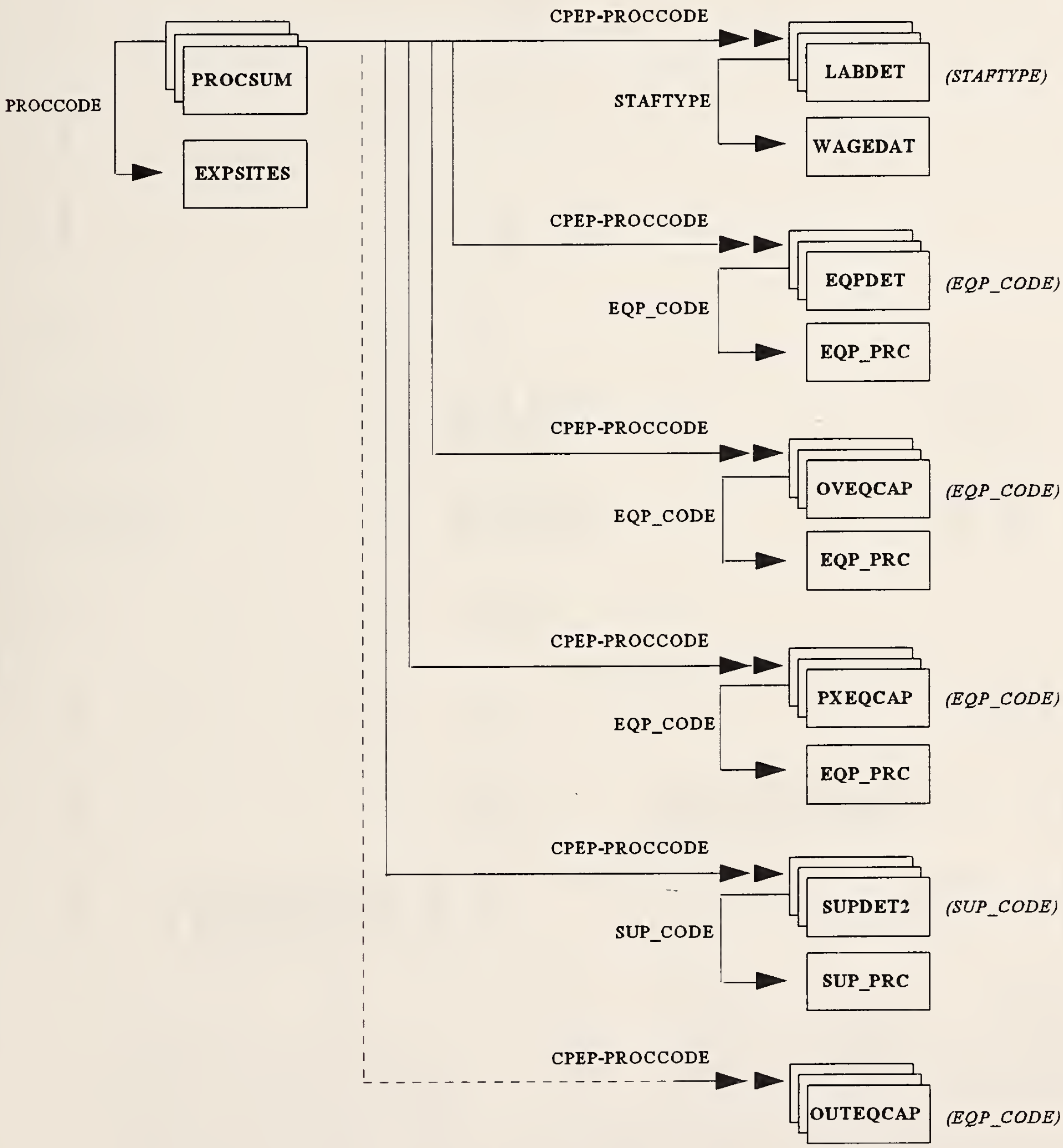
- The DESC, PRICE, PRC_CNT and PRC_UNIT variables, whose values in the SUP_PRC dataset have also been included in the SUPDET2 datasets.

Exhibit 7-5 shows the multiple occurrences of variables. It is always preferable to link to the global files and use the variables on the global file, rather than using the counterpart variables that have been added for convenience to the detail files.

All of the cost (labor, supply, equipment) values in PROCSUM were arrived at by aggregating the respective detail datasets to the level of the linking key (i.e., CPEP-PROCCODE) and incorporating these results into the single corresponding record on PROCSUM. For example, if five in-office supply item records are contained in the supply detail file for one CPT-4 code, supply-item specific costs are calculated and summed across the five records to arrive at one supply cost total for the single record on PROCSUM.

**Exhibit 7-4**

**Common Relationships Among CPEP Database File Types**



## Exhibit 7-5
## Variables by File

| VARNAME | LABEL | PROCSUM | LABDET | SUPDET2 | EQPDET | OVEQCAP | PXEQCAP | SERVPT | WAGEDAT | SUP_PRC | EQP_PRC | EXPSITES | OUTEQCAP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANNFACT | Annualizing factor, eqp cost plus maint. | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| CAPFRAC | Annualizing factor for capital eqp cost | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| CG0_I | Clin staff cost for pre-serv in office | PROCSUM | | | | | | | | | | | |
| CG0_O | Clin staff cost for pre-serv out-office | PROCSUM | | | | | | | | | | | |
| CG1X_I | Clin staff cost for post-ops in-office | PROCSUM | | | | | | | | | | | |
| CG1X_O | Clin staff cost for post-ops out-office | PROCSUM | | | | | | | | | | | |
| CG1_I | Clin staff cost for serv in-office | PROCSUM | | | | | | | | | | | |
| CG1_O | Clin staff cost for serv out-office | PROCSUM | | | | | | | | | | | |
| CG2X_I | Admin staff cost for post-ops in-office | PROCSUM | | | | | | | | | | | |
| CG2X_O | Admin staff cost for post-ops out-office | PROCSUM | | | | | | | | | | | |
| CG2_I | Admin staff cost for serv in-office | PROCSUM | | | | | | | | | | | |
| CG2_O | Admin staff cost for serv out-office | PROCSUM | | | | | | | | | | | |
| CLINADM | Record is CLIN or ADMIN estimate | | | | | | | SERVPT | | | | | |
| COMPFLAG | Service cost completion indicator | PROCSUM | | | | | | | | | | | |
| COST_MIN | Equipment cost per minute | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| CPEP | CPEP providing estimate | PROCSUM | LABDET | SUPDET2 | EQPDET | OVEQCAP | PXEQCAP | SERVPT | | | | | OUTEQCAP |
| DESC | Description | | LABDET | SUPDET2 | EQPDET | OVEQCAP | PXEQCAP | | WAGEDAT | SUP_PRC | EQP_PRC | | OUTEQCAP |
| EQP_CODE | Code for type of equipment | | | | EQPDET | OVEQCAP | PXEQCAP | | | | EQP_PRC | | OUTEQCAP |
| EQTI | Minutes for equipment use, in-office | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| EQTO | Minutes for equipment use, out-office | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| EXP_IN | Expected to be Profiled IN | | | | | | | | | | | EXPSITES | |
| EXP_OUT | Expected to be Profiled OUT | | | | | | | | | | | EXPSITES | |
| FAM | The family number for the service | PROCSUM | LABDET | | | | | | | | | | |
| G0_I | Clin staff time for pre-serv in office | | LABDET | | | | | | | | | | |
| G0_O | Clin staff time for pre-serv out-office | | LABDET | | | | | | | | | | |
| G1X_I | Clin staff time for post-ops in-office | | LABDET | | | | | | | | | | |
| G1X_O | Clin staff time for post-ops out-office | | LABDET | | | | | | | | | | |
| G1_I | Clin staff time for serv in-office | | LABDET | | | | | | | | | | |
| G1_O | Clin staff time for serv out-office | | LABDET | | | | | | | | | | |
| G2X_I | Admin staff time for post-ops in-office | | LABDET | | | | | | | | | | |
| G2X_O | Admin staff time for post-ops out-office | | LABDET | | | | | | | | | | |
| G2_I | Admin staff time for serv in-office | | LABDET | | | | | | | | | | |
| G2_O | Admin staff time for serv out-office | | LABDET | | | | | | | | | | |
| GLOBAL | The Medicare global period | PROCSUM | | | | | | | | | | | |
| HRSWK | Hours per week office assumed open | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| IN | Code profiled in the office (Y/N) | PROCSUM | LABDET | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| INQCNV | Qty of standardized supp. units, in-off | | | SUPDET2 | | | | | | | | | |
| INTRATE | Loan interest rate, this equipment type | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| IN_COST | Cost of supply item, in-office service | | | SUPDET2 | | | | | | | | | |
| ISREF | Indicates if code is a ref service(0,1) | PROCSUM | LABDET | | | | | | | | | | |
| LIFE | Equipment useful life (years) | | | | | OVEQCAP | PXEQCAP | | | | EQP_PRC | | OUTEQCAP |

## Exhibit 7-5
## Variables by File (Continued)

| VARNAME | LABEL | PROCSUM | LABDET | SUPDET2 | EQPDET | OVEQCAP | PXEQCAP | SERVPT | WAGEDAT | SUP_PRC | EQP_PRC | EXPSITES | OUTEQCAP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAINT | Eqpt annual maint rate (% of purchase) | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| MINS_YR | Minutes/year equipment is assumed in use | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| OUT | Code profiled out of the office (Y/N) | PROCSUM | LABDET | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| OUTQCNV | Qty of standardized supp. units, out-off | | | SUPDET2 | | | | | | | | | |
| OUT_COST | Cost of supply item,out-office service | | | SUPDET2 | | | | | | | | | |
| OVEQ_I | Overhead equipment cost in-office | PROCSUM | | | | OVEQCAP | | | | | | | |
| OVEQ_O | Overhead equipment cost out-office | PROCSUM | | | | OVEQCAP | | | | | | | |
| PCT_IN | Percent of Volume In-Office | | | | | | | | | | | EXPSITES | |
| PCT_OUT | Percent of Volume Out-of-Office | | | | | | | | | | | EXPSITES | |
| POVIS | No. of post-op visits assigned by CPEP | PROCSUM | | | | | | | | | | | |
| PRC_CNT | Quantity associated with price | | | SUPDET2 | | | | | | SUP_PRC | | | |
| PRC_UNIT | Unit of measure for stdrdzd supply price | | | SUPDET2 | | | | | | SUP_PRC | | | |
| PRICE | Purchase price | | | SUPDET2 | | OVEQCAP | PXEQCAP | | | SUP_PRC | EQP_PRC | | OUTEQCAP |
| PROCCODE | HCPCS (service) code | PROCSUM | LABDET | SUPDET2 | EQPDET | OVEQCAP | PXEQCAP | SERVPT | | | | EXPSITES | OUTEQCAP |
| PXEQ_I | Serv specific equipment cost in-office | PROCSUM | | | | | PXEQCAP | | | | | | OUTEQCAP |
| PXEQ_O | Serv specific equipment cost out-office | PROCSUM | | | | | PXEQCAP | | | | | | OUTEQCAP |
| RATE | Total compensation per minute | | LABDET | | | | | | WAGEDAT | | | | |
| SERVREF | Service referenced by CPEP | | | | | | | SERVPT | | | | | |
| SITE | In-office(IN) vs. out-office(OUT) | | | | | | | SERVPT | | | | | |
| SOURCE | Source of estimate | | | | | | | | | SUP_PRC | EQP_PRC | | |
| STAFTYPE | Code for staff type | | LABDET | | | | | | WAGEDAT | | | | |
| SUPP_I | Supply costs in-office | PROCSUM | | | | | | | | | | | |
| SUPP_O | Supply costs out-office | PROCSUM | | | | | | | | | | | |
| SUP_CODE | Code for supply item | | | SUPDET2 | | | | | | SUP_PRC | | | |
| TEXCEP | Exception to default equip use time(0,1) | | | | | | PXEQCAP | | | | | | OUTEQCAP |
| TIMECAT | Labor time category(e.g., G2x) | | | | | | | SERVPT | | | | | |
| TIMEDEL | Indicates if time estimates edited (Y/N) | PROCSUM | | | | | | | | | | | |
| TOTEQPI | Total equipment cost in-office | PROCSUM | | | | | | | | | | | |
| TOTEQPO | Total equipment cost out-office | PROCSUM | | | | | | | | | | | |
| TOTLABAI | Total admin staff cost in-office | PROCSUM | | | | | | | | | | | |
| TOTLABAO | Total admin staff cost out-office | PROCSUM | | | | | | | | | | | |
| TOTLABCI | Total clinical staff cost in-office | PROCSUM | | | | | | | | | | | |
| TOTLABCO | Total clinical staff cost out-office | PROCSUM | | | | | | | | | | | |
| TOTLABI | Total labor cost in-office | PROCSUM | | | | | | | | | | | |
| TOTLABO | Total labor cost out-office | PROCSUM | | | | | | | | | | | |
| TOT_I | Total service cost in-office | PROCSUM | | | | | | | | | | | |
| TOT_O | Total service cost out-office | PROCSUM | | | | | | | | | | | |
| USAGE | Proportion of max time equipment used | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |
| VOL94 | 1994 Medicare Volume | | | | | | | | | | | EXPSITES | |
| WKSYR | Weeks per year office is assumed open | | | | | OVEQCAP | PXEQCAP | | | | | | OUTEQCAP |

*Conventions Regarding Missing Values*

Missing values in data files are used to indicate values that were not or could not be obtained. Missing values occur in two general cases:

- When a service code was not profiled by a particular CPEP at a particular site of service (i.e., in-office or out-of-office), missing values are assigned to variables associated with the site of service which is not profiled. For example, if CPEP 1 did not profile service code "15101" for the in-office setting (IN="N"), variables on the supply detail dataset (SUPDET2) specific to the in-office setting (namely, INQCNV, INCOST) will contain missing values for observations with CPEP="C 1" and PROCCODE="15101". Similarly, the corresponding summary record for CPEP="C1" and PROCCODE="ABCDE" in the PROCSUM data set will contain missing values for all variables specific to the in-office setting.

- When a service code *was* profiled by a particular CPEP at a given site of service, missing values are assigned if:

  — a value for a particular variable (relating to that site of service) *that was, in general, collected as part of the CPEP process,* was not obtained. For example, the CPEP could not provide supply details, or a supply price was not identified; or

  — the value of one or more of the components of a particular variable *that was computed from primary data variables* was either not provided or not available. For example, cost fields are missing when either price or quantity is missing. *When a particular variable is missing, missing values propagate to all other variables in the same or other datasets that are directly or indirectly dependent on that variable.* No assignment of partially complete or imputed values to variables with at least one component missing has been made.

*Conventions Regarding Special Values*

The CPEP database also uses some codes with special meaning to indicate particular types of situations in which the data are not present. These are detailed within each variable's entry in the Data Dictionary. For example, EQP_CODE has a value of "code not profiled" (E99990) in the EQPDET file when a service has not been profiled. These special codes are specific to a type of data file; conventions vary across the files. The Data Dictionary documents the special codes used for each variable, and analysis of any of the files should be preceded by a careful review of the data dictionary information for that file.

### 7.2.2 Important Considerations in Using These Data

Points that should be kept in mind in using this data are:

- The terms and concepts for the project should be well understood before the files are used. Chapter 3.0 should be reviewed, in particular, *for services that include global periods, the site of service is anchored to the procedure period site and is reported as such in the database*. This is a very important point to keep in mind when examining or analyzing the CPEP data files. Thus, the post-operative office visits that take place after an inpatient 90 day global surgical service are categorized as out-office, even though these visits may take place in the physician's office.

- The files have been created from an extensive process of data recording and entry verification. The reference service data have also undergone review by the CPEP panelists whose consensus produced the values; non-reference data have been reviewed extensively by Abt (e.g., quality review edits) but not by the CPEP panelists.

- The data represent the consensus of the CPEPs as recorded by Abt Associates. They have not been validated against external frames of reference.

- The data in these files have been carefully reviewed and quality controlled, drawing on the written notes recorded by Abt Associates staff during the CPEP meetings. The data reflect resource estimates provided by the CPEPs with few exceptions (as discussed in Section 7.1.3 in the PROCSUM file descriptions), these estimates have not been edited or altered.

- These data and documentation were originally intended for HCFA and the health services research community, to be used as an input into the process of developing practice expense relative value units. The enormous volume of data is maintained in separate files relating to labor, supplies, and equipment. Use of the detailed data files (as opposed to the cost summary file PROCSUM) by non-technical users should be undertaken with care, and after the full set of documentation has been reviewed and understood.

- Users should keep the ultimate use of these data in mind: they were collected as one source of data to determine relative values. As such, it is the relative relationships among the resource requirements, rather than the absolute levels, that are important.