# An Expanded Medicare Outpatient End Stage Renal Disease Prospective Payment System Phase I

# Appendix A Database Report

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# I. BACKGROUND

This document is a review of the data that are available to the Centers for Medicare and Medicaid Services (HCFA) to broaden and improve the current outpatient prospective payment system (PPS) for Medicare ESRD beneficiaries. It has represents a minor update from the original report submitted on April 3 as a deliverable for this contract.

Several recent government initiatives have motivated an examination of the current ESRD PPS. The system, known as the composite rate, has not been revised substantially since inception, despite several changes that have taken place in the delivery of ESRD therapy since that time. HCFA issued a Request For Proposals (RFP) on August 1, 2000 for the initial phase of an evaluation of the feasibility of substantially expanding the bundle of services that are included in the PPS, with planned follow-up phases for implementation of the expansion. The contract for the HCFA project was awarded to the University of Michigan. Subsequent to the RFP, the Benefits Improvement and Protection Act of 2000 (BIPA) was enacted. Section 422c of BIPA requires an expansion of the coverage of the ESRD prospective payment system. This document has been prepared by the University of Michigan under contract with HCFA, as an assessment the information that is needed, the data that are available, and the utility of available databases for meeting those information needs. In order to clearly state the problem, the remainder of this section is extracted from the original RFP.

The current system has aspects of both a PPS and fee for service reimbursement. The current unit of payment, the composite rate per dialysis treatment, is intended to cover the renal related services and supplies routinely provided to Medicare beneficiaries. But providers also can bill Medicare for other dialysis-related services in addition to receiving the composite rate. As part of outpatient ESRD payment reform, HCFA is planning to develop an ESRD PPS in which all renal related services, tests, drugs, and supplies ultimately are bundled into a fixed reliable payment rate. The first phase of this research will assess the feasibility of using currently available HCFA databases and other sources to proceed with the development of a bundled ESRD PPS. Subsequent phases of this contract will determine the need for any additional data, explore the sufficiency and testing of that data, evaluate the need to create and test an assessment instrument, and create an ESRD data file for further analysis. These data subsequently will be examined to test their feasibility for the construction of facility specific measures of case mix, which may predict differences in appropriate consumption in the context of a bundled Medicare outpatient ESRD PPS

## A. INTRODUCTION

In the broadest terms, the objective for a revised dialysis payment system is to promote the delivery of high quality, dialysis-related services in an economically efficient manner. Accomplishing this objective requires a careful analysis of the workings and shortcomings of the existing payment system, an analysis of how well existing data are able to inform decisions about the costs incurred by an efficient provider delivering high quality services, and analyses of the relationships between dialysis modality, case mix, and costs. These analyses will be required to devise a system that ensures access to

quality care for more complex patients and ensures equitable reimbursement to those facilities that serve them. Broadening the bundle of services included in the composite rate can simplify the billing process and can remove incentives for excessive use of separately billable services. However, broadening the bundle necessitates increased attention to quality assurance measures to ensure that the expanded PPS does not result in an inappropriate reduction in the use of some services that were formerly billed separately (e.g. EPO). Further, case mix adjustments may have to be developed. Even if the cost of services included in the existing composite rate does not vary substantially with case mix factors, the services in a broader bundle might exhibit significant, predictable variations. Finally, a broader bundle makes facility revenues more predictable but also places facilities at risk for the costs of providing a wider array of services. If these risks are substantial (particularly for small, independent facilities who cannot spread the risk of unusually costly "outliers" over many cases), a mechanism for incorporating such outlier cases in an expanded PPS might be warranted.

Data Needs. In the development of a proposal for a prospective payment system for ESRD-related services, several types of data are likely to be necessary or at least highly useful. To understand the types of data most essential, it is important to consider carefully the uses to which the data will be put. There are at least four distinct processes requiring data analysis: (1) development of the original PPS system; (2) regular (such as annual) maintenance and updating of the system; (3) regular reporting of the quality and appropriateness of patient care; (4) occasional special studies, perhaps leading to system refinement. We describe the nature of each of these processes briefly.

## B. DEVELOPMENT OF AN EXPANDED PPS SYSTEM

Several crucial issues must be addressed in order to expand the current PPS system to include more services in a fair and effective manner.

1. Identification of the products to be included in the bundle. For example, Section 422(c) of BIPA requires that a more comprehensive composite rate include drugs that are "routinely used" such as EPO and other drugs. Outpatient vascular access services and procedures may also be included in the basic product.

2. Definitions of the products to be included in the PPS may also depend on other factors:
    a. Definition of standard adjustments to the payment schedule. Adjustments for patient severity (case mix adjustment) can help to protect individual providers from the financial risk associated with a heterogeneous patient population, and can help protect patients for whom care is more costly than average from discrimination. Definition of such adjustments requires determination of the distribution of expenditures of various categories across different types of ESRD patients.
    b. Determining possible differentials for different dialysis modalities (peritoneal dialysis, hemodialysis, home hemodialysis) and non-traditional schedules (daily hemodialysis) may be necessary in order to assure the potential for patients and their physician to make the most appropriate care choices given the patients' individual needs and preferences.

c. Are there categories of providers, defined by geography or other relevant characteristics, in which the costs of providing the basic product are significantly higher or lower than the mean? If so, should these cost differences be reflected in a payment differential? Answers to these questions require information regarding cost variability by type of provider, standardizing for product. A wage index or other input price adjustments could also conceptually fall into the definition of standard adjustments.

3. The potential for substitution of different services outside of the PPS system for services that are intended to be part of the PPS will be important for some services. For example, the provision of vascular access is a necessary component of dialysis, but this service is currently typically provided through a combination of inpatient and outpatient services. Changes in billing procedures and practice patterns resulting from a new PPS will require observation and measurement for future policy considerations.

4. A method should be determined to identify outliers, or patients whose condition is so atypical that their medical treatment would cost much more than the planned payment structure.

5. Determination of base payment rate for the typical producer. Setting a regulated price is optimally based on knowledge of the relevant cost of the efficient producer. Information on the costs, or at least on the payments made to providers, is necessary for the basic product.

6. Determination of the unit of payment for each patient. Several alternatives are under consideration, including per dialysis session, per week, or per month.

7. Determination of how to manage the payment for patients who move among providers.

## C. REGULAR MAINTENANCE OF THE PPS

HCFA will consider a regular (such as annual) update of the system to reflect changes in the determinants of cost and quality. Section 422b of BIPA requires adjustment for market basket inflation and changes in market, productivity, new technologies, and margin of profit. For example, wage inflation might justify a general increase in the basic price. Or, cost-reducing productivity improvements might justify a reduction in price. Data necessary for regular maintenance might include rates of change in input prices and changes in staffing ratios. Although changes in medical technology are not predictable, a system for review of such changes will also be needed to allow for modifications in the PPS.

## D. REGULAR REPORTING OF THE QUALITY AND APPROPRIATENESS OF PATIENT CARE

The institution of a new payment system establishes a new set of incentives for providers. Some of these changes in incentives are expected, understood, and often desired. But even the best-designed payment systems can stimulate unexpected provider responses, some of which could lead to reductions in the quantity or quality of care. We are particularly interested in provider responses that might harm patient care. Hence, a system of data collection must be established that permits monitoring of patient care quality and access. These activities should be coordinated with monitoring systems already in place, such as the system run by the Office of Clinical Standards and Quality (OCSQ).

## E. SPECIAL STUDIES

Either in response to the incentives in the new system or because of changes in the technology of ESRD care, providers may change their production processes. Such changes might warrant occasional modifications to the payment system. In addition to regular updates accounting for routine factors such as changes in input prices, a special update might be important in the first few years following implementation of the revised PPS because practice patterns may change in ways that cannot be fully foreseen. For example, an updated payment system might make an assumption about proportion and characteristics of patients switched to subcutaneous EPO administration in response to adding EPO to the bundle. However, the actual prevalence of subcutaneous administration will not be known with certainty until after the payment system is implemented. Another example is that payment for a product that includes vascular access procedures might motivate physicians affiliated with dialysis units to inappropriately hospitalize patients needing vascular access more frequently. Such a process change can have expenditure-increasing implications, and an adjustment to the system may be warranted. Or, there might be a quality-enhancing but cost-increasing technological development. Failure to adjust the payment system to reflect the higher costs will retard the diffusion of this technology or force offsetting compromises in other aspects of patient care. The nature of these studies is unpredictable. Hence, some of the data necessary to carry them out will have to be identified when the need for the special study becomes apparent. Occasional special studies might result in changes in the definitions of the products, changes in the basic price, or changes in categories of producers meriting payment adjustment.

# II. PPS DATA SOURCES

There are many sources of information that can be used to develop an expanded outpatient ESRD PPS. Each of these data sources can be useful for meeting the needs listed above in section 2. We have divided the possible PPS data sources into three groups. This first group consists of primary, recurring, government data sources. These sources generally collect data about entire populations rather than about samples. The second group consists of broader data systems that link and integrate data from multiple sources in the first group. These broader data systems will be the most effective way to access most of the sources in the first group. The third group consists of special studies. These typically collect data about a sample of patients, are of limited duration, and may not be sponsored by the government.

## A. PATIENT DATABASES

### 1. Ability to link to other data sources

Standard Analytical Files contain the Medicare Beneficiary Claim Account Number (SAS: CAN, either the Social Security Administration Social Security Number (SSN) or the Railroad Retirement Board Identification numbers (RRB)) and a Beneficiary Identification Code (SAS: BIC). Together the two codes form the Healthcare Identification Code (HIC = CAN + BIC), which can be used to link SAF records with other healthcare databases. Because beneficiaries occasionally change HICs, crosswalk files obtained from the ESRD Program Medical Management and Information System (PMMIS)/Renal Beneficiary and Utilization System (REBUS) (PMMIS/REBUS) IDEN data and/or from the Medicare Enrollment Database (EDB) must be obtained to perform a proper linkage. Patient matching is also done on the basis of other identifiers (e.g., surname, first name, SSN, birth date, sex).

Organ Procurement and Transplantation Network (OPTN) transplant data require patient matching on the basis of identifiers such as surname, first name, SSN, birth date, and sex in order to link this data with other databases. Much of this work has already been done by the University of Michigan KECC to link the SRTR data with HCFA ESRD data. The resulting linked records will then have a Healthcare Identification Code (HIC) where available.

## 2. HCFA STANDARD ANALYTICAL FILES (SAFS) FOR INSTITUTIONAL CLAIMS

### a) Scope

The SAFs for institutional claims (inpatient hospitals, outpatient facilities, skilled nursing facilities, hospices, and home health agencies) are a near universe of patient claim level data. The database is updated quarterly and HCFA estimates that the SAFs are at least 98% complete when the database is closed annually. However, beneficiaries for whom Medicare is a secondary payment source, such as those enrolled in a Medicare Health Maintenance Organizations (HMOs), may not have claims during the period of enrollment. The outpatient SAF will be the primary source for information about the current payments received by dialysis facilities for treatment of ESRD patients.

### b) Years available

The Health Care Financing Administration (HCFA) institutional SAFs started with 1989 claims data. Prior to 1989, a 20% subset of national Medicare institutional claims were collected as part of the MEDPAR system.

### c) Number of observations

In 1999 for example, there were 12,239,392 inpatient claims of which 598,587 (4.9%) were for ESRD patients, 107,018,890 outpatient claims of which 5,472,423 (5.1%) were for ESRD patients, 3,154,837 skilled nursing facility (SNF) claims of which 98,393 (3.1%) were for ESRD patients, 1,274,572 hospice claims of which 12,658 (1.0%) were for ESRD patients, and 9,786,788 home health agency claims of which 314,120 (3.2%) were for ESRD patients.

### d) Key variables for cost determination

Substantially more information is now available in version I of these data, which is described in the main report. The description below is based upon Version H, but is left as documentation of prior versions of the SAFs. There are various payment and charge variables in the SAFs, which would be useful for cost determination. There are payment variables. There is also a total charge variable. The provider number can be used for allotting payments and charges to facilities. One of the types of record trailers for the claims is a Claim Revenue Center Group. The Claim Revenue Center Group contains a revenue center code identifying the type of center and a charge amount for the services provided in that center which will be useful for breaking down the components of the total charge amount.

| **Variable name** | **SAS variable name*** |
|---|---|
| Claim Payment Amount | PMT_AMT |
| National Claims History (NCH) Primary Payer | PRPAYAMT |

| | |
|---|---|
| Claim Paid Amount | |
| Claim Total Charge Amount | TOT_CHRG |
| Provider Number | PROVIDER |
| Revenue Center Code | REV_CNTR |
| Revenue Center Total Charge Amount | REV_CHRG |

* The SAS system is an integrated system of software providing complete control over data access, management, analysis, and presentation.

### e) Key variables for case mix evaluation

In addition to demographic variables such as date of birth, sex, and race, the main portion of the SAF records contains other variables that are possibly useful for case mix adjusting. For example, the principal diagnosis and the E diagnosis (E codes identify the external cause of injuries, poisonings, or other adverse affects) will be useful for case mix adjusting. Three of the trailers: the Claim Diagnosis Group containing diagnoses (occurring up to 10 times); the Claim Procedure Group containing procedures (occurring up to 6 times); and the Claim Revenue Center Group containing the variables revenue centers, the HCFA Common Procedure Coding System (HCPCS) procedure code, initial modifier, second modifier, and unit counts (occurring up to 58 times) will be relevant for case mix adjusting.

| **Variable name** | **SAS variable name** |
|---|---|
| Beneficiary Birth Date | BENE_DOB |
| Beneficiary Sex Identification Code | SEX |
| Beneficiary Race Code | RACE |
| Claim Principal Diagnosis Code | PDGNS_CD |
| Claim Diagnosis E Code | DGNS_E |
| Claim Diagnosis Code | DGNS_CD |
| Claim Procedure Code | PRCDR_CD |
| Revenue Center Code | REV_CNTR |
| Revenue Center HCFA Common Procedure Coding System (HCPCS) Code | HCPCS_CD |
| Revenue Center HCPCS Initial Modifier Code | MDFR_CD1 |
| Revenue Center HCPCS Second Modifier Code | MDFR_CD2 |
| Revenue Center Unit Count | REV_UNIT |

### f) Collection form

The institutional claims are primarily filed electronically. A paper copy of the patient billing form, HCFA UB-92, appears in Appendix 1. The data are collected by HCFA Carriers, edited and forwarded to the HCFA Common Working File sites, further edited and forwarded to HCFA.

# 3. HCFA STANDARD ANALYTICAL FILE (SAF) FOR PHYSICIAN/SUPPLIER CLAIMS

## a) Scope

The Physician/Supplier SAF is a near universe of Medicare patient physician/supplier claims. These files differ from the institutional claim SAFs for ESRD payment evaluation purposes in that they contain physician specific payments for services that may be covered under an outpatient ESRD PPS. The database is updated annually with data becoming available in August of the following year. HCFA estimates that the physician/supplier SAF is 98% complete at the time of annual closure.

## b) Years available

The Physician/Supplier SAF started with the 1991 claims data. Prior to 1991 HCFA only maintained a 5% sample of physician/supplier claims.

## c) Number of observations

To obtain physician/supplier claims data, a "finder" file is built and submitted to HCFA. HCFA staff members add the data request and the finder file to a batch of jobs to be run against the physician/supplier database monthly. In 1999, the finder file of ESRD patients yielded 23,376,898 physician/supplier claims for ESRD patients. The size of the complete physician/supplier database for all Medicare patients is not available on output documents. A reasonable estimate would assume that claims for ESRD patients are about 5% of the total claims and would yield an annual database of approximately 470 million claims.

## d) Key variables for cost determination

On the main portion of the physician/supplier claims there are the following variables: payments, primary payer payments, submitted charges, and allowed charges, which could be used for cost determination. On the Carrier Line Item Record trailer the following variables: UPINs, provider specialties, type of service codes, payments, deductibles, primary payer payments, submitted charges, and allowed charges which could be used for cost determination.

| Variable names | SAS variable names |
|---|---|
| Claim Payment Amount | PMT_AMT |
| Carrier Claim Primary Payer Paid Amount | PRPAYAMT |
| NCH Carrier Claim Submitted Charge Amount | SBMT_CHRG |
| NCH Carrier Claim Allowed Charge Amount | ALOWCHRG |
| Carrier Line Performing UPIN Number | PRF_UPIN |
| Line HCFA Provider Specialty Code | HCFASPCL |
| Line HCFA Type Service Code | TYPSRVCB |
| Line NCH Payment Amount | LINEPMT |
| Line Beneficiary Part B Deductible Amount | LDEDAMT |

| | |
|---|---|
| Line Beneficiary Primary Payer Paid Amount | LPRPDAMT |
| Line Submitted Charge Amount | LSBMTCHG |
| Line Allowed Charge Amount | LALOWCHG |

### e) Key variables for case mix evaluation

On the main portion of the physician/supplier records, the following demographic variables possibly useful for case mix analysis and adjustment are found: birth dates, sex, and race. Also on the main section of the SAF records, principal diagnoses will be useful for case mix adjusting. Since there is some question as to the validity and utility of this field, it should be used with caution and further data support. For example, more than a single instance of a particular diagnosis should be reflected before such a diagnosis is inferred. Two of the trailers: the Carrier Claim Diagnosis Record containing the diagnoses occurring up to four times and the Carrier Line Item Record containing the variables: UPINs, provider specialties, type of service, HCPCS codes, and modifiers could be useful for case mix adjustment.

| **Variable names** | **SAS variable names** |
|---|---|
| Beneficiary Birth Date | BENE_DOB |
| Beneficiary Sex Identification Code | SEX |
| Beneficiary Race C | RACE |
| Claim Principal Diagnosis Code | PDGNS_CD |
| Claim Diagnosis Code | DGNS_CD |
| Carrier Performing UPIN Number | PRF_UPIN |
| Line HCFA Provider Specialty Code | HCFASPCL |
| Line HCFA Type Service Code | TYPSRVCB |
| Line HCPCS Code | HCPCS_CD |
| Line HCPCS Initial Modifier Code | MDFR_CD1 |
| Line HCPCS Second Modifier Code | MDFR_CD2 |

### f) Collection form

Physician/supplier data are submitted on the form HCFA 1500 that appears in Appendix 1. The data are collected by HCFA Regional Carriers and HCFA Durable Medical Equipment Regional Carriers (DMERC), edited and forwarded to the HCFA Common Working File sites, further edited, and forwarded to HCFA.

## 4. HCFA 2728, CHRONIC ESRD MEDICAL EVIDENCE FORM

### a) Scope

The Medical Evidence Database in the PMMIS/REBUS system is a nearly universal patient level historical database that is used to establish or re-establish the medical eligibility of the patient for Medicare ESRD benefits. The database is updated daily.

### b) Years Available

The collection of Medical Evidence data began in 1977 but it was not until 1982 that the submission of the Medical Evidence form became mandatory.

### c) Number of observations

As of February 22, 2001 there were 1,134,711 records in the Medical Evidence Database. Approximately 80,000 records are added yearly corresponding to incident ESRD patients and to transplant failure patients returning to ESRD status. Old records are not removed at death.

### d) Key variables for case mix evaluation

The Medical Evidence database contains information about insurance coverage at onset of ESRD, a field capturing the primary cause of ESRD (over 100 categories), and fields capturing the following comorbidities: congestive heart failure, ischemic heart disease, myocardial infarction, cardiac arrest, cardiac dysrhythmia, pericarditis, cerebrovascular disease, peripheral vascular disease, hypertension, diabetes, diabetes on insulin, chronic obstructive pulmonary disease, tobacco use, alcohol dependence, drug dependence, HIV positive, and AIDS. Various laboratory values are also coded: hematocrit, hemoglobin, serum albumin, creatinine, urea clearance, and the BUN, all of which are indicators of the patient's health status.

### e) Ability to link to other data sources

The Medical Evidence database contains the Medicare Beneficiary CAN and a BIC. Together the two codes form the Healthcare Identification Code (HIC), which can be used to link Medical Evidence records with other healthcare databases. Some care is needed with such a linkage, however as Medical Evidence records for patients not already eligible for Medicare benefits are coded with a BIC of ZZ. The BIC ZZ is not a standard Medicare BIC and for patients with such a BIC (and often for those with a BIC of T) patient matching has to be done on the basis of other identifiers (e.g., surname, first name, SSN, birth date, sex)

### f) Collection form

Medical Evidence data are collected on the form HCFA 2728 which appears in Appendix 1. The data are collected by the HCFA ESRD Networks and forwarded to HCFA.

## 5. MEDICARE ENROLLMENT DATABASE (EDB)

### a) Scope

The Medical Enrollment Database (EDB) is a universe of Medicare eligible patients. The EDB contains not only all currently eligible patients but also all historically eligible patients. The database is updated daily.

### b) Years available

The EDB contains patients dating back to 1972. In particular, it contains Medicare ESRD patients form 1973, the first year that ESRD was a Medicare covered illness.

### c) Number of observations

The ESRD subset of the EDB contains approximately 1.5 million patients as of February 22, 2001.

### d) Key variables for cost determination

Four of the relations in the edb are relevant to cost determination primarily by helping determine periods of eligibility and types of eligibility. The four relations are, 1) the patient identification relation from which the hics, the birth dates, and the death dates are relevant variables 2) the primary payer relation from which the entitlement start dates and entitlement end dates are relevant (any entry here means that medicare is a secondary payer) 3) the group health organization relation from which the entitlement start dates and end dates are relevant and, 4) the esrd relation from which the entitlement start dates, end dates, sources, and termination reasons are relevant.

| VARIABLE NAME | SAS VARIABLE NAME |
|---|---|
| HEALTHCARE IDENTIFICATION CODE | HIC |
| BIRTH DATE | BENE_DOB |
| DEATH DATE | BENE_DOD |
| PRIMARY PAYER ENTITLEMENT START DATES | PPBEG |
| PRIMARY PAYER ENTITLEMENT END DATE | PPEND |
| GROUP HEALTH ORGANIZATION ENTITLEMENT START DATE | GHOBEG |
| GROUP HEALTH ORGANIZATION ENTITLEMENT END DATE | GHOEND |
| ESRD ENTITLEMENT START DATE | ESRBEG |
| ESRD ENTITLEMENT END DATE | ESREND |
| ESRD ENTITLEMENT SOURCE CODE | ESRSSC |
| ESRD ENTITLEMENT TERMINATION REASON | ESRTRC |

### e) Collection Forms

There is no medicare collection form for the edb. The medicare enrollment database is directly generated from the social security enrollment database with which it interacts daily to update eligibility fields and other information about status changes.

## 6. DEATH NOTIFICATION DATABASE

### a) Scope

The Death Notification Database is a patient level set of data that is nearly universal on the subset of Medicare patients who have died. This database is updated daily.

### b) Years available

PMMIS began collection of the death notification forms in 1977.

### c) Number of observations

As of February 22, 2001 there were 765,048 death notification records in the Death Notification database. The Death Notification database is updated daily and is constantly growing. In the earlier years of this database, Death Notification forms were not universally completed for all patients.

### d) Key variables for cost determination

The death date, obtained from the Death Notification database or from the EDB, could be used for right censoring time series cost determination analyses.

### e) Key variables for case mix evaluation

The cause of death from the Death Notification may prove useful for determining comorbid conditions for case mix adjustment.

### f) Collection forms

The Death Notification database is based on data received on form HCFA 2746-U3 (see Appendix 1). The Death Notification forms are collected by the HCFA ESRD Networks and forwarded to HCFA.

## 7. ORGAN PROCUREMENT AND TRANSPLANTATION NETWORK (OPTN) TRANSPLANT DATA

### a) Scope

The Scientific Registry of Transplant Recipients (SRTR) database is a patient level set of data for the ongoing evaluation of the scientific and clinical status of solid organ transplantation in the United States. This database is updated monthly with data collected by the OPTN. The SRTR is administered by University Renal Research and Education Association (URREA), a not for profit health research foundation, in collaboration with the Kidney Epidemiology and Cost Center (KECC) at the University of Michigan. Kidney transplants account for approximately 64% of all transplants.

### b) Years available

The United Network for Organ Sharing (UNOS) began the collection of solid organ transplant data in 1988.

### c) Number of observations

As of May, 2001 there were waiting list records in the SRTR for 483,496 transplant candidacies. The database also includes clinical data from 284,538 transplants and 1,315,871 transplant follow-up records. The database is constantly growing.

### d) Key variables for cost determination

The transplant date, and the date of graft failure for kidney patients obtained from the SRTR database may be useful for determining cut-off points for cost determination (i.e. for right censoring time series cost determination analyses).

**e) Key variables for case mix evaluation**

There are comorbid conditions and laboratory test data collected prior to and during waitlisting. Some additional comorbid and laboratory data are collected at the time of transplant and for transplant follow-up reports, which could be pertinent in the event of a return to dialysis.

**f) Collection forms**

The SRTR data is collected with the UNet (Service Mark not an acronym) on-line system by the OPTN.

# B. PROVIDER DATABASES

## 1. ABILITY TO LINK TO OTHER DATA SOURCES

Files contain the Medicare provider number so that this database may be linked to other databases at the provider of care level.

## 2. HCFA ANNUAL FACILITY SURVEY

### (1) Scope

The HCFA Annual Facility Survey (AFS) is a near universe of facility level data collected annually from freestanding and hospital related dialysis facilities.

### (2) Years collected

**b) Years covered.**

The HCFA Annual Facility Survey has been collected annually since 1980. With the addition of non-Medicare certified Veteran's Administration facilities in 1992, the survey is completed by more than 99% of existing dialysis facilities.

**c) Number of observations**

In the 1998 Facility Survey, 3,648 facilities completed the survey and in 1999, 3,881 facilities completed the survey. The number of facilities has been increasing each year since the inception of the survey.

**d) Key variables for cost determination**

The provider address is part of the survey and the data fields: city, SSA county code, Federal Information Processing Standard (FIPS) county code, and zip code may be useful for determining urbanality as part of potential price adjusters. The survey also provides counts by modality of treatment (hemodialysis, peritoneal dialysis) at the beginning and end of the survey period which can

be used to validate counts determined from claims data. Similarly, data fields describe organs harvested, organs obtained, organs transplanted, and patients transplanted all of which may be relevant to cost determination. The survey contains the field, total stations, which might be utilized to determine cost effectiveness.

### e) Collection form

The AFS is collected on the form HCFA 2744 which can be found in Appendix 1. The data are collected by the HCFA ESRD Networks and forwarded to HCFA.

## 3. CENTER FOR DISEASE CONTROL (CDC): NATIONAL SURVEILLANCE OF DIALYSIS-ASSOCIATED DISEASES IN THE UNITED STATES

### a) Scope

The CDC National Surveillance of Dialysis-Associated Diseases is a facility level database with a 90% response rate.

### b) Years available

The Centers for Disease Control and Prevention (CDC) has been conducting surveillance of hemodialysis-associated hepatitis since the early 1970s. In an effort to obtain a higher response rate, and thus more complete information, CDC initiated a cooperative program with the Health Care Financing Administration (HCFA) in 1976 that provided for a questionnaire from CDC to be included in HCFA's annual facility survey. Since collaboration with HCFA was begun, the CDC survey has been performed for calendar years 1976, 1980, 1982 to 1997, and 1999.

### c) Number of observations

Ninety percent of the completed 1999 AFS forms yields approximately 3,500 facilities completing the CDC survey.

### d) Key variables for case mix evaluation

In addition to variables addressing the occurrence of hemodialysis-associated hepatitis, other hemodialysis-associated diseases and practices not related to hepatitis have been included over the years. The CDC questionnaire is continually updated to collect data about hemodialysis practices and hemodialysis-associated diseases of current interest and importance. The on-going information about the presence of hemodialysis associated diseases may be useful for determining facility level comorbidity information for potential case mix adjustment.

### e) Collection Form

The collection form for this data is CDC 53.7, National Surveillance of Dialysis Associated Diseases (see Appendix I). The data are collected by the HCFA ESRD Networks together with the HCFA AFS and are forwarded to the CDC.

# 4. MEDICARE COST REPORTS

## a) Scope

The Medicare Cost Reports are a nearly universal provider level database. All renal facilities that are certified by Medicare (freestanding or hospital based) are required to submit annually a detailed cost report containing a breakdown of costs.

## b) Years available

The Medicare Cost Reports for freestanding and hospital-based renal facilities have been collected for many years. Currently available on the HCFA web site are databases for the years 1994-99.

## c) Number of observations

There is one observation per facility per quarter and there were approximately 3,900 facilities reporting cost information in the last available cost report.

## d) Key variables for cost determination

There are 2 separate databases for Medicare Cost Reports, one for hospital based facilities and one for freestanding facilities. Generally, the freestanding facility data is of a higher quality than that of hospital based facilities. In both databases, however, total costs, FTE costs, erythropoietin (EPO) costs, other drug costs, and other institutional costs can be determined. These databases could be useful for providing overall cost values.

## e) Collection form

Two forms are used for the collection of Medicare Cost Reports. The independent renal facility (free-standing) form is HCFA 265-94 and the Hospital-based renal facility form is HCFA 2552-96 from which the renal minimum data set is generated from Worksheets S-2 and S-5 and Worksheets I 1-5. These data collection forms are included in Appendix 1. The data for hospital-based facilities and for freestanding facilities are generated in the facilities and forwarded directly to HCFA.

# 5. ONLINE SURVEY CERTIFICATION AND REPORTING SYSTEM (OSCAR)

## a) Scope

OSCAR is a database that contains data from surveys of every institutional health care provider in the United States that is certified to provide services under either Medicare or Medicaid (or both). Seventy-five percent of active ESRD facilities were surveyed in the last five years, twenty percent in the last year.

### b) Years available

The OSCAR began in October 1991 and was based on data from MMACS (Medicare/Medicaid Automated Certification System), which was discontinued in March 1990. Each facility's record contains information only from its most recent four surveys.

### c) Number of observations

There were 16,886 records in the OSCAR on December 8, 2000. Each record contains up to 3,326 data items for each provider.

### d) Key variables for cost determination

For ESRD facilities the OSCAR reports the types of services provided (e.g., hemodialysis, peritoneal dialysis, home training hemodialysis, home training peritoneal dialysis, home support peritoneal dialysis), the number of stations (total, hemodialysis, hemo training), the number of patients at a given time (each shift, each day for a week), the number of patients by treatment modality (total dialysis, hemodialysis, peritoneal dialysis, home patients), the number of staff members (registered nurses, licensed practical nurses, social workers, dieticians, technicians), and deficiencies (written policies/procedures re: hemodialyzer reuse, hours for dialysis scheduled for patient convenience, water for dialysis analyzed periodically, bacteriology of the dialysate). These data are potentially useful in checking the reliability of overlapping items on the Medicare cost reports and HCFA and CDC facility surveys, and as a source of information on quality deficiencies identified by state surveyors, which can be useful in the ongoing monitoring of care under the revised PPS.

### e) Collection form

The OSCAR data are collected using a forms package that contains the Survey Report Form (SRF), the Medicare/Medicaid Certification and Transmittal Form (HCFA-1539) and Medicare/Medicaid applications for certification. Originally the complete forms package was sent online to central office update systems from the HCFA regional offices where the source document files were maintained. Currently State agencies survey facilities and key survey information into the system using modems from microcomputers located at State agency sites.

## 6. ESRD Clinical Performance Measures Project

One activity included in the ESRD HCQIP was the National/ Network ESRD Core Indicators Project (CIP). This project was initiated as a national intervention approach to assist dialysis providers in the improvement of patient care and outcomes. The ESRD CIP was CMS's first nationwide population-based study designed to assess and identify opportunities to improve the care of patients with ESRD (10). This project established the first consistent clinical ESRD database. The elements included in the database represent clinical measures thought to be indicative of key components of care surrounding dialysis. As such, the data points are considered "indicators" for use in triggering improvement activities. The ESRD CIP was initiated in 1994, and in 1999 this project was merged with the ESRD Clinical Performance Measures Project.

Section 4558(b) of the Balanced Budget Act (BBA) of 1997 required CMS to develop and implement by January 1, 2000, a method to measure and report the quality of renal dialysis services provided

under the Medicare program. To implement this legislation, CMS funded the development of Clinical Performance Measures (CPMs) based on the National Kidney Foundation (NKF) Dialysis Outcomes Quality Initiative (DOQI) Clinical Practice Guidelines (2, 3, 4, 5).

For information regarding the development of the CPMs, refer to the 1999 Annual Report, End-Stage Renal Disease Clinical Performance Measures Project on the Internet at www.hcfa.gov/ quality/3m.htm.

On March 1, 1999, the ESRD Core Indicators Project was merged with the ESRD CPM Project and this project is now known as the ESRD CPM Project. The ESRD CPMs are similar to the core indicators with the addition of measures for assessing vascular access.

This 2001 ESRD CPM Project Annual Report provides the results of some of the CPMs on a sample of adult in-center hemo-dialysis patients, adult peritoneal dialysis patients, and on all pediatric (aged ? 12 and < 18 years) in-center hemodialysis patients; it does not provide results on a dialysis facility-specific basis. The quality of dialysis services is reported for adult and pediatric in-center hemodialysis patients for the last quarter in 2000 and adult peritoneal dialysis patients for the time period October 2000–March 2001.

CMS and the ESRD Networks are committed to improving ESRD patient care and outcomes by providing tools that can be used by the renal community in assessing patient care processes and outcomes and identifying opportunities for improvement. One of these tools includes data feedback reports based on the clinical information obtained from the ESRD CPM Project, formerly known as the ESRD CIP. We invite the renal community to provide us with ideas and feedback as to ways CMS and the Networks can best help the community to improve patient care.

## a) PROJECT METHODS

The purpose of the ESRD CPM Project is to provide comparative data to ESRD caregivers to assist them in assessing and improving the care provided to dialysis patients. The data collected in 1994 (for the time period October-December 1993) established a baseline estimate for important clinical measures of care for adult in-center hemodialysis patients in the United States (11). From 1994 to 1998, CMS collected ESRD data under the ESRD CIP. The purpose of these data collections was to determine whether patterns in these clinical measures had changed and if opportunities to improve care continued to exist (12-16).

The first data collection effort for the ESRD CPMs was con-ducted in 1999. It examined data from October–December 1998 for adult in-center hemodialysis patients, and from October 1998 to March 1999 for adult peritoneal dialysis patients. Information to calculate the CPMs was collected and further opportunities to improve care were identified (17).

The second data collection effort for the ESRD CPMs, conducted in 2000, examined data from October-December 1999 for adult and pediatric in-center hemodialysis patients, and from October 1999-March 2000 for adult peritoneal dialysis patients (18).

This report describes the findings from the third data collection effort for the ESRD CPMs which was conducted in 2001 and collected data from October-December 2000 for adult and pediatric in-center

hemodialysis patients, and from October 2000 -March 2001 for adult peritoneal dialysis patients. These data help to determine if there are opportunities to improve care and to evaluate patterns of care across the nation.

## b) The Sample

Annually, each ESRD Network conducts a survey of ESRD facilities to validate the census of ESRD patients in the Network at the end of the calendar year. In March 2001, a listing of adult (aged ? 18 years as of September 30, 2000) in-center hemodialysis and adult peritoneal dialysis patients who were alive and dialyzing on December 31, 2000, was obtained from each of the 18 ESRD Networks. The listing included, but was not limited to, the following information about each patient who met the project criteria: last name, first name, middle initial, date of birth, gender, race, Social Security and/or Health Insurance Claim number, underlying etiology of ESRD, date that dialysis was initiated, and provider number of the facility where the patient was dialyzing.

From this universe of patients, a national random sample, stratified by Network, of adult in-center hemodialysis patients was drawn. The sample size of adult in-center hemodialysis patients was selected to allow estimation of a proportion with a 95% confidence interval around that estimate no larger than 10 percentage points (i.e., ±5%) for Network-specific estimates of the key Hemodialysis s and other indicators. Additionally a 30% over-sample was drawn to compensate for an anticipated non-response rate and to assure a large enough sample of the adult in-center hemodialysis patient population who were dialyzing at least six months prior to October 1, 2000. The final sample consisted of 8,853 in-center hemodialysis patients.

The peritoneal dialysis patient sample included a random selection of 5% of adult peritoneal dialysis patients in the nation. Additionally, a 10% over-sample was drawn to compensate for an anticipated non-response rate. The final sample consisted of 1,439 peritoneal dialysis patients.

All pediatric (aged $\geq$12 and < 18 years) in-center hemodialysis patients in the U.S. (n = 516) were included in the 2001 ESRD CPM Study.

A 5% national random sample of hemodialysis facilities was also drawn and consisted of 214 hemodialysis facilities. These facilities were surveyed to obtain information regarding post-dialysis BUN sampling, dialyzer reuse, and measurement of total cell volume of reprocessed dialyzers.

This year's data collection was unique in that it included a 5% sample of adult Asian in-center hemodialysis patients in the U.S. A Supplemental Report describing the results of the data collected on the Asian adult in-center hemodialysis patients is planned for 2002.

## c) Data Collection

Three data collection forms were used: a three-page in-center hemodialysis form, a four-page peritoneal dialysis form, and a one-page hemodialysis facility-specific form (Appendices 2, 3, and 4 respectively); the use of these forms was authorized through the National Institutes of Health (NIH) clinical exemption process. Descriptive information on each selected patient and hemodialysis facility was printed onto gummed labels, and sent to the individual ESRD Networks along with the forms to be used to collect the data. If demographic information (e.g., name, date of birth, race) or clinical

information (e.g., date that initial dialysis occurred) was incorrect, facility staff were asked to correct the information on the forms. Staff at ESRD facilities were also asked to abstract ethnicity and clinical information from the medical record of each selected patient. In May 2001, the data collection forms for patients and facilities

in the sample were distributed to ESRD facilities. Clinical information contained in the medical record was abstracted for each patient in the adult hemodialysis sample and among all pediatric in-center hemodialysis patients who received in-center hemodialysis at any time during October, November, and December 2000. Clinical information contained in the medical record was also abstracted for each patient in the adult peritoneal dialysis sample who was receiving peritoneal dialysis at any time during the two-month periods of October–November 2000, December 2000–January 2001, and February–March 2001.

Completed forms were returned to the appropriate Network, where data were reviewed for acceptability and manually entered into a Visual FoxPro data entry program. In August 2001, each Network sent a copy of their Visual FoxPro data files to CMS's contractor, ESRD Network 9/10, in Indianapolis, Indiana, where the data were aggregated and then submitted to CMS, in an Epi Info, v.6.04a file (19), for the initial analysis.

## d) CLINICAL PERFORMANCE MEASURES (CPMs)

The clinical information abstracted by facility staff is used in this report to describe some of the CPMs that were developed from the NKF-DOQI Guidelines and other quality indicators for several conditions of care for adult dialysis patients. These CPMs do not apply to patients under the age of 18 years. The CPMs were developed in the areas of hemodialysis and peritoneal dialysis adequacy, vascular access and anemia management. A complete description of the 15 CPMs appears in Appendix 1. The CPMs used for this report were modified slightly from the initial version for clarification and to facilitate data analysis.

## e) Hemodialysis Adequacy CPMs

I. The patient's delivered dose of hemodialysis is measured at least once per month.

II. The patient's delivered dose of hemodialysis reported in the patient's chart is calculated by using formal urea kinetic modeling (UKM) or the Daugirdas II formula for Kt/V.

III. The patient's (for those patients on hemodialysis six months or longer and dialyzing three times per week) delivered dose calculated from data points on the data collection form (monthly measurement averaged over the three-month study period) of hemodialysis is $Kt/V > 1.2$.

The clinical information collected to calculate these adequacy CPMs also allows us to describe other aspects of dialysis adequacy (or indicators), such as the mean Kt/V values for hemo-dialysis patients in each Network area and in the US.

## f) Peritoneal Dialysis Adequacy CPMs

I. The patient's total solute clearance for urea and creatinine is measured routinely (defined for this report as at least once during the six-month study period).

II. The patient's total solute clearance for urea (weekly Kt/V urea ) and creatinine (weekly creatinine clearance) is calculated in a standard way. (See Peritoneal Dialysis Adequacy CPM II in Appendix 1.)

III. For patients on continuous ambulatory peritoneal dialysis (CAPD), the delivered peritoneal dialysis dose is a total Kt/V urea of at least 2.0 per week and a total creatinine clearance (CrCl) of at least 60 L/week/1.73 m 2 OR evidence that the dialysis prescription was changed if the adequacy measurements were below these thresholds.

For CCPD patients (cycler patients with a daytime dwell), the weekly delivered peritoneal dialysis dose is a total Kt/V urea of at least 2.1 and a weekly total creatinine clearance of at least 63 L /1.73 m 2 OR evidence that the dialysis prescription was changed if the adequacy measurements were below these thresholds.

For NIPD patients (cycler patients without a daytime dwell), the weekly delivered peritoneal dialysis dose is a total Kt/V urea of at least 2.2 and a weekly total creatinine clearance of at least 66 L /1.73 m 2 OR evidence that the dialysis prescription was changed if the adequacy measurements were below these thresholds.

## g) Vascular Access CPMs

I. A primary arterial venous fistula (AVF) should be the access for at least 50% of all new patients initiating hemodialysis. A native AVF should be the primary access for 40% of prevalent patients undergoing hemodialysis.

II. Less than 10% of chronic maintenance hemodialysis patients should be maintained on catheters (continuously for > 90 days) as their permanent chronic dialysis access.

III. A patient's AV graft should be routinely monitored for stenosis. (See Vascular Access CPM III in Appendix 1 for a list of techniques and frequency of monitoring used to screen for the presence of stenosis.)

## h) Anemia Management CPMs

I. The target hemoglobin for patients prescribed Epoetin is 11-12 gm/dL. Patients with a mean hemoglobin >12 gm/dL and not prescribed Epoetin were excluded from analysis for this CPM.

IIa. For anemic patients (hemoglobin < 11 gm/dL in at least one study month) or patients prescribed Epoetin, the percent transferrin saturation and serum ferritin concentration are assessed (measured) at least once in a three-month period.

IIb. For all anemic patients (hemoglobin < 11 gm/dL in at least one study month) or patients prescribed Epoetin, at least one serum ferritin concentration ≥ 100 ng/mL and at least one transferrin saturation > 20% were documented during the three-month study period.

III. All anemic patients (hemoglobin < 11 gm/dL in at least one study month) or patients prescribed Epoetin, and with at least one transferrin saturation < 20% or at least one serum ferritin concentration < 100 ng/mL during the study period are prescribed intravenous iron; UNLESS the mean transferrin saturation was > 50% or the mean serum ferritin concentration was > 800 ng/mL; UNLESS the patient was in the first three months of dialysis and was prescribed a trial dose of oral iron.

## i) SERUM ALBUMIN

Although serum albumin is not a CPM for this data collection period, it is one of the original core indicators and was chosen as an indicator for assessing mortality risk for adult in-center hemodialysis patients and adult peritoneal dialysis patients. This project collects the serum albumin value as well as the test method (bromcresol green [BCG] method and bromcresol purple [BCP] method) because these two methods are commonly used for determining serum albumin concentrations and have been reported to yield systematically different results—the BCG method yielding higher serum albumin concentrations than the BCP method (20).

For the history of this project, mean serum albumin values < 3.5 gm/dL by the BCG method have been defined as an indicator of inadequate serum albumin. Since the percent of mean serum albumin values < 3.2 gm/dL by the BCP method was nearly the same as the percent of mean serum albumin values < 3.5 gm/dL by the BCG method, we have historically also defined a BCP result < 3.2 gm/dL as an indicator of inadequate serum albumin. Mean serum albumin values ≥ 4.0 gm/dL (BCG method) and ≥ 3.7 gm/dL (BCP method) have been defined as indicators of optimal serum albumin.

In June 2000, the NKF K/DOQI Guidelines for Nutrition in Chronic Renal Failure were published. Guideline 3 of the Clinical Practice Guidelines states that a pre-dialysis or stabilized serum albumin equal to or greater than the lower limit of normal range (approximately 4.0 gm/dL for the bromecresol green method) is the outcome goal (21).

Findings from this project allow us to report the percent of patients with mean serum albumin values ≥ 4.0 gm/dL (BCG method) and ≥ 3.7 gm/dL (BCP method) and the percent of patients with mean serum albumin values ≥ 3.5 gm/dL (BCG method) and 3.2 gm/dL (BCP method) for adult hemodialysis patients in each Network area and nationally, and nationally for adult peritoneal dialysis patients and pediatric hemodialysis patients.

## j) PEDIATRIC IN-CENTER HEMODIALYSIS PATIENTS

Although there are no CPMs established for the pediatric age group, demographic and clinical information from October-December 2000 were collected on all adolescent patients (≥ 12 and < 18 years) in the U.S. in order to describe several core indicators of dialysis care. These core indicators included hemodialysis adequacy, vascular access, anemia management, and serum albumin.

# C. DATA SYSTEMS

## 1. ESRD PROGRAM MEDICAL MANAGEMENT AND INFORMATION SYSTEM (PMMIS)/RENAL BENEFICIARY AND UTILIZATION SYSTEM (REBUS) (PMMIS/REBUS)

### a) Databases

The following table describes the databases which comprise the PMMIS/REBUS data system.

| DATABASE | YEARS AVAILABLE | DESCRIPTION | DATA SOURCE |
|---|---|---|---|
| PATIENT MASTER FILE (IDEN) | 1977-PRESENT | BASIC PATIENT IDENTIFICATION, DEMOGRAPHIC, AND ELIGIBILITY DATA | EDB, NETWORKS |
| MEDICAL EVIDENCE (ME) | 1977-PRESENT EXTENSIVELY REVISED 1981 | PATIENT IDENTIFICATION, DEMOGRAPHIC, AND CAUSE OF ESRD DATA PLUS DATE OF FIRST DIALYSIS | HCFA FORM 2728 ESRD MEDICARE ENTITLEMENT AND/OR PATIENT REGISTRATION |
| DEATH NOTIFICATION (DN) | 1977-PRESENT EXTENSIVELY REVISED 1990 | PATIENT IDENTIFICATION, PLACE, DATE AND CAUSE OF DEATH (1 PRIMARY AND UP TO 4 SECONDARY, RENAL REPLACEMENT THERAPY DISCONTINUED AND REASONS WHY, TRANSPLANT, FUNCTIONAL, DIALYSIS AFTER TRANSPLANT | HCFA ESRD DEATH NOTIFICATION FORM 2746 |
| TRANSPLANT EVENT DATA | 1977-PRESENT FORM REVISED 1982, PARALLEL COLLECTION BY HCFA AND UNOS* 1987-1993 | TRANSPLANT DATE, DONOR CHARACTERISTICS, RECIPIENT CHARACTERISTICS | ESRD TRANSPLANT INFORMATION, FORM HCFA-2745; NUMEROUS UNOS/PHS/HCFA FORMS REPLACED BY UNET SYSTEM – OPTN NETWORK LEVEL. |
| TRANSPLANT FOLLOW-UP DATA | 1977-PRESENT REVISED LIKE TRANSPLANT EVENT DATA | PATIENT STATUS, GRAFT STATUS, PATIENT LOCATION, IMMUNOSUPPRESSIVE UTILIZATION, DEATH DATES, CAUSE OF DEATH, CAUSE OF GRAFT FAILURE COLLECTED AT DISCHARGE, 6 MONTHS POST TRANSPLANT, EACH YEAR POST TRANSPLANT, AND AT GRAFT FAILURE | HCFA ESRD TRANSPLANT FOLLOW-UP FORM; UNOS/PHS/HCFA RECIPIENT FOLLOW-UP FORMS REPLACED BY UNET SYSTEM – OPTN NETWORK LEVEL |
| DIALYSIS SUMMARY (QDIAL) | 1977-PRESENT | PATIENT IDENTIFICATION, QUARTERLY SUMMARY OF DIALYSIS BILLS (INCLUDES A SUMMARY OF SESSIONS AND EPO AND DIALYSIS CHARGES AFTER CIRCA 1995 BUT NOT OF TOTAL CHARGES OR | COMMON WORKING FILES |

| | | | |
|---|---|---|---|
| | | PAYMENTS) | |
| INPATIENT STAYS | 1977-PRESENT | PATIENT IDENTIFICATION, UP TO 5 DIAGNOSES, UP TO 3 PROCEDURES, DRG, AND EPO CHARGE (NO TOTAL CHARGE OR PAYMENT) | COMMON WORKING FILES |

### b) Enhancements to input databases

On the IDEN database records, PMMIS/REBUS includes information about the most recent dialysis provider, date of last dialysis session, dialysis type, information about the first and last administration of EPO, identification of the first dialysis treatment date, and the cause of ESRD. PMMIS/REBUS verifies modality, provider and setting and also tries to catch and remove duplicate entries (caused mainly when a patient who previously had an "XX" or "T" BIC becomes Medicare eligible and receives a 'real' HIC and BIC).

On the Medical Evidence database, PMMIS/REBUS runs a test algorithm to verify eligibility for Medicare and certain dates and adds the results of the test. Also, a certification date is added.

On the Death Notification database, PMMIS/REBUS runs a set of edits and indicates the result in a variable.

In February 2002, the Office of Inspector General issued a report titled "Problems Pervade the Renal Beneficiary and Utilization System." This report discusses a number of issues of accuracy and timeliness in the REBUS database and the approaches that CMS is taking to address these issues in the development of REMIS, SIMS, and VISION.

## 2. KIDNEY EPIDEMIOLOGY AND COST CENTER (KECC) ESRD DATABASE

### a) Databases

The following table describes the databases which comprise the KECC data system.

| Database | Years available | Description | Data Source |
|---|---|---|---|
| Institutional Medicare Claims | 1989-present | All claims data from inpatient hospitals, Skilled Nursing Facilities (SNFs), Outpatient facilities (hospital-based and free-standing), Hospices, and Home Health Agencies. The database contains total charges, total payments, dialysis sessions and charges, EPO administrations, doses and charges, DRG (inpatient only) | HCFA Standard Analytical Files (SAFs) REBUS/PMMIS Dialysis Summary and Inpatient Stays |
| Institutional Medicare Details | 1989-present | Key variables to link to the relevant Claim, a code value which can be a claim condition code, a diagnostic code, an ICD-9 procedure code, a revenue center code, a discharge status code or a claim value code corresponding to trailer records in the HCFA SAF | HCFA Standard Analytical Files (SAFs) REBUS/PMMIS Dialysis Summary and Inpatient Stays |
| Physician/Supplier | 1991- | Line items containing diagnoses, HCFA Common | HCFA Physician/Supplier |

| | | | |
|---|---|---|---|
| Medicare Claims | present | Procedure Coding System (HCPCS) codes, Service code, type of service code, place of service code, submitted charge, allowed charge, and payment, provider Universal Physician Identification Number (UPIN), provider specialty code, and primary payer code | SAFs |
| Patients | 1977-present | PMMIS/REBUS patient demographics, unique patient id, date of first ESRD service computed based on PMMIS/REBUS Medical Evidence database, Medicare dialysis claims, and kidney transplant dates, death date and causes of death from PMMIS/REBUS Death Notification database | HCFA Patient Master File (IDEN), Medical Evidence, inpatient SAF, outpatient SAF, UNOS transplant files |
| Medical Evidence | 1977-present | Same as PMMIS/REBUS with unique patient id | HCFA Medical Evidence (ME) |
| Facility | 1980-present | Derived from HCFA Annual Facility Survey with added unique facility ID | HCFA Annual Facility Survey |
| Residence | 1989-present | A residence history (up to 50 occurrences) for ESRD patients | Derived from HCFA EDB |
| Inpatient Hospital Stays | 1989-present | Contains from and through dates, DRG, dialysis sessions, up to 10 diagnoses, up to 10 procedures, and the current ESRD treatment modality. | Derived from the inpatient SAF and the KECC Treatment History database. |
| Treatment History | 1989-present | The treatment history is a record of time periods in one modality of treatment with one provider. In addition to the overall history, periods following a 60-day rule are also maintained, i.e., less than 60 days on a modality in one provider are not treated as a separate period. | Derived from Patients, Medicare Claims (SAFs), PMMIS/REBUS Quarterly Dialysis and PMMIS/REBUS Inpatient Stays |
| Transplant | 1977-present | Patient Demographic and clinical transplant details | UNOS OPTN Scientific Registry of Transplant Recipient Files (SRTR) |
| Transplant Follow-up | 1977-present | | SRTR Follow-up Files |
| Transplant Wait list | 1995-present | | SRTR Waitlist Files |

## b) Enhancements to input database

The primary addition to the HCFA data from which the KECC databases are derived is a unique patient identifier. A unique patient identifier is assigned and is used across all of the data sources, allowing the various sources to be treated as a single integrated database. Patient IDs are assigned to each data record by matching the patient identifiers on that record to a central table of patients. This process eliminates a substantial number of duplicate patient records.

A date of first ESRD service is computed for each patient based on the Medical Evidence Form, Medicare dialysis claims, and kidney transplant dates. This date is used as the start of ESRD for each patient. This process also determines whether there is enough data for this patient to establish that they really have ESRD.

For kidney transplants, the database computes transplant failure dates based on the Medical Evidence Forms indicating a return to dialysis, a resumption of Medicare dialysis claims, the occurrence of a subsequent transplant, or a Transplant Follow-up record indicating a graft failure.

## 3. STANDARD INFORMATION MANAGEMENT SYSTEM (SIMS)

SIMS is the Standard Information Management System of the ESRD Networks. As described in the *SIMS Training Manual*, SIMS consists of

- computer hardware at each of the 18 ESRD Network offices and at 2 central repository locations,
- a secure wide-area computer network connecting the ESRD Network offices with each other, with the repositories, and with CMS
- software for data entry, database management, and reporting
- databases at each ESRD Network office that are consolidated into a center database
- a central help desk

The software supports entry of CMS-2728, CMS-2746, CMS-2744, patient events, and facility/physician information as well as additional forms. These forms will support viewing and updating existing entries, as well as adding in brand new information. More specifically SIMS provides for:

- **2728/2746** - Data entry, validation and queuing of CMS-2728 and CMS-2746 forms for electronic submission to CMS.
- **2744** - Automatic generation of CMS-2744 forms based on the patient event tracking data. The preliminary CMS-2744, with accompanying reports, can be sent to facilities for verification before the final CMS-2744 forms are submitted to CMS electronically.
- **Patient Demographics** - Data entry and reporting of patient demographics for annual incidence and prevalence reporting and ability to produce mailing labels for all patients.
- **Patient Events** - Data entry and reporting of a database for tracking significant patient events, including transfers in and out as well as other losses and gains to the patient populations of facilities, and changes in patient modality and transplant status.
- **Facility Information** - Data entry, management and reporting of facility information, including physical and mailing addresses, phone and fax numbers, services offered, etc. of facilities in the Network. SIMS will also provide for data entry, management and reporting of key staff members of the facilities in the Network, including alternate address (e.g. for people preferring to receive mail at home), job category, kinds of mailings to be sent.
- **Grievances/Contacts** - ESRD patients and/or their representative contact the Network seeking assistance with several issues such as quality of care problems, request for information, personnel issues, treatment options, and communication difficulties. A method of tracking and categorizing these beneficiary concerns will be defined and uniformly tabulated.
- **Quality Improvement Projects** - A revolutionary new system will be introduced for the tracking of QIP projects among internal staff, CMS staff and regional CMS project officers. Users will be able to design their QIP project and establish a "workflow" that includes approval processes and the ability to attach documents that can be modified. Users will be alerted of QIP work that has been assigned to them via use of an "inbox", and the program tracks the progress of the project. Users that are not part of the workflow will be allowed to run reports and see work in progress.

When completed, SIMS will allow data entry of ESRD data at the facility level with common fields, common editing, and common acceptable ranges of values that should greatly enhance the quality of the data. Currently Medical Evidence and Death Notification Forms are being transmitted

by SIMS to HCFA. SIMS has the potential to provide a single, regularly updated facility database that brings together data items that are currently unavailable or unreliable or that currently are available in separate databases. The chain ownership of dialysis facilities data item will be of particular use in studying facility characteristics, practice patterns, and costs.

When available, patient event tracking across facilities and networks will be of prime importance to determining the facility responsible for each patient at any given point of time. The key advantage of the SIMS system is the availability of variables from currently disparate sources including variables for case mix adjustment, and quality/practice pattern monitoring (see HCFA-2728 for specific variables). The SIMS is intended to centralize and standardize collection of data from several sources and to provide continuously updated data.

### a) Content of SIMS Database

The ESRD Network Organizations Manual specifies in greater detail the data that the ESRD Networks are required to maintain. The following text is excerpted from that Manual.

#### (1) General Patient Data

- Social security number;
- Health insurance claim number;
- Date of birth;
- Sex;
- Race;
- Ethnicity;
- First name;
- Last name;
- State or zipcode of residence;
- Patient employment status (from medical evidence form); and
- Medical coverage (from medical evidence form).

#### (2) Patient Events

Date of event and provider at time of event for the following events:

- Dialysis after transplant - when a patient restarts dialysis therapy after a kidney transplant failure.
- Discontinue - when a patient discontinues ESRD therapy voluntarily or by physician’s recommendation.
- Loss to follow-up - report a patient's loss to follow-up if the facility is absolutely sure that no provider treats this patient. This event should be used sparingly.
- Modality shift - when a patient changes his/her modality of treatment (e.g., from in-center hemodialysis to home continuous ambulatory peritoneal dialysis (CAPD)).
- New ESRD patient - a patient who has been diagnosed with chronic renal disease and has never been on dialysis. A Form HCFA-2728 form is initiated for Medicare eligibility as well as registration in the ESRD program. This also includes a transplant patient who never dialyzed prior to transplantation.

- Recover function - when a patient regains renal function and is able to survive without ESRD therapy.
- Restart - patient who resumes dialysis after he/she discontinued dialysis and/or recovered kidney function.
- Transfer in - occurs when a patient, previously dialyzing as an outpatient in another approved renal facility, transfers to a new facility within or out of your network area. The transferring unit must provide a copy of the patient's Form HCFA-2728 form to the new facility.
- Transfer out - when a patient transfers from one outpatient chronic dialysis facility to another.
- Transfer out for transplant - when a dialysis patient leaves the dialysis unit for a kidney transplant at an approved renal transplant center.
- Transplant - when a patient receives a kidney transplant.
- Transplant failure - when the patient's transplanted kidney no longer functions and there is a need to resume dialysis on a regular basis.

(3) Patient Transfer Events.

a. Date of most recent transfer into network area;
b. Date of most recent transfer out of network area; and
c. Previous State of residence (if known).

(4) Historic Information.

a. Date regular dialysis began;
b. Initial provider number (provider at time of onset, if known);
c. Primary cause of renal failure;
d. Initial patient residence zip code and State; and
e. Initial modality.

(5) Death Information

a. Date of death;
b. Cause of death; and
c. Provider submitting death information.

**b) Facility Data**

- Provider number;
- Name, mailing and physical address, and phone number;
- County name where facility is physically located;
- Names of key staff (medical director, administrator, head nurse);
- Facility ownership type (profit, non-profit);
- Chain organization (Y/N);
- Chain/Corporate affiliation;
- Shifts starting at 5:00 PM or later (Y/N);
- Number of stations (as self reported by the facility); and Modalities offered (hemodialysis, peritoneal dialysis, and/or home training; as self-reported by the facility).

### c) CMS ESRD Forms

- Form HCFA-2728-U3 - ESRD Medical Evidence Report, Medicare Entitlement, and/or Patient Registration (completed on each incident ESRD patient or each patient re-entering the Medicare program);
- Form HCFA-2744 - ESRD Facility Survey (completed annually);
- Form HCFA-2746 - ESRD Death Notification or facility generated Death-Notification Form (completed within 30 days after the death of the patient).

### d) Patient Tracking in the SIMS Database

The patient tracking data in SIMS is the primary new data that SIMS offers. The ESRD Networks are required to track both the patient's treatment modality and the dialysis center at which the patient is being treated, but for a number of reasons, the quality and timeliness of the data are uncertain. The ESRD Networks are required to enter changes in patient status within 90 days of the event. No protocol is given for how the information is to be collected, and we can expect substantial differences in the protocols used by the various ESRD Networks. No validation of the SIMS patient tracking data against Medicare claims data or other data sources has been done.

The SIMS patient tracking data are most useful for determining the status of patients for whom dialysis claims are not being filed. This can occur when the patient is covered by an employer-paid group health plan during the first 24 months of dialysis, when a patient is covered by a Medicare HMO, when a patient has had a transplant, and when a patient recovers renal function. One of the purposes of the patient tracking data is to allow CMS to determine the status of such patients for the purposed of determining whether the patient is still entitled to Medicare ESRD benefits.

## 4. UNITED STATES RENAL DATA SYSTEM COORDINATING CENTER (USRDS CC) DATABASE

### (1) Databases

The following table describes the databases which comprise the USRDS CC data system which is maintained by the Minneapolis Medical Research Foundation (MMRF).

| Database | Years available | Description | Data Source |
|---|---|---|---|
| Institutional Medicare Claims | 1989-present | All claims data from inpatient hospitals, Skilled Nursing Facilities (SNFs), Outpatient facilities (hospital-based and free-standing), Hospices, and Home Health Agencies. The database contains total charges, total payments, dialysis sessions and charges, EPO administrations, doses and charges, DRG (inpatient only), | HCFA Standard Analytical Files (SAFs). |
| Physician/Supplier Medicare Claims | 1991-present | Line items containing diagnoses, HCFA Common Procedure Coding System (HCPCS) codes, Service code, type of service code, place of service code, submitted charge, allowed charge, and payment, provider Universal Physician Identification Number (UPIN), provider specialty code, and primary payer code. | HCFA Physician/Supplier SAFs |
| Patient Roster | 1977-present | PMMIS/REBUS patient demographics, unique patient id | HCFA Patient Master File (IDEN) |
| Medical Evidence | 1977-present | Same as PMMIS/REBUS with unique patient id | HCFA Medical Evidence (ME) |
| Facility | 1980-present | Derived from HCFA Annual Facility Survey with added unique facility ID | HCFA Annual Facility Survey |
| Residence | 1989-present | A residence history (up to 50 occurrences) for ESRD patients | Derived from HCFA EDB |
| Inpatient Hospital Stays | 1989-present | Contains from and through dates, DRG, dialysis sessions, up to 10 diagnoses, up to 10 procedures, and the current ESRD treatment modality. | Derived from the inpatient SAF and the Treatment History database. |

| | | | |
|---|---|---|---|
| Treatment History | 1989-present | The treatment history is a record of time periods in one modality of treatment with one provider. In addition to the overall history, periods following a 60-day rule are also maintained, i.e., less than 60 days on a modality in one provider are not treated as a separate period. | Derived from Patients, Medicare Claims (SAFs), PMMIS/REBUS Quarterly Dialysis and PMMIS/REBUS Inpatient Stays |
| Transplant | | Patient Demographic and clinical transplant details | UNOS OPTN Recipient Files |
| Transplant Follow-up | | | UNOS OPTN Follow-up Files |
| Transplant Wait list | | | UNOS OPTN Waitlist Files |

### b) Variables calculated and added to input database

The current USRDS database for 2000 has made use of a graphical information system (GIS) to enhance the geographical presentation of ESRD data.

## D. SPECIAL STUDIES

## 1. DIALYSIS MORTALITY AND MORBIDITY STUDY (DMMS)

### a) Sample

The USRDS Dialysis Morbidity and Mortality Study (DMMS) is an observational study in which demographic, comorbidity, laboratory, treatment, socioeconomic, and insurance data were collected for a large random sample of U.S. dialysis patients, using the patient's dialysis records. The study included 4 phases ("waves") of data collection on over 20,000 randomly selected dialysis patients over a 3-year period. Almost all Medicare certified dialysis facilities participated in one of the four waves. Pediatric dialysis facilities (defined as those having 30% or more pediatric patients) were excluded from participation in the DMMS as they had just been included in a separate Pediatric Growth and Development Study.

A sample of dialysis units (N=550) was randomly selected for Wave I of the DMMS from the Master List of Medicare Approved Dialysis Facilities as of December 31, 1993. This Master List exists as part of the annual Medicare Survey of Dialysis Facilities. The sample of patients selected for Wave I of the DMMS was selected from a national census of hemodialysis patients as of December 31, 1993. This census of hemodialysis patients (Medicare and non-Medicare) was provided by the 18 ESRD Networks. Patients were excluded if they were less than 15 years of age, in training for any self care treatment, or receiving Continuous Ambulatory Peritoneal Dialysis (CAPD), home hemodialysis or other dialysis on 12/31/93. From the 550 selected facilities, a total of 6300 in-center hemodialysis patients were selected for inclusion in the study (to achieve a sample size goal of 6000 patients, assuming a 95 percent response rate) in the following manner: To increase the number of incident (new) patients included, all hemodialysis patients starting therapy in December of 1993 were included

(N=1100 expected). The remaining 5200 patients were randomly selected from the remaining eligible patients receiving hemodialysis on December 31, 1993 at the selected facilities. Approximately one in five patients were selected from each facility to obtain the desired sample size. Of these, it was expected that approximately 25 percent would have started hemodialysis in 1993 (also labeled "incident") and the remainder would have started in prior years (labeled "prevalent"). The "core" set of data questions was administered to all patients in the sample. Patients identified as incident in 1993 (all patients starting hemodialysis in December 1993 in addition to a random sample of patients starting ESRD treatment in the remaining months of 1993 and on hemodialysis on December 31, 1993) were included in the "non-core" study of vascular access. A random selection of one half of the overall sample of 6300 patients was drawn for the nutrition and anemia studies.

A sample of U.S. dialysis units was randomly selected for each of Waves 2, 3, and 4 of the DMMS. The dialysis units included in Waves 2, 3 and 4 are each a random selection of 25 percent of the dialysis units in the United States listed on the Master List of Medicare Approved Dialysis Facilities as of December 31, 1993 and not already included in Wave 1. The Master List exists as part of the annual ESRD Facility Survey.

Wave 2 of the DMMS is a prospective study of incident hemodialysis and peritoneal dialysis patients (Medicare and non-Medicare) who initiated ESRD therapy in 1996. Since Wave 2 included a sample of patients starting dialysis in 1996/97, the dialysis units for this Wave were a random selection of 25 percent of the dialysis units listed on the December 1993 Master List in addition to all new dialysis units opening after January 1, 1994. For the purposes of this study, the definition of an incident patient is one who is receiving regular in-center hemodialysis or any type of peritoneal dialysis treatments for chronic renal failure at least once weekly for the first time. This does not include patients receiving intermittent dialysis treatments for fluid overload or heart failure. Modality type was identified on day 60 of ESRD. Patients treated with peritoneal dialysis or hemodialysis on this date (day 60) were eligible. The modality assignment for patients on HD but training for PD on day 60 was deferred 10 days. Patients were excluded if they were on another form of therapy e.g. home hemodialysis, if they had a previous transplant, or if they were less than 18 years of age. The study start date was considered the date that the modality type was defined (about day 60 of ESRD). To obtain comparable numbers of PD and HD patients within the sample, PD patients were oversampled. All eligible incident PD patients were included whereas only twenty percent of all corresponding HD patients were included, selecting only those whose social security number ended with "2" or "9".

From among the randomly selected dialysis units for Waves 3 and 4, the sample of patients selected for Waves 3 and 4 of the DMMS was selected from a national census of hemodialysis patients as of December 31, 1993. The 18 ESRD Networks provided this census of hemodialysis patients (Medicare and non-Medicare). For all Waves, patients were excluded if they were less than 15 years of age, if they were on home hemodialysis, or if they had a previous transplant. For Waves 3 and 4, patients were also excluded if they were in training for any self-care treatment or if they were on peritoneal dialysis. For Wave 2, patients on peritoneal dialysis were included. Modality assignment for Wave 2 was defined on day 60 of ESRD. The modality assignment for patients on HD but who were training for PD on day 60 was deferred 10 days.

### b) Years

The year for which information was requested for Waves 1, 3, and 4 is 1994. Wave 2 describes events occurring in 1996-1997.

### c) Key variables for case mix evaluation

The core component of the DMMS contains information on comorbid conditions present in 1994 and practice patterns, both of which will be useful for case mix adjusting and for checking the sensitivity of case mix adjusting. The DMMS may be used as a source of comorbidities that are collected after the onset of ESRD. Comorbidities for this nationally representative sample can be linked to claims data to develop benchmark cost models and determine how sensitive these models are to the exclusion of comorbidities that would be difficult to reliably measure on a national basis. Also, the prevalence of comorbidities in DMMS could be compared to other sources such as the HCFA 2728 and claims records. Among the comorbid conditions captured are smoking status, prior diagnosis of congestive heart disease, coronary artery disease, angina, myocardial infarction, cardiac arrest, cerebrovascular accident, transient ischemic attacks, peripheral vascular disease, absent foot pulses, claudication, congestive heart failure, pericarditis, diabetes, lung disease, neoplasm (together with site), bilateral amputee, cardiomegaly by X-ray, left ventricle hypertrophy by EKG or echocardiogram, and AIDS. Also captured are prior treatments such as bypass surgery, coronary angioplasty, coronary angiography (with status), amputation due to peripheral vascular disease, limb amputation (other cause), and insulin therapy. Among the therapies captured are whether parenteral iron was administered, the route of administration, the date of first administration, the dose, the number of administrations per week; whether EPO was administered, units of EPO per administration, units of EPO per week, EPO administration start date post ESRD, most recent hematocrit prior to administration, and whether EPO was administered prior to ESRD onset.

### d) Linkability

The collection form for the DMMS Waves, 1, 3, and 4 contained social security numbers (SSNs), and Medicare HICs, name, and sex obtained from the December 31, 1993 Network censuses, as well as space for correction by the facility. Wave 2 contained space for the facility to enter name, sex, SSN, HIC, and birth date. Given this information we were able to link more than 90% of the DMMS data with the KECC database; the non-linked patients are predominantly not eligible for Medicare.

### e) Collection form and method

The data collection forms for the various waves of the DMMS and for the various special studies that accompanied each wave appear in Appendix 1. The DMMS forms were filled out in the dialysis facility by facility staff. A validation study was performed by network staff who validated a subset of the data collected on the core form.

## 2. DIALYSIS OUTCOMES AND PRACTICE PATTERNS STUDY (DOPPS)

## a) Sample

The Dialysis Outcomes and Practice Patterns Study (DOPPS) is a prospective, longitudinal, observational study of hemodialysis patients and facilities in seven countries with large populations of dialysis patients: France, Germany, Italy, Japan, Spain, the United Kingdom, and the United States. The goal of the study is to determine which practice patterns are associated with the best patient outcomes, with adjustment for a wide range of patient case-mix characteristics. The primary outcomes of interest are mortality, hospitalization, quality of life, and vascular access events. The facility sample from the seven countries consists of 327 hemodialysis centers in which 24,392 patients were treated when the study began. A random sample of 10,332 patients has been selected thus far for more detailed longitudinal data collection. Departing patients are replaced during the study. A study coordinator at each dialysis facility collects baseline and longitudinal patient data. Patients are asked to complete a questionnaire that addresses quality of life on a yearly basis. The medical director and nurse manager in each facility complete a practice pattern questionnaire. The study was initiated sequentially in the United States, then Europe, and finally Japan, between 1996 and 1999 and is currently ongoing in all countries.

The countries were selected on the basis of geographic diversity, variation in practices and outcomes, and relatively large numbers of ESRD patients. The basic study design and study instruments are shared across all countries with minor local modifications as necessary.

Facility Sample. In the United States, a stratified random sample of chronic hemodialysis facilities was selected to achieve variation in practice patterns and outcomes. The initial sampling frame consisted of a random subsample of a listing of dialysis facilities published by the Health Care Financing Administration (HCFA). For each dialysis facility, a measure of mortality was estimated using the adjusted mortality ratio (AMR) for the year 1996, based on publicly available measures of crude mortality, mean age and percent of diabetic patients in each facility. The AMR estimates the standardized mortality ratio (SMR), which is the ratio of observed to expected deaths in a facility where expected deaths are based on the age, race, sex, and diabetic status of each patient treated in the center. The AMR is based on average rather than individual patient characteristics. A simple random sample of 97 dialysis facilities was initially selected without regard to the AMR. In order to augment the representation of facilities with extremes in outcomes (and potentially in practice patterns), a purposive sample of 31 facilities were drawn from the upper tail and 33 from the lower tail of the AMR distribution. A representative description of US dialysis facilities can be obtained using the random sample or the overall sample weighted by the probability of facility selection.

In Europe, the sample is composed of 20 dialysis centers from each of the five participating countries for a total of 100 facilities. Facilities were sampled from all dialysis facilities in each country, obtained from national sources with the assistance of the country investigators. Within each country, the sample was proportionately stratified by geographic region and facility type in order to assure that the facilities were representative. As the number of geographic regions generally exceeded the sample size, sample stratification was achieved by setting a maximum quota for each region. The facility type strata were determined by the conventions used in each country (e.g. center vs. satellite centers). In Japan, 66 dialysis facilities were enrolled from a national list of hemodialysis facilities. The sample was stratified by geographic region (prefecture) and facility type.

Facilities treating fewer than 20 chronic hemodialysis patients in the US and fewer than 25 elsewhere were excluded for reasons of study efficiency (the minimum size was increased for Europe and Japan

because fewer facilities were enrolled than in the US). This restriction led to the exclusion of fewer than 5% of all hemodialysis patients in each country. Facilities treating less than the threshold number of patients after recruitment (because the patient count declined after facility enrollment) were retained in the study.

Patient Sample. At the start of the project, the study coordinator in each participating facility listed the census of prevalent in-center hemodialysis patients greater than 17 years of age. This census listing includes basic patient information such as age, race, sex, and the cause of ESRD. At regular intervals of approximately every four months, the census is updated to indicate all new and departed patients since the last census update. The date and reason for each departure are entered on the census form. Within each participating facility, the census listing was used to select a random sample of 20 to 40 patients, varying according to the size of the facility. Detailed longitudinal data collection is performed for this representative sample of patients. Departed patients are replaced approximately every four months, using random selection from the patients entering the dialysis facility during the interval.

Data Collection. A study coordinator in each participating dialysis center performs data collection. In addition, specific questionnaires are completed by sampled patients, the medical director, and the nurse manager of each participating facility. The cumulative census form provides basic data about all hemodialysis patients treated in each facility (see above). The study coordinator completes a detailed medical questionnaire for each patient selected for the sample. Medical questionnaire information is largely abstracted from the medical record, supplemented by personal knowledge of the patients. The medical questionnaire addresses a variety of areas including ESRD history, medical and psychosocial history, dialysis prescription, laboratory data, and prescribed medications at the time of study enrollment. The study coordinator completes an interval summary approximately every four months for each sampled patient. The interval summary updates laboratory data, dialysis prescription, medication use and the interval occurrence of hospitalizations, outpatient events and medical interventions, vascular access events, and departures. Patients are asked to complete a questionnaire that includes the Kidney Disease Quality of Life survey (KDQOL™) and modules concerning pre-ESRD care, economic aspects of ESRD, employment and rehabilitation. Patients repeat the KDQOL™ survey each year.

Facility practice patterns are measured by comprehensive questionnaires that are completed by the medical director and the nurse manager (or designee) at each dialysis center. These surveys address a wide range of practice and management issues including dialysis prescription, water quality, dialyzer re-use practices, staffing patterns, nutrition, vascular access, and health maintenance and are repeated at yearly intervals. In addition, the summary of patient-specific treatments at the facility level provides valuable information about practice patterns.

The same data collection instruments are used in each country, with minor modifications as appropriate (i.e. incorporation of local terminology, deletion of answer choices known to be unavailable). The questionnaires were translated from American English to French, German, Italian, Japanese, Spanish, and Queen's English. In each country, the translated questionnaires were reviewed for meaning and context by nephrologists and pre-tested in dialysis centers not selected for the study.

**b) Years**

DOPPS data collection began in 1996 and is continuing.

### c) Key variables for case mix evaluation

DOPPS can provide an extensive list of comorbidities (see the list under DMMS) which are collected longitudinally. With DOPPS the development of comorbidities in a dialysis population can be traced. This provides a unique opportunity for testing case mix methodologies.

### d) Linkability

Of course, only the patients from dialysis centers in the United States can be linked with Medicare databases and since DOPPS has non-Medicare patients enrolled, those patients will not link. The Social Security Number is collected by DOPPS and can be matched against the EDB to obtain HICs for those DOPPS patients who are also eligible for Medicare. Nearly 90% of DOPPS United States patients can be linked with Medicare data.

### e) Collection forms

The various data collection forms used in the United States for DOPPS appear in Appendix 1.

## 3. HCFA MANAGED CARE DEMONSTRATION (DEMO)

### a) Sample

The HCFA Managed Care Demonstration seeks to test the notion that managed care can raise the health status of beneficiaries while reducing out-of-pocket costs and overall program costs. The incentive is to provide high quality care such that high cost, acute health episodes are averted. For example, approximately 38% of ESRD program costs are for hospitalizations, and in theory, many of these can be prevented through high delivered dose of dialysis, better care of vascular access, and other “best practices.”

The Medicare ESRD Demonstration project was begun at three sites across the country: Health Options, Inc. (HOI), a subsidiary of Blue Cross/Blue Shield of Florida, based in Miami; Southern California Kaiser Permanente Medical Group (KP), based in Los Angeles; and Xantus Health Care Corporation, based in Nashville, Tennessee. Each program developed its own unique structure, though similarities exist. The demonstration was initiated in September, 1996 and the sites began enrolling patients in 1997.

Managed Care (MC) can be described as a system in which a single, legally-entitled entity accepts the financial and clinical responsibility for the coordination and funding of a broad spectrum of medical care for a group of patients. An important part of this MC concept is that the legal entity agrees to accept a prospective fixed price per patient for a given time period. MC can be contrasted to fee-for-service (FFS) in which the payment structures are to reimburse providers for each medical service on an individual patient basis. The system in place in the United States for End Stage Renal Disease (ESRD) patients is primarily FFS, although the composite rate represents a prospective pricing structure for outpatient routine dialysis services; applied on a per treatment basis. Medicare is the primary insurer for over 90 percent of the ESRD patients in the U.S. regardless of their age. MC is a major alternative for the FFS system and is a central part of health care reform proposals, both

conceptually and practically. Currently Federal law, which governs Medicare, does not permit ESRD patients to join Medicare MC plans, although patients who are in a Medicare Risk MC plan at the time they develop ESRD are eligible to elect to continue MC coverage.

In an attempt to better understand the potential benefits and limitations of MC to provide services for patients with ESRD, the US Congress legislated that a demonstration (Demo) be conducted to test the feasibility and appropriateness of treating ESRD patients under MC plans. In 1996, HCFA made three separate awards to health maintenance organizations to conduct a demonstration of insuring ESRD patients who were otherwise eligible for Medicare primary insurance. These MC organizations selected for the Demo were allowed considerable flexibility in the design and implementation of their insurance plans.

Of the three health plans originally chosen to conduct the Demo, only two have survived into the current period, namely Health Options Inc. (HOI) of Southern Florida and Kaiser Permanente (KP) of Southern California. These Demo plans offer two distinct models of care. The Florida site has primarily fee-for-service (FFS) contracts with the majority of their providers, with the exception of the capitation arrangements made with primary care nephrologists and select specialists. The KP Demo plan is a closed-practice plan for specialist and inpatient care, with the majority of outpatient dialysis services provided under FFS provider contracts (although over the course of the Demo, KP has been internalizing more of their dialysis care). Both plans offer outpatient medications included in their formulary at no cost to patients and medical care with no patient coinsurance obligations. Coinsurance and copayments were waived as part of the "extra benefits" offered, over and above the benefits offered in the standard Medicare Risk HMO, which were intended to equal the additional 5 percent of the Average Annual Per Capita Cost (AAPCC) that the health plans were reimbursed for conducting the Demonstration. In contrast, standard FFS Medicare does not generally cover outpatient medications and typically has a 20 percent patient coinsurance obligation for nearly all medical services.

Existing adult chronic renal failure patients (including hemodialysis (HD) and peritoneal dialysis as well as functioning kidney transplant patients) for whom Medicare was the primary insurer and who were resident in the two geographic areas, were initially recruited by the two Demo sites indirectly through marketing materials mailed by HCFA. Subsequently, the Demo sites were also given opportunities to market directly to ESRD patients and staff at local dialysis facilities. Patients who were already enrolled in the KP Medicare Risk HMO plan were listed and randomized by HCFA and given the opportunity to join the Demo on a two-for-one basis (i.e., for every two new enrollees, KP could enroll one of their existing MC patients into the Demo plan). These KP patients are referred to as "rollover" patients or KP RO. Enrollment commenced in February and June 1998 for the CA and FL Demo sites respectively. Active recruitment and intake was continuous for at least 12 months at both sites, with "passive" enrollment continuing until the end of the three-year Demonstration period.

### b) Comparison samples

Nationally Representative DOPPS Patients. Demo HD patients are compared to a nationally representative sample of US in-center adult HD patients from the Dialysis Outcomes and Practice Patterns Study (DOPPS). Because DOPPS patients are representative of the entire U.S. and thus include only a few dialysis facilities that are located within the Demo service areas, for the focused geographic comparisons, we broadened our selection of DOPPS patients to include those residing

anywhere within CA or FL. Some analyses compare Demo patients to the entire US DOPPS sample and are adjusted for geographic region of the US in these instances.

Approximately 82 percent of DOPPS patients have Medicare primary FFS insurance. Among these patients, a small number (about 5 percent) are covered by Medicare Risk HMO plans. The remaining 18 percent are insured by private health plans (of which, about 30% are managed care plans) or state Medicaid. These patients are most likely in the midst of the coordination period prior to their becoming eligible for Medicare primary coverage.

Matched Geographic Comparison Patients. In addition to the DOPPS, matched samples of FFS and non-Demo MC (NDMC) (i.e., Medicare Risk HMO) patients were also randomly selected from Demo service area dialysis facilities for comparison to the Demo patients. The FFS and NDMC patients were matched to the Demo patients according to their distributions of age, race, and time since onset of ESRD.

Managed Care Kaiser Rollover Patients. Patients who were "rollovers," i.e., those already covered by the Kaiser MC plan who were randomly selected to "roll over" into the Demo plan, need to be treated separately and are denoted as KP RO. Because these patients were found to differ from those enrolling in the Demo program and from FFS, these patients will be separated from the new KP Demo enrollees. A comparison of these KP RO patients to the selected matched sample of NDMC patients may be of interest to see whether differences exist between the two MC groups.

CA and FL Medicare FFS Patients. All ESRD patients residing in California and Florida who were on hemodialysis on December 1, 1998 and had Medicare as their primary insurer were identified using the Medicare Enrollment Database. Claims data from the HCFA Standard Analysis Files were queried for these patients to be used in the analysis of cost and utilization.

### c) Years

The Demo collected data in 1997-98.

### d) Key variables for cost determination

The Demonstration allows comparison of managed care costs compared to fee for service costs among several groups of Medicare patients. The specific variables are the variables of relevance in the HCFA SAFs.

### e) Key variables for case mix evaluation

The Demo used the same set of comorbid conditions that are collected for DOPPS patients.

### f) Linkability

In general the Demo patients can be linked to other Medicare data but, of course, there will be no claims data for these patients during their enrollment period. The Demo did find claims for the year prior to enrollment for the majority of the Demo patients (some had been previously enrolled in the KP MC plan).

### g) Collection forms

See Appendix 1.

## 4. PROVIDER MEDICAL CARE DATABASE

### a) Scope

Patient databases maintained by several chains and facilities include clinical indicators and cost elements for many ESRD patients. Initial discussions with managers of several of these data systems indicate a willingness to share relevant data for this project.

### b) Years available

Varies by provider.

### c) Number of observations

Varies by provider.

### d) Key variables for cost determination

Data from these sources may be available to HCFA and may be useful in occasional special studies. Data may include cost report summaries and billing information.

### e) Ability to link to other databases

Patient data in this database will need to be kept confidential. These data may be available but the ability to link to other databases is not yet clear.

### f) Collection Forms

Varies by provider.

## 5. HEMODIALYSIS STUDY

### a) Scope

The Hemodialysis Study, directed by Tom Greene Ph.D. of the Cleveland Clinic Foundation, is a multicenter randomized clinical trial of hemodialysis prescriptions for patients with end stage renal disease that includes participants from over 65 dialysis facilities associated with 15 clinical centers in the United States.

### b) Years available

The Hemodialysis Study has been collecting data since 1994. Formal randomization of patients began in 1995. The study is scheduled to end in the fall of 2001.

### c) Number of observations

This study uses a recruitment-with-replacement design to maintain a sample size of 900 patients. In all 1517 patients have been enrolled as of July 1, 1999.

### d) Key variables for cost determination

Data from this study are available to HCFA and may be useful in occasional special studies.

### e) Ability to link to other databases

Participants in this study were assigned randomized clinical treatment for study purposes. These data are available but cannot be linked to other databases.

### f) Collection Forms

The data collection forms for this study are not available.

## E. SPECIAL STUDIES

An ESRD Forms Review Workshop took place at CMS on January 31 to February 1, 2001. The comments submitted for consideration, with the recommendations of the ESRD Forms Review Workshop participants are shown in the tables at *http://www.hcfa.gov/quality/3aa4.htm* for:

- End Stage Renal Disease Medical Evidence and/or Patient Registration Form (HCFA-2728)
- ESRD Facility Survey Form (HCFA-2744)
- ESRD Death Notification Form (CMS-2746)

The value of each data item was assessed based upon its relevance to ESRD Registry Management, Program Administration, and Beneficiary Entitlement, with the quality of care for the Beneficiary being paramount. All of the comments, submitted by interested ESRD stakeholders in preparation for the meeting, were considered by the participants. The workgroup recommendations centered on the **content** of the data items collected via the ESRD forms. For each item on the forms, the participants considered:

- Whether the item should be retained
- Whether the item has outlived its usefulness and should be deleted
- Whether new items should be added

These changes would have an impact on an expanded PPS system, especially case mix adjustor methods. The proposed changes to the 2728 form are likely to lead to improved case mix adjustors.

# III. POTENTIAL USES AND LIMITATIONS OF EACH DATABASE

**Much of the data needed to inform the determination of payment rates for a revised PPS and to determine whether case mix adjustments are warranted is at the level of the individual patient. The primary patient file will track the treating facility, dialysis modality, claims and comorbidities for all Medicare eligible ESRD patients. This will involve identifying the patients, their periods of Medicare Primary Payer status, assigning patients to a particular treating facility at each point in time, and then accruing claims and comorbidity history to these identified patients and eligibility periods. These patient data can be linked, as needed, with a variety of data that are available at the facility level, including aggregate costs from the Medicare Cost Reports, annual facility surveys (HCFA and CDC), and regulatory data from OSCAR. Links can also be made for patients in the samples of facilities included in special studies such as DMMS, DOPPS, the Managed Care Demonstration, and the HEMO Trial. The cost reports and claims records are the most important sources of cost and change information.**

## A. HCFA STANDARD ANALYTICAL FILES (SAFS)

The SAFs provide the only means of detailing Medicare spending on renal-related care for all eligible ESRD patients. The Outpatient SAF will be the primary source for information about the current payments received by dialysis facilities for treatment of ESRD patients. The physician/supplier SAF could also be used to determine the extent to which certain services that might be covered under an expanded PPS are currently billed by physician/supplier providers rather than by the dialysis facility. The Outpatient SAF claims filed under non-dialysis revenue centers but providing services identified as renal-related will also be used for the same purpose. Overall, these files will allow the characterization of Medicare payments by patient, by modality, by unit of time, and by specific service or type of service.

In addition to payments and charges which will be used for cost determination, the SAF claims also contain diagnostic codes (ICD-9-CM) and procedure codes, which can be used to track comorbidities and treatment patterns. These will be useful for cost determination and for case mix adjustment.

Analyses will have to recognize several limitations of the SAFs. First and foremost, the SAFs reflect charges for services and Medicare payments. Ideally, we would have data on the cost to facilities of providing services rather than charges and payments. Thus, using claims data as a basis for determining the cost of services requires an assumption that the amounts paid by Medicare provide a reasonable reflection of the costs experienced by an efficient provider delivering the service or that charges can be adjusted to costs based on cost report ratio of cost to charges for ancillary type services. A further limitation of the claims files are that often no Medicare claims are generated when Medicare is not the primary payer for the beneficiary and no Medicare claims are generated for HMO beneficiaries. An additional weakness of institutional SAF claims is that the payment is the payment for the entire claim. The Medicare SAFs contain line items containing HCPCS codes for procedures performed, revenue center codes indicating the relevant revenue center, and diagnoses associated with the performed procedures. They only contain a charge associated with the procedures not a payment. Payments are only the aggregate amount paid for the entire claim (typically a month of services). Individual components covered by the current composite rate are not separately reported on outpatient

dialysis claims, so for items currently included we can only observe the number of dialysis treatments and the allowable payment rate. Due to the current payment limit of 3 weekly sessions, the claims files will not be very useful in determining the differential cost of non-traditional schedules such as daily hemodialysis. Finally, the infrequent updates (quarterly) and the lack of a completely closed database at any given point in time need to be considered. If direct access were available to the National Claims History (NCH, the common working files), this weakness could be cured by continuously updating a claims database. Table 1 from "Reliability and Validity in Hospital Case Mix Measurement", (Pettengill and Vertrees, HCFA Review, Vol. 4:2, 1982) gives and approach as to how hospital costs and billed charges can be combined to yield cost per discharge.

The paid claims data are central to the development of a PPS. Product definition and the determination of which services to include in the basic product will be determined by examining paid claims. Determination of outliers to differentiate payment levels will be determined by examining certain cases within the paid claims. Some equivalent of the claims data will be needed to monitor performance after a prospective payment system is developed. Maintenance of the PPS demands some equivalent of the current claims data so that appropriate adjustments can be made to the PPS as practice patterns and technology change. Similarly some equivalent of the claims will be needed for quality control. The claim equivalent collection should at the least collect diagnoses and procedures performed. For monitoring and refinement purposes, consideration needs to be given to the issue of which components of an expanded bundle (e.g., EPO) need to be specifically reported on the claims and subject to audit. Such reporting requirements would compromise one potential benefit of an expanded bundle (less paperwork for the facility to file and HCFA to process). However, a major weakness of the existing bundle is the difficulty of monitoring the types and quantities of services that go into the billable unit of a dialysis treatment, and hence the difficulty of determining the true cost of dialysis.

## B. HCFA 2728, CHRONIC ESRD MEDICAL EVIDENCE FORM DATABASE

This form is the only universal source of information about the cause of ESRD. The Medical Evidence database will also provide information about comorbidities at ESRD onset affecting the course of the ESRD. Such data will help determine if differential levels of payment should be based on some type of case mix adjustments.

The primary weaknesses are a lack of completeness in many of the forms and the fact that the comorbidities are only available at the start of ESRD. Reporting of comorbidities does not affect the primary purpose of the form, which is to establish Medicare eligibility on the basis of chronic renal failure. Thus, we would expect comorbid conditions to be underreported, and underreporting has in fact been verified by comparisons to the DMMS. Further, the completeness of reporting may vary systematically by physician or region. Because completion of this form is required only at the onset of ESRD, there is no follow-up reporting of newly developed comorbidities or of cured, former comorbidities. Further verification against the DMMS, comorbidities reported in the claims files, or data from dialysis firms would be useful.

## C. HCFA ANNUAL FACILITY SURVEY

The AFS can be used together with cost reports in the development of the PPS to determine if any facility specific differences should be determinants of payment differentials. An example of this is the urban adjustment in the inpatient hospital PPS.

The primary weakness of the HCFA AFS is that its accuracy depends on complete reporting by each facility and full reporting by all facilities. Unfortunately neither of these processes has been validated.

## D. CDC: NATIONAL SURVEILLANCE OF DIALYSIS-ASSOCIATED DISEASES IN THE UNITED STATES, 1999

These facility level data may be useful in the development stage as well as in the ongoing maintenance of the PPS. In particular, they provide a national means of tracking the diffusion of various technologies and practices, provided the surveys are kept sufficiently up-to-date by including any important, new technologies and practices early in their diffusion process.

## E. MEDICARE COST REPORTS

The Medicare cost reports will be important in the development and maintenance of the PPS particularly in the determination of Medicare allowable costs and the cost impact of the PPS. These data may provide some verification that, on aggregate, the assumption that Medicare payments approximate costs is not egregiously wrong. The reports also provide certain statistical data such as staffing patterns and number of dialysis stations as well as on costs. The cost reports should allow the development of a cost to charge ratio which might be useful in estimating costs for line items where only the charge is recorded. They also potentially permit the estimation of statistical cost functions to assess the aggregate impact of dialysis modality mix, comorbidities, and practice patterns on Medicare allowable costs (see Dor, Held, and Pauly, 1992, and Hirth, Held, Orzol, and Dor, 1999).

The primary weakness of the cost reports is that very different formats are used for freestanding dialysis facilities as opposed to hospital-based facilities. The categories, particularly revenue center categories, in the two formats are sufficiently distinct that they really cannot be collapsed and compared on very many categories. Further, since the reports are not used to set payments to individual facilities, the level of auditing is not high. However, studies using cost report data have been able to explain nearly 90 percent of cost variation across facilities, which would not be likely if the data contained many large, non-?random reporting errors.

## F. SIMS – VISION - CROWN

SIMS has become an important part of the overall CMS ESRD data picture and will grow in importance as it matures. Its most important contributions will be a more comprehensive and up-to-

date facility database and the ability to track patients for whom dialysis claims are not being filed. It is unlikely to be of use in the billing process because its data collection protocol is not standardized and because a time lag of up to 90 days in data collection can be expected.

## G. CPMS

The Clinical Practice Measures provide a model for the type of quality control data collection that will be essential to ensure that quality of care is maintained as more services are included in the composite rate.

## H. MEDICARE ENROLLMENT DATABASE (EDB)

The EDB will help to define Medicare secondary payer periods and the HMO membership periods. This will be crucial to the development and maintenance of a PPS because failure to exclude such periods from the cost analysis would generate a downward bias on the estimates.

The weakness of the EDB, if any, is the mode of access to the data. Access can be obtained only through the EDB Workbench. The EDB Workbench is a mainframe clist (list of commands) that operates a set of programs that allow menu-driven access to the EDB data. There are only a small, finite number of ways in which the data can be accessed through the Workbench, e.g., the most common way to access EDB information is by providing a finder file for the Workbench to use to select EDB patient records.

## I. OSCAR

These data are potentially useful in checking the reliability of overlapping items on the Medicare Cost Reports and HCFA and CDC facility surveys, and as a source of information on quality deficiencies identified by state surveyors. This can be useful in the ongoing monitoring of care under the revised PPS. The primary weaknesses are that facilities are not surveyed every year and that although the data elements are uniform nationally, the survey process varies by state.

## J. DEATH NOTIFICATION DATABASE

These data will be used to end the patient's eligibility period.

* * *

The following data sets are available for samples of patients and facilities rather than for the universe of patients or facilities. Their potential uses are therefore limited, but they are likely to play a

significant role in supporting specific parts of the analyses underlying the expanded PPS. These potential uses and limitations will only be briefly described here.

## K. DMMS

The DMMS can serve as a "gold standard" for the reporting of comorbidities to which other sources (claims, HCFA 2728) can be compared. Case mix adjustment models can be built using DMMS data linked to claims, allowing the comparison of the performance of models based on a broad set of measures to models based on more limited sets of measures that could feasibly be collected and implemented on a universal basis. Similarly, comparisons could be made to alternative patient groupings intended to capture variations in the cost of care.

Multivariate cost models will use various sets of candidate case mix adjusters to determine the relationships between these variables and costs at the patient and facility levels. Detailed comorbidities available from sources such as DMMS or DOPPS will allow benchmark models to be estimated for a sample of patients. These models can then be restricted to case mix measures that are universally available and verifiable (and, hence, are feasible candidates for inclusion in a case mix adjustment system). Comparisons of these more limited, but feasible, adjustments to the benchmark models will allow us to determine how well a feasible case mix adjustment system is likely to perform relative to a more sophisticated system. Should this performance be poor, recommendations for collection and auditing of additional case mix adjustment data could follow. These analyses should be performed for each major dialysis modality.

## L. DOPPS

DOPPS could be put to similar uses as DMMS, but it also has the further advantages of having data collected for a longer period of time. In addition, the sampling strategy oversampled units with well above average or well below average standardized mortality rates (SMRs), allowing a comparison of costs and practice patterns among facilities experiencing very different clinical outcomes.

## M. MANAGED CARE DEMONSTRATION

The Managed Care Demonstration Project will provide some insight on the difficulties of collecting information similar to claims when claims are not required for reimbursement. The Project also provides some insight on the difference between Fee-for-Service and managed care patient management and costs.

## N. HEMO TRIAL

Data from the HEMO Trial can be used to establish the cost differential associated with higher dialysis dose and high flux membranes. Should these interventions prove to be clinically beneficial, HCFA may want to ensure that payments are sufficient to make their use economically feasible.

# IV. PRELIMINARY WORK IN IDENTIFYING ELIGIBILITY PERIODS AND COSTS

For the purpose of this Database Report, we will briefly discuss several preliminary data analyses we have completed. Presentation of final estimates and recommendations for further data collection are beyond the scope of this report. This section serves only to illustrate the types of analyses of existing data that could be undertaken to inform the construction of a revised PPS and determine what gaps exist in these databases.

The cost estimates that are possible using existing data available to HCFA rely heavily on the Medicare claims SAFs. Costs can be identified on a per dialysis session basis (for HD, or dialysis session equivalent for PD) or per unit of time. We anticipate that cost measures per unit time, which could always be converted to a per treatment basis by dividing by the average number of treatments in the time interval, will be more useful.

Estimating costs per unit of time requires an assignment of the patient to a specific dialysis facility for a specific period of time. Thus, the ability to make unambiguous, continuous, and non-overlapping assignments needs to be explored.

An analysis of all dialysis patients from 1995-2000 revealed that about 25 percent of patients had at least one period of overlapping service dates on outpatient dialysis claims from multiple providers. In such cases, assignment of payments to providers would be difficult in a system based on a per unit of time payment. A summary of the types of overlaps that occurred, and their frequencies is included as Appendix 2.

Once the eligible patients, their at-risk periods, and their assignment to providers have been established, cost estimation can begin. Most of the costs potentially included under an expanded PPS for renal-related outpatient care will appear as outpatient institutional claims with dialysis revenue center codes. However, some may appear in the physician/supplier files or may even appear without any specific indication of dialysis-relatedness. In preliminary work, we have identified total charges by HCPCS code in 1999 for dialysis revenue centers and from physician/supplier claims. A summary of the top 100 codes by total charges is included as an Appendix. Note that only a fraction of EPO costs are accounted for in our preliminary analyses as most of these costs need to be captured from the dialysis revenue center line items rather than from the claims details that we have examined.

We have also mapped carrier-specific codes to the carriers that use them for outpatient dialysis, physician/supplier and durable medical equipment claims. The difficulty with these carrier-defined codes is the lack of a description field on the SAFs. HCFA has obtained descriptions of these codes to allow them to be identified and categorized.

# V. CONCLUSION

This document describes the available data sources for the development and implementation of a revised PPS for outpatient, renal-related care and discusses how these data sources might be used in this process and our initial assessment of their limitations. Our initial review of the available databases indicates that despite some significant challenges, using primarily existing data as the basis for a new bundled PPS for renal-related care is likely to be feasible. The data are not always ideal, but these databases are likely to have error rates similar to those of the databases used to successfully develop HCFA's other prospective payment systems. The existing composite rate masks details of services that are provided under the composite payments. Analyses of the individual claims and cost reports must be combined to yield total cost models. It is important to note that any PPS should remain open to revision or updating as its imperfections become apparent.

The final report of Phase I will include a variety of analyses necessary to make a final determination as to whether or not these databases can provide an adequate empirical basis for a revised payment system. Specific analyses aimed at establishing payment rates, case mix and other adjustments, and updating and monitoring processes will be proposed for Phase II. In areas where the existing data have substantial limitations, primary data collections may also be proposed.

# An Expanded Medicare Outpatient End Stage Renal Disease Prospective Payment System Phase I

# Appendix B
# Case Mix Literature Review

Robert Wolfe, Principal Investigator

Richard Hirth, Jack Wheeler, Philip Tedeschi, Randall Webb, Erik Roys, Glenn Wright, Marc Turenne, Alyssa Pozniak, Valarie Ashby, Cora Brunton, Susan Reimann, Philip Held, and Sandy Callard

August 2002

**Title: Comorbid conditions and correlations with mortality risk among 3,399 incident hemodialysis patients.**

**Authors/Citation:** Held, Port, et al. AJKD, 1992, Nov 20 (5 Suppl 2):32-8

**Summary of Results:** The authors studied the effect of comorbid conditions on mortality for a sample of 3,399 patients. Coronary artery disease and congestive heart failure had a relative mortality risk (RR) of 1.22 and 1.26, respectively. Undernourishment had a RR of 1.34. Other factors associated with higher mortality risk included older age, diabetes as cause of ESRD, active smoking, and relatively low serum albumin creatinine concentration.

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**Title: Hemodialysis Practices, Case Mix, and In-Center Dialysis Costs.**

**Authors:** Hirth, Hatcher, Greer, Port, Held.

**Summary of Results:** These authors studied the effects of case mix and treatment practices on costs with a sample of 437 facilities. The only case-mix factors found to predict cost were proportion of patients with Hispanic origin and average bilirubin. Treatment factors that predicted cost were longer treatment times, type of membranes used, and reuse of membranes. All in all, there were few strong case mix-cost relationships.

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**Title: Dialysis Technologies and Practices in a Fixed Reimbursement Environment.**

**Authors:** Hirth, Chernew, Carroll, Armstrong.

**Summary of Results:** These authors studied the effects of unit characteristics, patient characteristics, area, and competitive environment on technologies and practices with a sample of 2,150 units. Adoption of new dialysis technologies and practices was not uniform across facilities and populations with different characteristics. Further, socio-economic status has not been eliminated as a source of variation in ESRD care.

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**Title: Medicare Reimbursement and the utilization of EPO in 1989 and 1993.**

**Authors:** Hirth, Chernew, Caitlin, Carroll, Armstrong.

**Summary of Results:** These authors studied the effects of unit characteristics and socioeconomic factors on use of EPO with a sample of 1,689 units. High use of EPO was related to a variety of dialysis unit, patient, and area characteristics. The change in the Medicare reimbursement method for EPO resulted not only in higher use of EPO overall, but also had different effects on several patients groups. Lower socio-economic status reduced EPO penetration in 1989 but not in 1993.

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**Title: Differences in the cost of hemodialysis by dialyzer membrane.**

**Authors:** Orzol, Carroll, Hirth, Pereira, Port, Held.

**Summary of Results:** These authors studied the effects of type of dialyzer membrane on costs with a sample of 287 units. Freestanding hemodialysis units using only modified cellulose and synthetic dialyzers had higher total, labor, and overhead costs (Medicare) than did dialysis units using cellulose dialyzers. Unexpectedly, supply and maintenance costs were the same, probably influenced by reuse of dialyzers. Reported differences in outcomes by dialyzer membrane may be related at least in part to differences in direct patient care.

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**Title: Cost Effectiveness of Hemodialysis Compared to Peritoneal Dialysis in the First Year of Dialysis**

**Authors:** Held, Wolfe, Ashby, Orzol, Port, Golper.

**Summary of Results:** These authors studied the effects of PD versus HD on cost and survival with a sample of 138 and 727 patients. PD is more cost-effective than HD during the 1st year for patients without diabetes, except for black males under 55.

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**Title: Patterns of Medicare Spending per Month for Incident, Elderly Hemodialysis (HD) and Peritoneal Dialysis (PD) Patients.**

**Authors:** Hirth, Greer, Chen, Jain, Port, Pereira, Golper, Wolfe.

**Summary of Result:** These authors studied the effects of month, modality, and demographics on costs. Medicare spending varies with time on dialysis and is substantially higher than average during the first 4 to 8 months of ESRD and during the last 3 moths of life. Cost studies need to account for these patterns.

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**Title: Mortality Differences between Hemodialysis and Peritoneal Dialysis: The Role of Serum Albumin and Comorbid Medical Conditions.**

**Authors:** Stack, Port.

**Summary of Results:** These authors studied the effects of modality, comorbidity, and demographics on mortality. PD was associated with a survival advantage at 2-years compared with HD when adjusted only for differences in demographics. Adjustment for several comorbid conditions did not alter the magnitude of this relationship until adjustment for albumin at ESRD onset is added. In this final model the relative benefit of PD was only seen up to 9 months; after 15 months, HD conferred a survival advantage. Pre-ESRD nutrition is a major confounder in evaluating mortality differences between PD and HD.

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**Title: Association between Vascular Access Type and Standardized Mortality (SMR) and Hospitalization (SHR) Ratios in Dialysis Units.**

**Authors:** Wolfe, Dhingra, Hulbert-Shearon, Young, Port.

**Summary of Results:** These authors studied the effects of vascular access type and demographics on SMR and SHR with a sample of 2,510 units. Dialysis units with greater utilization of central venous catheters (CVC) had significantly higher mortality and hospitalization rates when adjusted for age, race, sex, diabetes, comorbidities, labs, and percent new patients. This suggests that unit-level practice patterns for vascular access are strongly related to SMR and SHR. Such units also have significantly more patients with low URR which may contribute to these differences in SMR and SHR.

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**Title: The Extent and Sources of Geographic Variation in Medicare End-Stage Renal Disease Expenditures.**

**Authors:** Hirth, Tedeschi, Wheeler.

**Summary of Results:** These authors studied the effects of demographics, health care wages, Standardized Hospitalization Ratio (SHR), facility characteristics, modality, and SES on Medicare expenditures with a sample of 284,670 patients. Considerable variation exists in Medicare spending per ESRD patient year at risk. This variation is due mostly to use of services other than dialysis. The most important explanatory factors were distribution of renal replacement modalities, SHR, and the Medicare area wage index.

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**Title: The Medicare Costs of Renal Dialysis: Evidence from a Statistical Cost Function**

**Authors/Citation:** Dor, Held, Pauly. Medical Care, Vol. 30 No. 10. Oct 1992.

**Summary of Results:** These authors studied the effects of number of treatments, modality, facility characteristics, and demographics on costs with a sample of 684 facilities. PD costs less than HD, but it is only a small percentage of all dialysis. Training costs are very expensive and Medicare does not cover much of them. There is no evidence for economies of scale in center size.

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**Title: Types of vascular access predicts mortality in U.S. hemodialysis patients.**

**Authors/Citation:** Dinghra, Young, Hulbert-Shearon, Leavey, Port. Kidney International, Vol. 60 (2001), pp. 1443-1451

**Summary of Results:** These authors studied the effects of type of vascular access, demographics, and patient characteristics on mortality with a sample of 5,507 patients. Patients with AV Graft (AVG) and Central Venous Catheter (CVC) have higher overall relative risk of death when compared to those with AV Fistula (AVF), even after adjusting for various comorbid conditions. Furthermore, the study shows that in diabetics the relative risk of death due to infections and cardiac causes was higher in those with AVG and CVC. The relative risk of death due to infections was also higher in nondiabetics with AVG and CVC as compared with AVF.

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**Title: Ownership, Competition, and the Adoption of New Technologies and Cost-Saving Practices in a Fixed-Price Environment.**

**Authors/Citation:** Hirth, Chernew, Orzol. Inquiry 37:282-294 (Fall 2000)

**Summary of Results:** These authors studied the effects of facility characteristics on technologies and cost-cutting practices with a sample of 1,963 facilities from 1989 and 2,505 facilities from 1993. The fixed-price environment of dialysis determines the implicit cost-benefit test that underlies the decision to adopt a new technology. In the long run, firms are unlikely to invest in developing technologies that are not anticipated to pass the fixed-price, cost-benefit test even if such technologies would be economically attractive in a flexible price regime. Increasingly, providers throughout the U.S. health care system are facing incentives similar to those that have characterized the dialysis environment for several decades.

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**Title: Predictors of Type of Vascular Access in Hemodialysis Patients.**

**Authors/Citation:** Hirth, Turenne, Woods, Young, Port, Pauly, Held. JAMA, Oct 23/30, 1996 volume 276

**Summary of Results:** These authors studied the effects of patient characteristics on type of vascular access with a sample of 2,741 patients. An increase over time in the prevalence of comorbidities in patients initiating dialysis has been suggested as an explanation for the declining use of fistulas relative to grafts. However, the data presented here demonstrate that increasing case mix severity, recently analyzed for the same study samples, could not account for the large and rapid shift away from fistulas and grafts observed in this study.

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**Title: Analysis of Right-Censored Cost Data.**

**Author:** Chen.

**Summary of Results:** These authors studied the effects of patient characteristics and type of censorship on costs with a sample of 4,740 PD and 33,992 HD patients. Based on all the results, they found that patient characteristics are significantly associated with lifetime cost and survival time. The advantage of the regression method is that it allows the cost function to depend on patient characteristics. In addition, the peritoneal dialysis treatment generally costs less but prolongs life longer than hemodialysis treatment. In other words, peritoneal dialysis treatment is a dominant strategy.

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**Title: Impact of hypertension on cardiomyopathy, morbidity and mortality in end-stage renal disease.**

**Authors/Citation:** Foley, Parfrey, Harnett, Kent, Murray, Barre. Kidney Int 1996, May;49(5):1279-85.

**Summary of Results:** These authors studied the effects of hypertension and patient characteristics on cardiomyopathy, morbidity, and mortality with a sample of 432 patients. Blood pressure is associated with the presence of concentric LV hypertrophy, the change in LB mass index, and cavity volume on follow-up echocardiography, the development of de novo cardiac failure, and the development of de novo ischemic heart disease. Association with LV dilation is of borderline significance. Mean arterial blood pressures greater than 106 mm Hg are associated with both echocardiographic and clinical endpoints. Paradoxically, low mean arterial blood pressure is independently associated with mortality.

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**Title: Effect of coexistant diseases on survival of patients undergoing dialysis.**

**Authors/Citation:** Nicolucci, Cubasso, Labbrozzi, Mari, Impicciatore, Procaccini, Forcella, Stella, Querques, Pappani, et al. ASAIO J 1992 Jul-Sep;38(3):M291-5

**Summary of Results:** These authors studied the effects of index levels of coexistant diseases and patient characteristics on survival with a sample of 255 patients. Patient mortality was associated with age, cause of renal failure, and ICED. ICED is an index of coexistant diseases. Gender and type of dialysis were not associated with survival.

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**Title: Functional status and quality of life: predictors of early mortality among patients entering treatment for end stage renal disease.**

**Authors/Citation:** McClellan, Anson, Birkeli, Tuttle. J Clin Epidemiol 1991;44(1):83-9

**Summary of Results:** These authors studied the effects of two indices of quality of life on mortality with a sample of 294 patients. Functional status (measured by the Karnofsky Performance Scale) and quality of life (measured by the Spitzer Quality of Life Index) are strong independent risk factors for subsequent mortality in new dialysis patients.

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**Title: Variation in end-stage renal disease patient outcomes: what we know, what should we know, and how do we find it out?**

**Authors/Citation:** Kurtin, Nissenson. J Am Soc Nephrol 1993 May;3(11):1738-47

**Summary of Results:** This article is a review. The authors conclude that we need to define and "quantitate" the outcomes of dialytic care.

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**Title: Principles and practice of case mix adjustment: application to end-stage renal disease.**

**Authors/Citation:** Greenfield, Sullivan, Silliman, Dukes, Kaplan. Am J Kidney Dis 1994 Aug;24(2):298-307

**Summary of Results:** This article describes how to build a model for optimal case mix adjustment.

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**Title: Continuous quality improvement in chronic disease: a computerized medical record enables description of a severity index to evaluate outcomes in end-stage renal disease.**

**Authors/Citations:** Pollak, Pesce, Kant. Am J Kidney Dis 1992 Jun:19(6):514-22

**Summary of Results:** These authors construct a severity index. They then find that over time, there has been a trend toward more severely ill patients enrolling for ESRD treatment.

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**Title: Influence of co-morbidity on mortality and morbidity in patients treated with hemodialysis.**

**Authors/Citation:** Keane, Collins. Am J Kidney Dis, Vol 24, 1010-1018

**Summary of Results:** These authors evaluate existing studies. Age, diabetes, and complex comorbidities account for the higher mortality seen in U.S. ESRD patients.

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**Title: Daily Dialysis and Long-Term Outcomes- The Lynchburg Nephrology NHHD Experience.**

**Citations:** Nephrology News and Issues, Dec.1999

**Summary of Results:** This is a review of other studies. The authors conclude that NHHD has improved costs and outcomes.

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**Title: The intensity of hemodialysis and the response to erythropoietin in patients with end-stage renal disease**

**Authors/Citation:** Ifudu O, Feldman J, Friedman E. The New England Journal of Medicine, February 15, 1996 Vol 334, No. 7.

**Summary of Results:** These authors studied the effects of several medical measures on hematocrit, URR, and serum albumin with a sample of 135 patients. In patients with ESRD, inadequate hemodialysis is associated with a suboptimal response to EPO therapy. Increasing the intensity of dialysis in patients with anemia who are receiving inadequate dialysis results in a significant increase in the hematocrit.

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**Title: Improvement of Sleep Apnea in Patients with Chronic Renal Failure who Undergo Nocturnal Hemodialysis**

**Authors/Citation:** Hanly PJ, Pierratos A. The New England Journal of Medicine. January 11, 2001 Vol 344, No. 2

**Summary of Results:** These authors studied the effects of several medical measures on sleep apnea with a sample of 14 patients. Nocturnal hemodialysis corrects sleep apnea associated with chronic renal failure.

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**Title: Validation of Comorbid Conditions on the End-Stage Renal Disease Medical Evidence Report: The CHOICE Study.**

**Authors/Citation:** Longenecker, et al JASN, 2000

**Summary of Results:** These authors studied the effects of 17 comorbid conditions on validity and sensitivity with a sample of 1,005 patients. This study found generally low sensitivity but high specificity for 17 prevalent comorbid conditions on HCFA Form 2728 when compared with the medical records of 1,005 dialysis patients. Considerable effort needs to be expended to improve Form 2728 if it is to be used to provide accurate estimates of comorbid diseases in ESRD patients.

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**Title: Daily hemodialysis: dialysis for the next century.**

**Authors/Citation:** Kjellstrand C, Ting G. "Adv Ren Replace Ther 1998 oct;5(4): 367-74

**Summary of Results:** This paper is a review of other studies. The authors conclude that daily hemodialysis has many advantages compared to the current regime.

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**Title: A simple comorbidity scale predicts clinical outcomes and costs in dialysis patients.**

**Author/s Citation:** Beddhu S, Bruns F, Saul M, Seddon P, Zeidel M. The American Journal of Medicine 108 (8):609-613. 2000.

**Summary of Results:** These authors studied the effects of the Charlson Comorbidity Index on hospitalization, mortality, and costs with a sample of 268 patients. The modified Charlson Comorbidity Index predicts outcomes and costs in dialysis patients. This index may be useful in determining appropriate payment for care of dialysis patients under capitated payment schemes and as a research tool to stratify dialysis patients in order to compare the outcomes of various interventions.

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**Title: Influence of health related quality of life, functional status and comorbidity on mortality in patients starting renal replacement therapy (CALVIDIA Study).**

**Authors/Citation:** Lopez-Revuelta, Alvaro-Moreno, Garcia-Lopez, Calvidia Group. JASN 2000 Sept Vol 11 [A0835]

**Summary of Results:** These authors studied the effects of comorbidity and several quality of life scales on mortality with a sample of 343 patients. HRQOL (health-related quality of life) and FS (functional status) are risk factors in patients starting dialysis.

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**Title: Charlson Comorbidity Instrument as predictor of mortality in patients on dialysis.**

**Author/Citations:** Garcia-Lopez, Lopez-Revuelta, de Alvaro. JASN 2000 Sept Vol 11. [A0787]

**Summary of Results:** The Charlson Comorbidity index is a strong predictor of mortality in patients who start dialysis, which annuls all other factors known, including age, diabetes, and albumin.

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**Title: The impact of a vascular access center (VAC) upon nephrology practice outcomes.**

**Author/Citation:** Jackson, Lewis, Brouillette, Brantley. JASN 2000 Sept Vol 11 [A0991]

**Summary of Results:** A coordinated vascular care system including a VAC has achieved a reduction in treatment delays, in hospitalizations and missed dialysis treatments, and it leads to an increase in other positive factors.

**Title: ICD-9 coding compared to medical record review to determine simple comorbidity scale predicting clinical outcomes of dialysis patients.**

**Authors/Citation:** Bruns, Beddhu, Saul, Seddon, Zeidel. JASN 2000 Sept Vol 11 [A1197]

**Summary of Results:** These authors studied the effects of CCI and ICD-9 codes on cost, admission, and mortality with a sample of 267 patients. CCI correlates tightly with cost, admissions, and survival. Simple substitution of ICD-9 codes for individual record review did not replicate these results.

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**Title: Changes in comorbidity and their influence on survival: the CHOICE Cohort Study.**

**Authors/Citation:** Miskulin, Coresh, Meyer, Martin, Klag, Fink, Powe, Levey. JASN 2000 Sept Vol 11 [A1252]

**Summary of Results:** Changes in comorbidity are common and independently associated with survival. Changes in comorbidity could be viewed as a surrogate for outcome in longitudinal studies.

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**Title: Mortality outcomes in incident hemodialysis patients with hematocrit levels >= 36% are not different from hematocrit levels 33-<36%.**

**Authors/Citation:** Collins, St. Peter, Li, Ebben, Chen, Ma. JASN 2000 Sept Vol 11 [A1286]

**Summary of Results:** These authors studied the effects of hematocrit levels, comorbidities, and demographics on mortality and hospitalization. They found that mortality outcomes in incident hemodialysis patients with hematocrit levels >= 36% are not different from those with hematocrit levels 33-<36%.

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**Title: Impact of Inpatient Costs on Total Dialysis Costs: A Five Year Study.**

**Authors/Citation:** Bruns, Beddhu, Saul, Seddon, Zeidel. JASN 2000 Sept Vol 11 [A1196]

**Summary of Results:** Inpatient costs have an enormous effect on total dialysis costs.

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**Title: Cost-Effectiveness of 3 Strategies of Managing Tunneled-Cuffed Catheter (TCC) Associated Bacteremia in Hemodialysis Patients..**

**Authors/Citation:** Mokryzcki, Chalfin, Singhal. JASN 2000 Sept Vol 11 [A1016]

**Summary of Results:** These authors studied the effects of TCC management strategies on cost and treatment failure. TCC-guidewire exchange is more cost-effective than TCC-removal. TCC-guidewire exchange is also more cost-effective than TCC salvage when the pTxFail of TCC salvage is greater than 40%, as has been reported in the literature.

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**Title: A Comparison of Dialysis Treatments and Cost for the Bard, Tessio, and Optiflow Catheters**

**Authors/Citation:** Reddy, Palm-Montalbano, Waldman, Holley. JASN 2000 Sept Vol 11 [A1093]

**Summary of Results:** These authors studied the effects of types of catheters, demographics, comorbities, and practice patterns on cost and several medical measures. Optiflow catheters lead to better outcomes, and may be more cost-effective if their survival is high enough (this analysis could not be completed).

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**Title: Admission Days and the Proportion of Peritoneal Dialysis Patients Determine Total Dialysis Costs.**

**Author/Citation:** Bruns, Beddhu, Saul, Seddon, Zeidel. JASN 2000 Sept Vol 11 [A1195]

**Summary of Results:** These authors studied the effects of modality and admission days on costs. Both PD and HD upper quartile patients engender an enormous proportion of total expense and admission days.

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**Title: Peritoneal Dialysis and Hemodialysis Costs.**

**Authors/Citation:** Collins, St. Peter, Li, Manning, Ma. JASN 2000 Sept Vol 11 [A1205]

**Summary of Results:** These authors studied the effects of modality on costs with a sample of 232,234 patients. PD practices in the current era are associated with 20-24% lower expenditures for PD than HD patients.

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**Title: An Analysis of the Increased Demands Placed on Dialysis Health Care Team Members by Functionally Dependent Hemodialysis Patients.**

**Authors/Citation:** Sankarasubbaiyan S, Holley JL. Am J of Kidney Disease, Vol 35, No 6 (June), 2000;pp 1061-1067.

**Summary of Results:** These authors studied the effects of practice patterns and patient medical measures on time spent by health care workers with a sample of 63 patients. A facility can get just as good results for functionally dependent patients as for normal patients, but it must put a lot more resources into them in order to do so.

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**Title: The Cost of Caring for End-Stage Kidney Disease Patients: An Analysis Based on Hospital Financial Transaction Records.**

**Authors/Citation:** Fruns, Seddon, etal. JASN, 1998

**Summary of Results:** These authors studied the effects of modality on various costs with a sample of 113 HD and 35 PD patients. PD is less expensive than HD. The most fruitful area for savings is the cost of inpatient hospitalization. Careful management of the patient by the primary physician is the best route toward achieving high quality, cost-effective care.

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**Title: Pharmacy cost groups: A risk-adjuster for capitation payments based on the use of prescribed drugs.**

**Authors/Citation:** Lamers, L. M. 1999. *Medical Care* 37 (8): 824-30.

**Summary of Results:** Diagnostic information from prior hospitalization is a promising option for improving the demographic capitation payment formula.

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**Title: Medicare costs in urban and rural nursing homes: are differential payments required?**

**Authors/Citation:** Bishop C, Dor A. Inquiry 1994 Summer;31(2)153-62

**Summary of Results:** Rural Skilled Nursing Facilities (SNFs) are often underpaid when providing care in rural areas.

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**Title: The costs of Medicare patients in nursing homes in the United States: multiple output analysis,**

**Authors/Citation:** Dor A. J Health Econ 1989 Dec;8(3):253-70

**Summary of Results:** Medicare costs in nursing homes are well above reimbursement rates.

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**Title: Risk-adjusted capitation based on the Diagnostic Cost Group Model: an empirical evaluation with health survey information.**

**Authors/Citation:** Lamers LM Health Serv Res 1999 Feb;33(6):1727-44

**Summary of Results:** The authors studied the effects of demographics and prior hospitalization on costs. The predictive accuracy of the demographic model improves when it is extended with diagnostic information from prior hospitalizations.

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**Title: Practice Patterns, case mix, Medicare payment policy, and dialysis facility costs.**

**Authors/Citation:** Hirth RA, Held PJ, Orzol SM, Dor A LM Health Serv Res 1999 Feb;33(6):1567-92

**Summary of Results:** The authors studied the effects of case mix, practice patterns, features of the payment system, and facility characteristics on the cost of dialysis. The relationship between case mix and costs was weak. Practice patterns had a stronger effect. Facility type also had an effect.

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**Title: Price of dialysis, unit staffing, and the length of dialysis treatments.**

**Authors/Citation:** Held PJ, Garcia JR, Pauly MV, Cahn MA. Am J Kidney Dis 1990 May;15(5):441-50

**Summary of Results:** The authors studied the effects of Medicare price for outpatient maintenance dialysis on the level and composition of staffing of dialysis units, and on the length of the average hemodialysis treatment. Larger price cuts led to higher reduction in length of dialysis treatments, but had no significant effect on staffing.

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**Title: Development of a patient classification system for chronic hemodialysis patients.**

**Authors/Citation:** Freund L, Burrows-Hudson S, Preisig P

**Summary of Results:** The authors studied the effects of the American Nephrology Nurses' Association acuity tool on time spent by caregivers with a sample size of 600 patients in 12 centers. The tool was found to be a strong predictor of time spent by caregivers.

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**Title: Variations in the hemodialysis treatment process.**

**Authors/Citation:** Jones KR Clin Nurs Res 1992 Feb;1(1):50-66

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**Summary of Results:** The authors studied the effects of practice patterns on costs in 527 patients. Hospital-based units were found to be associated with more costly care.

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**Title: The Morbidity and Cost Implications of Inadequate Hemodialysis**

**Authors/Citation:** Ashwini Sehgal, Avi Dor, Alex Tsai, Janeen Leon. JASN 2000 Sept Vol 11 [A1279]

**Summary of Results:** The authors studied the effect of dialysis dose on hospitalizations and cost with sample size of 674 patients. Low dialysis dose was associated with higher costs and higher hospitalization rates.

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**Title: Effects of the 1983 "Composite Rate" Changes on ESRD patients, providers, and spending**

**Authors/Citation:** Held PJ, Bovbjerg RR, Pauly MV, Garcia JR, and Newmann JM. This report was drawn from the following articles:

***Survival Analysis of Patients Undergoing Dialysis. JAMA, February 6, 1987.**
***The End Stage Renal Disease Program: Here are Some of the Data. JAMA, February 6, 1987.**
***Survey and Reimbursement Information on Dialysis Units and Patients.**
***Competition and Efficiency in the End Stage Renal Disease Program. JHE 2 (1983).**
***Savings from Home Dialysis: Far Less than Expected.**
***Provider –Patient Relations and Treatment Choice in the Era of Fiscal Incentives: The Case of the End-Stage Renal Disease Program. The Milbank Quarterly, Vol. 65, No. 2, 1987.**

**Summary of Results:** The authors studied the effects of patient characteristics and facility characteristics on survival with a sample of 4,661 patients. Mortality was positively correlated with age, initial conditions leading to renal failure, being male and white, open staffing, and the number of staff physicians. Lower death rates were observed in larger dialysis units and when there had been long-term reuse of dialyzers. Not-for-profit and for-profit units appeared to have the same mortality. Free-standing units had lower mortality.

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**Title: The urea reduction ratio and serum albumin concentration as predictors of mortality in patients undergoing hemodialysis.**

**Authors/Citation:** Owen WF, Lew NL, Liu Y, Lowrie EG, Lazarus JM

**Summary of Results:** The authors studied the effects of urea reduction ratio (URR) and serum albumin concentration on mortality. It was found that the serum albumin concentration was a much better predictor of mortality than was the URR.

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**Title: Effect of dialyzer reuse on survival of patients treated with hemodialysis.**

**Authors/Citation:** Feldman HI, Kinosian M, Bilker WB, Simmons C, Holmes JH, Pauly MV, Escarce JJ. JAMA 1996 Aug 28;276(8):620-5

**Summary of Results:** The authors studied the effects of dialyzer reuse on survival for a sample of 27,938 patients. Some kinds of reprocessing led to higher mortality in reusing centers than in non-reusing centers. Other kinds led to no significant difference.

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**Title: Continuous quality improvement in chronic disease: a computerized medical record enables description of a severity index to evaluate outcomes in end-stage renal disease.**

**Authors/Citation:** Pollak VE, Pesce A, Kant KS. Am J Kidney Dis 1992 Jun;19(6):514-22

**Summary of Results:** The authors studied the effects of a previously derived index for mortality on probability for death and rates of hospitalization for a sample of 436 patients, and then for a sample of 718 patients. The index predicted mortality and hospitalization, and over time, there has been a trend toward more and more seriously ill patients enrolling.

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**Title: Trends in anemia treatment with erythropoietin usage and patient outcomes**

**Authors/Citation:** AJ Collins, JZ Ma, A Xia and J Ebben. AJKD 32:133S-141S

**Summary of Results:** The authors analyzed hematocrit trends over time, and also reviewed studies showing the effect of hematocrit on risk of death. Hematocrit levels have been rising over time.

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**Title: Severity of illness: concepts and measurements.**

**Authors/Citation:** Stein RE, Gortmaker SL, Perrin EC, Perrin JM, Pless IB, Walker DK, Weitzman M. Lancet 1987 Dec 26;2(8574):1506-9

**Summary of Results:** This is a review article.

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**Title: Designing a Capitation Payment Plan for Medicare End Stage Renal Disease Services**

**Authors/Citation:** Farley DO, Kallich JD, Carter GM, Lucas TW, Spritzer KL. RAND 1994. Santa Monica, CA.

**Summary of Results:** This report examines variability in Medicare costs for patients based upon age, sex, disability, old age SI, cause of ESRD, prior transplant, and months of ESRD treatment. This monograph includes an excellent discussion of issues of how the reimbursement system for dialysis could lead to specific financial incentives related to transplantation.

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**Title: Capitation Models for ESRD**

**Authors/Citation:** Bouchery EE, Gaylin DS, Rubin RJ, M.D., Shapiro JR, Held PJ. Renal Physicians Association, 2000. Rockville, MD.

**Summary of Results:** This monograph examined issues related to developing a capitation payment system to include both inpatient and outpatient costs for dialysis patients, focusing primarily upon physician reimbursement. Of special note is an examination of the costs of the components of the effective dose of dialysis. This report examined variability in Medicare costs for patients based upon the broader set of patient characteristics that are currently being collected on the HCFA-2728 form.

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# An Expanded Medicare Outpatient End Stage Renal Disease Prospective Payment System Phase I

# Appendix C
# Revenue Centers

Robert Wolfe, Principal Investigator

Richard Hirth, Jack Wheeler, Philip Tedeschi, Randall Webb, Erik Roys, Glenn Wright, Marc Turenne, Alyssa Pozniak, Valarie Ashby, Cora Brunton, Susan Reimann, Philip Held, and Sandy Callard

## 1999 Medicare Charges for 24032172 Outpatient Hemodialysis Sessions for 229311 Patients at 3673 Certified Facilities

| REVCENTER | Total charge by this revenue center | % of patients w srv>1 in this rev center | Charge per session | Total number of units on bills | # of units per session | % of facilities used this rev center | # of times this rev center occurs |
|---|---|---|---|---|---|---|---|
| R0821(D): HEMODIALYSIS OUTPATIENT OR HOME -- COMPOSITE OR OTHER RATE DIALYSIS - | $3,252,087,734 | 99.7% | $135.32 | 23,965,387 | 1.00 | 100% | 2,427,408 |
| R0636: DRUGS REQUIRING SPECIFIC IDENTIFICATION -- DRUGS REQUIRING DETAILED CODIN | $601,102,428 | 92.2% | $25.01 | 24,980,097 | 1.04 | 97.0% | 2,912,782 |
| R0634(E): DRUGS REQUIRING SPECIFIC IDENTIFICATION --EPO UNDER 10,000 UNITS -- E | $776,762,659 | 87.8% | $32.32 | 42,054,073 | 1.75 | 98.0% | 1,670,391 |
| R0270: MEDICAL/SURGICAL SUPPLIES - GENERAL CLASSIFICATION | $31,288,742 | 80.5% | $1.30 | 14,692,928 | 0.61 | 87.9% | 1,607,295 |
| R0635(E): DRUGS REQUIRING SPECIFIC IDENTIFICATION -- EPO 10,000 UNITS OR MORE - | $558,130,925 | 39.7% | $23.22 | 4,794,476 | 0.20 | 91.8% | 482,466 |
| 0771: PREVENTATIVE CARE SERVICES - VACCINE ADMINISTRATION | $458,541 | 30.1% | $0.02 | 116,703 | 0.00 | 64.2% | 115,477 |
| R0304(D): LABORATORY - NON-ROUTINE DIALYSIS | $19,152,958 | 10.3% | $0.80 | 1,833,854 | 0.08 | 18.4% | 577,651 |
| R0300: LABORATORY - GENERAL CLASSIFICATION | $17,572,645 | 6.60% | $0.73 | 23,862,260 | 0.99 | 15.4% | 310,025 |
| R0301: LABORATORY - CHEMISTRY | $11,384,366 | 5.00% | $0.47 | 276,236 | 0.01 | 9.75% | 259,046 |
| R0272: MEDICAL/SURGICAL SUPPLIES - STERILE SUPPLY | $2,400,598 | 4.55% | $0.10 | 356,461 | 0.01 | 12.8% | 39,055 |
| R0390: BLOOD STORAGE AND PROCESSING - GENERAL CLASSIFICATION | $5,678,947 | 4.33% | $0.24 | 188,572 | 0.01 | 34.9% | 93,937 |
| R0730: EKG/ECG (ELECTROCARDIOGRAM) - GENERAL CLASSIFICATION | $1,008,673 | 4.04% | $0.04 | 13,143 | 0.00 | 28.4% | 11,525 |
| R0250: PHARMACY - GENERAL CLASSIFICATION | $10,752,810 | 2.73% | $0.45 | 222,092 | 0.01 | 8.67% | 31,166 |
| R0305: LABORATORY - HEMATOLOGY | $1,570,585 | 2.55% | $0.07 | 39,455 | 0.00 | 7.50% | 33,540 |
| R0302: LABORATORY - IMMUNOLOGY | $1,375,916 | 2.07% | $0.06 | 25,288 | 0.00 | 6.06% | 23,366 |
| R0306: LABORATORY - BACTERIOLOGY & MICROBIOLOGY | $1,218,422 | 1.92% | $0.05 | 22,747 | 0.00 | 6.84% | 17,768 |
| R0921: OTHER DIAGNOSTIC SERVICES - PERIPHERAL VASCULAR LAB | $2,303,346 | 1.91% | $0.10 | 6,102 | 0.00 | 8.44% | 5,782 |
| R0320: RADIOLOGY DIAGNOSTIC - GENERAL CLASSIFICATION | $2,488,125 | 1.50% | $0.10 | 7,500 | 0.00 | 9.55% | 5,439 |
| R0271: MEDICAL/SURGICAL SUPPLIES - NONSTERILE SUPPLY | $150,369 | 1.28% | $0.01 | 8,856 | 0.00 | 12.0% | 4,449 |
| R0324: RADIOLOGY DIAGNOSTIC - CHEST X-RAY | $583,148 | 1.21% | $0.02 | 4,467 | 0.00 | 7.64% | 3,533 |
| R0309: LABORATORY - OTHER LABORATORY | $1,917,215 | 1.10% | $0.08 | 42,121 | 0.00 | 2.02% | 40,952 |
| R0381: BLOOD - PACKED RED CELLS | $681,793 | .979% | $0.03 | 6,575 | 0.00 | 11.7% | 3,117 |
| R0399: BLOOD STORAGE AND PROCESSING - OTHER BLOOD STORAGE AND PROCESSING | $820,111 | .868% | $0.03 | 11,102 | 0.00 | 5.20% | 4,246 |
| R0922: OTHER DIAGNOSTIC SERVICES - ELECTROMYELOGRAM | $1,267,149 | .856% | $0.05 | 18,282 | 0.00 | 2.35% | 3,985 |
| R0391: BLOOD STORAGE AND PROCESSING - BLOOD ADMINISTRATION | $745,863 | .644% | $0.03 | 5,942 | 0.00 | 4.40% | 2,793 |
| R0820(D): HEMODIALYSIS OUTPATIENT OR HOME -- GENERAL DIALYSIS - GENERAL CLASSIF | $5,403,991 | .558% | $0.22 | 16,913 | 0.00 | 1.50% | 3,320 |
| R0480: CARDIOLOGY - GENERAL CLASSIFICATION | $943,520 | .553% | $0.04 | 3,677 | 0.00 | 4.37% | 2,789 |
| R0258: PHARMACY - IV SOLUTIONS | $833,596 | .522% | $0.03 | 12,206 | 0.00 | 2.91% | 3,537 |
| R0259: PHARMACY - OTHER PHARMACY | $2,666,650 | .507% | $0.11 | 53,408 | 0.00 | 1.88% | 5,412 |
| R0450: EMERGENCY ROOM - GENERAL CLASSIFICATION | $260,619 | .400% | $0.01 | 2,196 | 0.00 | 2.02% | 1,644 |
| R0279: MEDICAL/SURGICAL SUPPLIES - OTHER DEVICES | $113,827 | .398% | $0.00 | 15,028 | 0.00 | 2.24% | 1,845 |
| R0825(D): HEMODIALYSIS OUTPATIENT OR HOME--SUPPORT SERVICES DIALYSIS - SUPPORT | $552,178 | .352% | $0.02 | 40,484 | 0.00 | 3.74% | 4,331 |
| R0360: OPERATING ROOM SERVICES - GENERAL CLASSIFICATION | $1,689,237 | .283% | $0.07 | 1,611 | 0.00 | 1.52% | 1,170 |
| R0307: LABORATORY - UROLOGY | $46,545 | .280% | $0.00 | 1,583 | 0.00 | 3.10% | 1,410 |
| R0801(D): INPATIENT RENAL HEMODIALYSIS HEMODIALYSIS | $4,686,002 | .259% | $0.19 | 7,424 | 0.00 | 3.82% | 1,081 |
| R0710: RECOVERY ROOM - GENERAL CLASSIFICATION | $346,651 | .250% | $0.01 | 12,191 | 0.00 | 1.41% | 683 |
| R0385: BLOOD - LEUKOCYTES | $197,252 | .233% | $0.01 | 1,539 | 0.00 | 2.33% | 809 |
| R0370: ANESTHESIA - GENERAL CLASSIFICATION | $278,228 | .228% | $0.01 | 11,073 | 0.00 | 1.30% | 684 |
| R0310: LABORATORY PATHOLOGICAL - GENERAL CLASSIFICATION | $72,467 | .223% | $0.00 | 1,638 | 0.00 | 4.01% | 902 |
| R0329: RADIOLOGY DIAGNOSTIC - OTHER | $437,983 | .184% | $0.02 | 1,034 | 0.00 | .941% | 955 |
| R0762: TREATMENT OR OBSERVATION ROOM - OBSERVATION ROOM (EFF 9/93) | $240,842 | .183% | $0.01 | 9,158 | 0.00 | 1.19% | 508 |
| R0460: PULMONARY FUNCTION - GENERAL CLASSI- FICATION | $2,383,264 | .179% | $0.10 | 3,599 | 0.00 | 2.66% | 550 |
| R0402: OTHER IMAGING SERVICES - ULTRASOUND | $153,384 | .125% | $0.01 | 349 | 0.00 | 2.55% | 323 |
| R0278: MEDICAL/SURGICAL SUPPLIES - OTHER IMPLANTS | $432,139 | .107% | $0.02 | 321 | 0.00 | .886% | 289 |
| R0490: AMBULATORY SURGICAL CARE - GENERAL CLASSIFICATION | $713,505 | .105% | $0.03 | 534 | 0.00 | .664% | 462 |
| R0260: IV THERAPY - GENERAL CLASSIFICATION | $55,681 | .101% | $0.00 | 1,856 | 0.00 | .775% | 665 |
| R0621: MEDICAL/SURGICAL SUPPLIES - SUPPLIES INCIDENT TO RADIOLOGY | $310,724 | .096% | $0.01 | 1,405 | 0.00 | .803% | 263 |

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|---|---|---|---|---|---|---|---|
| R0929: OTHER DIAGNOSTIC SERVICES - OTHER | $80,153 | .088% | $0.00 | 229 | 0.00 | .471% | 219 |
| R0251: PHARMACY - GENERIC DRUGS | $62,287 | .083% | $0.00 | 1,596 | 0.00 | .831% | 370 |
| R0382: BLOOD - WHOLE BLOOD | $66,707 | .083% | $0.00 | 480 | 0.00 | .997% | 258 |
| R0255: PHARMACY - DRUGS INCIDENT TO RADIOLOGY | $81,973 | .078% | $0.00 | 432 | 0.00 | .858% | 228 |
| R0252: PHARMACY - NONGENERIC DRUGS | $112,398 | .076% | $0.00 | 5,222 | 0.00 | .471% | 301 |
| R0389: BLOOD - OTHER BLOOD | $100,619 | .073% | $0.00 | 916 | 0.00 | .692% | 283 |
| R0420: PHYSICAL THERAPY - GENERAL CLASSIFICATION | $79,411 | .072% | $0.00 | 1,863 | 0.00 | 1.94% | 959 |
| R0761: TREATMENT OR OBSERVATION ROOM - TREATMENT ROOM (EFF 9/93) | $166,235 | .068% | $0.01 | 2,276 | 0.00 | .664% | 276 |
| R0829(D): HEMODIALYSIS OUTPATIENT OR HOME--OTHER DIALYSIS - OTHER | $105,990 | .064% | $0.00 | 340 | 0.00 | .471% | 213 |
| R0410: RESPIRATORY SERVICES - GENERAL CLASSIFICATION | $18,194 | .060% | $0.00 | 439 | 0.00 | .941% | 179 |
| R0351: CT SCAN - HEAD SCAN | $130,739 | .054% | $0.01 | 132 | 0.00 | 1.72% | 137 |
| R0350: COMPUTED TOMOGRAPHIC (CT) SCAN - GENERAL CLASSIFICATION | $140,682 | .047% | $0.01 | 174 | 0.00 | 1.27% | 123 |
| R0352: CT SCAN - BODY SCAN | $237,890 | .046% | $0.01 | 173 | 0.00 | 1.44% | 129 |
| R0424: PHYSICAL THERAPY - EVALUATION OR RE-EVALUATION | $11,450 | .042% | $0.00 | 164 | 0.00 | 1.16% | 129 |
| R0361: OPERATING ROOM SERVICES - MINOR SURGERY | $155,400 | .039% | $0.01 | 238 | 0.00 | .581% | 229 |
| R0323: RADIOLOGY DIAGNOSTIC - ARTERIOGRAPHY | $100,146 | .038% | $0.00 | 97 | 0.00 | .720% | 103 |
| R0379: ANESTHESIA - OTHER ANESTHESIA | $5,276 | .035% | $0.00 | 266 | 0.00 | .083% | 84 |
| R0341: NUCLEAR MEDICINE - DIAGNOSTIC | $86,907 | .034% | $0.00 | 121 | 0.00 | 1.05% | 116 |
| R0481: CARDIOLOGY - CARDIAC CATH LAB | $363,743 | .031% | $0.02 | 318 | 0.00 | 1.11% | 210 |
| R0380: BLOOD - GENERAL CLASSIFICATION | $31,304 | .030% | $0.00 | 218 | 0.00 | .858% | 100 |
| R0340: NUCLEAR MEDICINE - GENERAL CLASSIFICATION | $65,196 | .030% | $0.00 | 115 | 0.00 | .969% | 76 |
| R0274: MEDICAL/SURGICAL SUPPLIES - PROSTHETIC/ ORTHOTIC DEVICES | $34,780 | .029% | $0.00 | 295 | 0.00 | .221% | 102 |
| R0430: OCCUPATIONAL THERAPY - GENERAL CLASSIFICATION | $33,257 | .028% | $0.00 | 652 | 0.00 | .748% | 279 |
| R0881(D): MISCELLANEOUS DIALYSIS - ULTRAFILTRATION | $53,276 | .028% | $0.00 | 148 | 0.00 | .194% | 121 |
| R0312: LABORATORY PATHOLOGICAL - HISTOLOGY | $9,784 | .021% | $0.00 | 102 | 0.00 | .637% | 63 |
| R0321: RADIOLOGY DIAGNOSTIC - ANGIOCARDIOGRAPHY | $49,381 | .020% | $0.00 | 73 | 0.00 | .554% | 64 |
| R0510: CLINIC - GENERAL CLASSIFICATION | $11,839 | .020% | $0.00 | 74 | 0.00 | .609% | 48 |
| R0731: EKG/ECG (ELECTROCARDIOGRAM) - HOLTER MONITOR | $21,709 | .020% | $0.00 | 103 | 0.00 | .831% | 53 |
| R0732: EKG/ECG (ELECTROCARDIOGRAM) - TELEMETRY (INCLUDES FETAL MONITORING UNTIL | $42,003 | .019% | $0.00 | 213 | 0.00 | .664% | 52 |
| R0386: BLOOD - OTHER COMPONENTS | $9,119 | .018% | $0.00 | 100 | 0.00 | .111% | 49 |
| R0750: GASTRO-INTESTINAL SERVICES - GENERAL CLASSIFICATION | $56,370 | .018% | $0.00 | 81 | 0.00 | .581% | 48 |
| R0740: EEG (ELECTROENCEPHALOGRAM) - GENERAL CLASSIFICATION | $33,596 | .017% | $0.00 | 35 | 0.00 | .775% | 42 |
| R0434: OCCUPATIONAL THERAPY - EVALUATION OR RE-EVALUATION | $6,786 | .017% | $0.00 | 64 | 0.00 | .498% | 50 |
| R0760: TREATMENT OR OBSERVATION ROOM - GENERAL CLASSIFICATION | $9,667 | .017% | $0.00 | 455 | 0.00 | .360% | 43 |
| R0440: SPEECH LANGUAGE PATHOLOGY - GENERAL CLASSIFICATION | $9,874 | .016% | $0.00 | 156 | 0.00 | .720% | 106 |
| R0383: BLOOD - PLASMA | $5,920 | .013% | $0.00 | 105 | 0.00 | .526% | 36 |
| R0444: SPEECH LANGUAGE PATHOLOGY - EVALUATION OR RE-EVALUATION | $5,835 | .013% | $0.00 | 54 | 0.00 | .498% | 41 |
| R0409: OTHER IMAGING SERVICES - OTHER | $8,184 | .012% | $0.00 | 28 | 0.00 | .249% | 28 |
| R0421: PHYSICAL THERAPY - VISIT CHARGE | $6,978 | .012% | $0.00 | 160 | 0.00 | .443% | 93 |
| R0940: OTHER THERAPEUTIC SERVICES - GENERAL CLASSIFICATION | $5,783 | .012% | $0.00 | 56 | 0.00 | .221% | 32 |
| R0311: LABORATORY PATHOLOGICAL - CYTOLOGY | $3,611 | .011% | $0.00 | 29 | 0.00 | .360% | 26 |
| R0920: OTHER DIAGNOSTIC SERVICES - GENERAL CLASSIFICATION | $7,088 | .010% | $0.00 | 30 | 0.00 | .360% | 29 |
| R0482: CARDIOLOGY - STRESS TEST | $7,338 | .009% | $0.00 | 13 | 0.00 | .388% | 20 |
| R0841(D): CAPD COMPOSITE OR OTHER RATE OTHER RATE | $35,210 | .009% | $0.00 | 306 | 0.00 | .388% | 25 |
| R0261: IV THERAPY - INFUSION PUMP | $830 | .007% | $0.00 | 30 | 0.00 | .055% | 17 |
| R0412: RESPIRATORY SERVICES - INHALATION SERVICES | $1,465 | .007% | $0.00 | 23 | 0.00 | .194% | 18 |
| R0610: MAGNETIC RESONANCE IMAGING (MRI) - GENERAL CLASSIFICATION | $19,911 | .007% | $0.00 | 14 | 0.00 | .415% | 16 |

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|---|---|---|---|---|---|---|---|
| R0314: LABORATORY PATHOLOGICAL - BIOPSY | $3,456 | .007% | $0.00 | 29 | 0.00 | .083% | 18 |
| R0739: EKG/ECG (ELECTROCARDIOGRAM) - OTHER | $1,936 | .007% | $0.00 | 14 | 0.00 | .249% | 16 |
| R0719: RECOVERY ROOM - OTHER | $20,795 | .006% | $0.00 | 400 | 0.00 | .111% | 24 |
| R0611: MRI - BRAIN (INCLUDING BRAINSTEM) | $17,093 | .005% | $0.00 | 10 | 0.00 | .305% | 12 |
| R0851(D): CCPD OUTPATIENT--COMPOSITE OR OTHER RATE OTHER RATE | $21,505 | .005% | $0.00 | 130 | 0.00 | .194% | 11 |
| R0981: PROFESSIONAL FEES - EMERGENCY ROOM | $1,420 | .005% | $0.00 | 12 | 0.00 | .055% | 12 |
| R0985: PROFESSIONAL FEES - EKG | $156 | .005% | $0.00 | 12 | 0.00 | .028% | 12 |
| R0499: AMBULATORY SURGICAL CARE - OTHER | $33,127 | .004% | $0.00 | 13 | 0.00 | .028% | 13 |
| R0254: PHARMACY - DRUGS INCIDENT TO OTHER DIAGNOSTIC SERVICES | $5,277 | .004% | $0.00 | 12 | 0.00 | .111% | 9 |
| R0303(D): LABORATORY - RENAL PATIENT (HOME) | $653 | .004% | $0.00 | 15 | 0.00 | .194% | 15 |
| R0384: BLOOD - PLATELETS | $29,603 | .004% | $0.00 | 324 | 0.00 | .249% | 17 |
| R0469: PULMONARY FUNCTION - OTHER | $2,526 | .004% | $0.00 | 25 | 0.00 | .083% | 12 |
| 0483 | $15,768 | .004% | $0.00 | 0 | 0.00 | .055% | 10 |
| R0889(D): MISCELLANEOUS DIALYSIS - OTHER | $2,030 | .004% | $0.00 | 16 | 0.00 | .166% | 11 |
| R0359: CT SCAN - OTHER CT SCANS | $8,988 | .003% | $0.00 | 12 | 0.00 | .138% | 8 |
| R0441: SPEECH LANGUAGE PATHOLOGY - VISIT CHARGE | $1,758 | .003% | $0.00 | 21 | 0.00 | .138% | 18 |
| R0622: MEDICAL/SURGICAL SUPPLIES - SUPPLIES INCIDENT TO OTHER DIAGNOSTIC SERVICE | $8,806 | .003% | $0.00 | 16 | 0.00 | .111% | 8 |
| R0835(D): PERITONEAL DIALYSIS OUTPATIENT OR HOME -SUPPORT SERVICES SUPPORT SERV | $4,151 | .003% | $0.00 | 38 | 0.00 | .055% | 14 |
| R0369: OPERATING ROOM SERVICES - OTHER OPERATIMG ROOM SERVICES | $10,250 | .003% | $0.00 | 13 | 0.00 | .083% | 11 |
| R0431: OCCUPATIONAL THERAPY - VISIT CHARGE | $621 | .003% | $0.00 | 18 | 0.00 | .111% | 16 |
| R0612: MRI - SPINAL CORD (INCLUDING SPINE) | $8,973 | .003% | $0.00 | 5 | 0.00 | .166% | 7 |
| R0275: MEDICAL/SURGICAL SUPPLIES - PACE MAKER | $76,981 | .003% | $0.00 | 9 | 0.00 | .138% | 6 |
| R0333: RADIOLOGY THERAPEUTIC - RADIATION THERAPY | $12,373 | .003% | $0.00 | 55 | 0.00 | .166% | 22 |
| R0809(D): INPATIENT RENAL DIALYSIS - OTHER INPATIENT DIALYSIS | $5,820 | .003% | $0.00 | 14 | 0.00 | .055% | 6 |
| R0942: OTHER THERAPEUTIC SERVICES - EDUCATION/ TRAINING (INCLUDES DIABETES RELAT | $252 | .003% | $0.00 | 8 | 0.00 | .138% | 6 |
| R0845(D): CAPD OUTPATIENT - SUPPORT SERVICES | $866 | .002% | $0.00 | 129 | 0.00 | .138% | 5 |
| R0800(D): INPATIENT RENAL DIALYSIS - GENERAL CLASSIFICATION | $38,328 | .002% | $0.00 | 39 | 0.00 | .083% | 4 |
| R0419: RESPIRATORY SERVICES - OTHER | $219 | .001% | $0.00 | 3 | 0.00 | .083% | 3 |
| R0769: TREATMENT OR OBSERVATION ROOM - OTHER | $3,557 | .001% | $0.00 | 4 | 0.00 | .083% | 3 |
| R0803(D): INPATIENT RENAL DIALYSIS -CAPD CONTINUOUS AMBULATORY PERITONEAL DIALY | $1,823 | .001% | $0.00 | 4 | 0.00 | .083% | 4 |
| R0855(D): CCPD OUTPATIENT - SUPPORT SERVICES | $410 | .001% | $0.00 | 792 | 0.00 | .055% | 7 |
| R0964: PROFESSIONAL FEES - ANESTHETIST (CRNA) | $1,184 | .001% | $0.00 | 3 | 0.00 | .028% | 3 |
| R0319: LABORATORY PATHOLOGICAL - OTHER | $191 | .001% | $0.00 | 2 | 0.00 | .055% | 2 |
| R0400: OTHER IMAGING SERVICES - GENERAL CLASSIFICATION | $504 | .001% | $0.00 | 1 | 0.00 | .055% | 2 |
| R0401: OTHER IMAGING SERVICES - DIAGNOSTIC MAMMOGRAPHY | $302 | .001% | $0.00 | 2 | 0.00 | .055% | 2 |
| R0422: PHYSICAL THERAPY - HOURLY CHARGE | $270 | .001% | $0.00 | 6 | 0.00 | .028% | 2 |
| R0429: PHYSICAL THERAPY - OTHER | $124 | .001% | $0.00 | 7 | 0.00 | .028% | 2 |
| R0459: EMERGENCY ROOM - OTHER | $458 | .001% | $0.00 | 2 | 0.00 | .055% | 2 |
| R0489: CARDIOLOGY - OTHER | $1,280 | .001% | $0.00 | 1 | 0.00 | .055% | 2 |
| 0623: MEDICAL/SURGICAL SUPPLIES - SURGICAL DRESSINGS | $708 | .001% | $0.00 | 416 | 0.00 | .028% | 4 |
| R0200: INTENSIVE CARE - GENERAL CLASSIFICATION | $18 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0240: ALL INCLUSIVE ANCILLARY - GENERAL CLASSIFICATION | $1,032 | .000% | $0.00 | 10 | 0.00 | .028% | 1 |
| R0257: PHARMACY - NON-PRESCRIPTION | $2 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0269: IV THERAPY - OTHER IV THERAPY | $45 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0276: MEDICAL/SURGICAL SUPPLIES - INTRAOCULAR LENS | $341 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0280: ONCOLOGY-GENERAL CLASSIFICATION | $42 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0335: RADIOLOGY THERAPEUTIC - CHEMOTHERAPY IV | $300 | .000% | $0.00 | 2 | 0.00 | .028% | 2 |

1999 Medicare Charges for 24032172 Outpatient Hemodialysis Sessions for 229311 Patients at 3673 Certified Facilities

| REVCENTER | Total charge by this revenue center | % of patients w srv>1 in this rev center | Charge per session | Total number of units on bills | # of units per session | % of facilities used this rev center | # of times this rev center occurs |
|---|---|---|---|---|---|---|---|
| R0372: ANESTHESIA - INCIDENT TO OTHER DIAGNOSTIC SERVICES | $875 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0387: BLOOD - OTHER DERIVATIVES (CRYOPRICIPATATES) | $150 | .000% | $0.00 | 10 | 0.00 | .028% | 1 |
| R0413: RESPIRATORY SERVICES - HYPERBARIC OXYGEN THERAPY | $25,040 | .000% | $0.00 | 80 | 0.00 | .028% | 4 |
| R0432: OCCUPATIONAL THERAPY - HOURLY CHARGE | $135 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| 0451: EMERGENCY ROOM - EMTALA EMERGENCY MEDICAL SCREENING | $53 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0471: AUDIOLOGY - DIAGNOSTIC | $120 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0511: CLINIC - CHRONIC PAIN CENTER | $53 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0540: AMBULANCE - GENERAL CLASSIFICATION | $200 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0543: AMBULANCE - HEART MOBILE | $714 | .000% | $0.00 | 3 | 0.00 | .028% | 2 |
| R0549: AMBULANCE - OTHER | $25 | .000% | $0.00 | 5 | 0.00 | .028% | 1 |
| R0632: DRUGS REQUIRING SPECIFIC IDENTIFICATION - MULTIPLE DRUG SOURCE (EFF 9/93) | $900 | .000% | $0.00 | 3 | 0.00 | .028% | 1 |
| R0633: DRUGS REQUIRING SPECIFIC IDENTIFICATION - RESTRICTIVE PRESCRIPTION (EFF 9 | $358 | .000% | $0.00 | 10 | 0.00 | .028% | 1 |
| 0637 | $483 | .000% | $0.00 | 20 | 0.00 | .028% | 1 |
| 0670 | $32 | .000% | $0.00 | 20 | 0.00 | .028% | 1 |
| R0700: CAST ROOM - GENERAL CLASSIFICATION | $72 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0802(D): INPATIENT RENAL DIALYSIS - PERITONEAL NON-CAPD PERITONEAL (NON-CAPD) | $2,475 | .000% | $0.00 | 5 | 0.00 | .028% | 1 |
| R0831(D): PERITONEAL DIALYSIS OUTPATIENT OR HOME -COMPOSITE OR OTHER RATE PERIT | $336 | .000% | $0.00 | 2 | 0.00 | .028% | 1 |
| R0840(D): CAPD OUTPATIENT -- GENERAL DIALYSIS (CAPD) OUTPATIENT - GENERAL CLASS | $229 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| R0943: OTHER THERAPEUTIC SERVICES - CARDIAC REHABILITATION | $226 | .000% | $0.00 | 4 | 0.00 | .028% | 1 |
| R0960: PROFESSIONAL FEES - GENERAL CLASSIFICATION | $373 | .000% | $0.00 | 1 | 0.00 | .028% | 1 |
| 2270 | $3 | .000% | $0.00 | 5 | 0.00 | .028% | 1 |
| 2835 | $800 | .000% | $0.00 | 5 | 0.00 | .028% | 1 |
| 3234 | $290 | .000% | $0.00 | 5 | 0.00 | .028% | 1 |

## 1999 Medicare Charges for 3954111 Outpatient Peritoneal Dialysis Sessions for 27621 Patients at 1662 Certified Facilities

| REVCENTER | Total charge by this revenue center | % of patients w srv>1 in this rev center | Charge per session | Total number of units on bills | # of units per session | % of facilities used this rev center | # of times this rev center occurs |
|---|---|---|---|---|---|---|---|
| R0635(E): DRUGS REQUIRING SPECIFIC IDENTIFICATION -- EPO 10,000 UNITS OR MORE - | $47,402,099 | 64.6% | $31.52 | 4,261,330 | 2.83 | 85.2% | 81,540 |
| R0841(D): CAPD COMPOSITE OR OTHER RATE OTHER RATE | $136,602,869 | 52.8% | $90.85 | 2,290,064 | 1.52 | 88.2% | 105,226 |
| R0636: DRUGS REQUIRING SPECIFIC IDENTIFICATION -- DRUGS REQUIRING DETAILED CODIN | $4,822,156 | 51.8% | $3.21 | 171,030 | 0.11 | 80.9% | 45,026 |
| R0851(D): CCPD OUTPATIENT--COMPOSITE OR OTHER RATE OTHER RATE | $80,166,147 | 33.7% | $53.31 | 1,251,664 | 0.83 | 77.2% | 55,027 |
| R0270: MEDICAL/SURGICAL SUPPLIES - GENERAL CLASSIFICATION | $164,001 | 30.8% | $0.11 | 55,675 | 0.04 | 59.5% | 21,103 |
| R0634(E): DRUGS REQUIRING SPECIFIC IDENTIFICATION --EPO UNDER 10,000 UNITS -- E | $8,552,237 | 27.8% | $5.69 | 1,462,498 | 0.97 | 67.7% | 30,121 |
| R0855(D): CCPD OUTPATIENT - SUPPORT SERVICES | $5,358,655 | 25.3% | $3.56 | 255,634 | 0.17 | 50.7% | 47,864 |
| 0771: PREVENTATIVE CARE SERVICES - VACCINE ADMINISTRATION | $37,439 | 20.7% | $0.02 | 9,343 | 0.01 | 44.6% | 9,290 |
| R0845(D): CAPD OUTPATIENT - SUPPORT SERVICES | $3,596,327 | 19.6% | $2.39 | 148,054 | 0.10 | 45.0% | 31,791 |
| R0300: LABORATORY - GENERAL CLASSIFICATION | $1,519,428 | 7.83% | $1.01 | 1,036,256 | 0.69 | 11.9% | 33,382 |
| R0301: LABORATORY - CHEMISTRY | $1,125,052 | 5.59% | $0.75 | 28,249 | 0.02 | 7.49% | 27,017 |
| R0304(D): LABORATORY - NON-ROUTINE DIALYSIS | $1,382,311 | 5.32% | $0.92 | 30,864 | 0.02 | 7.37% | 29,257 |
| R0305: LABORATORY - HEMATOLOGY | $105,070 | 2.94% | $0.07 | 3,728 | 0.00 | 5.43% | 3,658 |
| R0306: LABORATORY - BACTERIOLOGY & MICROBIOLOGY | $158,298 | 2.86% | $0.11 | 3,785 | 0.00 | 5.98% | 3,534 |
| R0272: MEDICAL/SURGICAL SUPPLIES - STERILE SUPPLY | $28,070 | 1.95% | $0.02 | 1,004,040 | 0.67 | 5.74% | 1,100 |
| R0302: LABORATORY - IMMUNOLOGY | $96,500 | 1.87% | $0.06 | 1,518 | 0.00 | 4.11% | 1,491 |
| R0831(D): PERITONEAL DIALYSIS OUTPATIENT OR HOME -COMPOSITE OR OTHER RATE PERIT | $2,390,927 | 1.55% | $1.59 | 6,771 | 0.00 | 5.43% | 1,686 |
| R0730: EKG/ECG (ELECTROCARDIOGRAM) - GENERAL CLASSIFICATION | $23,486 | 1.18% | $0.02 | 379 | 0.00 | 8.03% | 360 |
| R0309: LABORATORY - OTHER LABORATORY | $75,285 | 1.16% | $0.05 | 1,792 | 0.00 | 2.66% | 1,772 |
| R0250: PHARMACY - GENERAL CLASSIFICATION | $67,773 | .731% | $0.05 | 1,888 | 0.00 | 3.38% | 377 |
| R0320: RADIOLOGY DIAGNOSTIC - GENERAL CLASSIFICATION | $52,470 | .673% | $0.03 | 275 | 0.00 | 4.29% | 242 |
| R0390: BLOOD STORAGE AND PROCESSING - GENERAL CLASSIFICATION | $48,470 | .601% | $0.03 | 1,288 | 0.00 | 3.14% | 745 |
| R0835(D): PERITONEAL DIALYSIS OUTPATIENT OR HOME -SUPPORT SERVICES SUPPORT SERV | $198,826 | .583% | $0.13 | 1,477 | 0.00 | .845% | 1,143 |
| R0307: LABORATORY - UROLOGY | $16,252 | .565% | $0.01 | 529 | 0.00 | 1.33% | 516 |
| R0303(D): LABORATORY - RENAL PATIENT (HOME) | $112,312 | .438% | $0.07 | 2,477 | 0.00 | .785% | 2,439 |
| R0940: OTHER THERAPEUTIC SERVICES - GENERAL CLASSIFICATION | $3,875 | .387% | $0.00 | 154 | 0.00 | .121% | 155 |
| R0324: RADIOLOGY DIAGNOSTIC - CHEST X-RAY | $11,060 | .362% | $0.01 | 112 | 0.00 | 2.84% | 111 |
| R0259: PHARMACY - OTHER PHARMACY | $55,634 | .217% | $0.04 | 831 | 0.00 | 1.03% | 144 |
| R0399: BLOOD STORAGE AND PROCESSING - OTHER BLOOD STORAGE AND PROCESSING | $8,735 | .196% | $0.01 | 380 | 0.00 | .664% | 357 |
| R0922: OTHER DIAGNOSTIC SERVICES - ELECTROMYELOGRAM | $28,541 | .188% | $0.02 | 551 | 0.00 | .543% | 80 |
| R0258: PHARMACY - IV SOLUTIONS | $14,225 | .152% | $0.01 | 70 | 0.00 | .845% | 59 |
| R0391: BLOOD STORAGE AND PROCESSING - BLOOD ADMINISTRATION | $7,824 | .101% | $0.01 | 67 | 0.00 | 1.33% | 47 |
| R0271: MEDICAL/SURGICAL SUPPLIES - NONSTERILE SUPPLY | $1,179 | .083% | $0.00 | 73 | 0.00 | .906% | 34 |
| R0480: CARDIOLOGY - GENERAL CLASSIFICATION | $17,393 | .076% | $0.01 | 64 | 0.00 | .483% | 58 |
| R0329: RADIOLOGY DIAGNOSTIC - OTHER | $5,182 | .069% | $0.00 | 39 | 0.00 | .543% | 37 |
| R0850(D): CCPD OUTPATIENT - GENERAL (CCPD) OUTPATIENT - GENERAL CLASSIFICATION | $19,687 | .069% | $0.01 | 135 | 0.00 | .362% | 33 |
| R0849(D): CAPD OUTPATIENT - OTHER | $25,848 | .062% | $0.02 | 93 | 0.00 | .423% | 25 |
| R0310: LABORATORY PATHOLOGICAL - GENERAL CLASSIFICATION | $5,362 | .058% | $0.00 | 42 | 0.00 | .604% | 33 |
| R0510: CLINIC - GENERAL CLASSIFICATION | $2,507 | .058% | $0.00 | 36 | 0.00 | .423% | 21 |
| R0825(D): HEMODIALYSIS OUTPATIENT OR HOME--SUPPORT SERVICES DIALYSIS - SUPPORT | $6,156 | .058% | $0.00 | 115 | 0.00 | .121% | 94 |
| R0921: OTHER DIAGNOSTIC SERVICES - PERIPHERAL VASCULAR LAB | $6,557 | .051% | $0.00 | 19 | 0.00 | .785% | 16 |
| R0260: IV THERAPY - GENERAL CLASSIFICATION | $2,032 | .047% | $0.00 | 22 | 0.00 | .302% | 20 |
| R0381: BLOOD - PACKED RED CELLS | $2,285 | .047% | $0.00 | 32 | 0.00 | .483% | 17 |
| R0450: EMERGENCY ROOM - GENERAL CLASSIFICATION | $3,877 | .047% | $0.00 | 14 | 0.00 | .543% | 14 |
| R0251: PHARMACY - GENERIC DRUGS | $4,932 | .043% | $0.00 | 185 | 0.00 | .302% | 21 |
| R0402: OTHER IMAGING SERVICES - ULTRASOUND | $3,038 | .043% | $0.00 | 12 | 0.00 | .483% | 12 |
| R0279: MEDICAL/SURGICAL SUPPLIES - OTHER DEVICES | $811 | .036% | $0.00 | 34 | 0.00 | .121% | 18 |

1999 Medicare Charges for 3954111 Outpatient Peritoneal Dialysis Sessions for 27621 Patients at 1662 Certified Facilities

| REVCENTER | Total charge by this revenue center | % of patients w srv>1 in this rev center | Charge per session | Total number of units on bills | # of units per session | % of facilities used this rev center | # of times this rev center occurs |
|---|---|---|---|---|---|---|---|
| R0761: TREATMENT OR OBSERVATION ROOM - TREATMENT ROOM (EFF 9/93) | $1,119 | .036% | $0.00 | 2 | 0.00 | .242% | 15 |
| R0385: BLOOD - LEUKOCYTES | $3,482 | .025% | $0.00 | 29 | 0.00 | .181% | 14 |
| R0762: TREATMENT OR OBSERVATION ROOM - OBSERVATION ROOM (EFF 9/93) | $3,726 | .025% | $0.00 | 181 | 0.00 | .423% | 8 |
| R0261: IV THERAPY - INFUSION PUMP | $925 | .022% | $0.00 | 15 | 0.00 | .060% | 9 |
| R0710: RECOVERY ROOM - GENERAL CLASSIFICATION | $2,934 | .022% | $0.00 | 20 | 0.00 | .362% | 6 |
| R0350: COMPUTED TOMOGRAPHIC (CT) SCAN - GENERAL CLASSIFICATION | $3,527 | .018% | $0.00 | 5 | 0.00 | .302% | 5 |
| R0352: CT SCAN - BODY SCAN | $12,461 | .018% | $0.01 | 5 | 0.00 | .302% | 5 |
| R0252: PHARMACY - NONGENERIC DRUGS | $2,041 | .014% | $0.00 | 13 | 0.00 | .121% | 4 |
| R0370: ANESTHESIA - GENERAL CLASSIFICATION | $2,330 | .014% | $0.00 | 140 | 0.00 | .242% | 4 |
| R0460: PULMONARY FUNCTION - GENERAL CLASSI- FICATION | $4,250 | .014% | $0.00 | 8 | 0.00 | .242% | 6 |
| R0830(D): PERITONEAL DIALYSIS OUTPATIENT OR HOME -GENERAL GENERAL CLASSIFICATIO | $527 | .014% | $0.00 | 5 | 0.00 | .181% | 4 |
| R0840(D): CAPD OUTPATIENT -- GENERAL DIALYSIS (CAPD) OUTPATIENT - GENERAL CLASS | $8,223 | .014% | $0.01 | 34 | 0.00 | .181% | 4 |
| R0319: LABORATORY PATHOLOGICAL - OTHER | $286 | .011% | $0.00 | 3 | 0.00 | .060% | 3 |
| R0321: RADIOLOGY DIAGNOSTIC - ANGIOCARDIOGRAPHY | $5,778 | .011% | $0.00 | 4 | 0.00 | .181% | 4 |
| R0340: NUCLEAR MEDICINE - GENERAL CLASSIFICATION | $2,412 | .011% | $0.00 | 6 | 0.00 | .181% | 3 |
| R0360: OPERATING ROOM SERVICES - GENERAL CLASSIFICATION | $9,686 | .011% | $0.01 | 27 | 0.00 | .181% | 4 |
| R0802(D): INPATIENT RENAL DIALYSIS - PERITONEAL NON-CAPD PERITONEAL (NON-CAPD) | $40,699 | .011% | $0.03 | 31 | 0.00 | .181% | 3 |
| R0803(D): INPATIENT RENAL DIALYSIS -CAPD CONTINUOUS AMBULATORY PERITONEAL DIALY | $3,343 | .011% | $0.00 | 19 | 0.00 | .181% | 8 |
| R0341: NUCLEAR MEDICINE - DIAGNOSTIC | $2,489 | .007% | $0.00 | 6 | 0.00 | .121% | 6 |
| R0351: CT SCAN - HEAD SCAN | $982 | .007% | $0.00 | 2 | 0.00 | .121% | 2 |
| R0410: RESPIRATORY SERVICES - GENERAL CLASSIFICATION | $751 | .007% | $0.00 | 14 | 0.00 | .121% | 3 |
| R0740: EEG (ELECTROENCEPHALOGRAM) - GENERAL CLASSIFICATION | $402 | .007% | $0.00 | 2 | 0.00 | .121% | 2 |
| R0844(D): CAPD OUTPATIENT - MAINTENANCE/100% | $94 | .007% | $0.00 | 2 | 0.00 | .060% | 2 |
| R0889(D): MISCELLANEOUS DIALYSIS - OTHER | $1,486 | .007% | $0.00 | 9 | 0.00 | .121% | 4 |
| R0311: LABORATORY PATHOLOGICAL - CYTOLOGY | $300 | .004% | $0.00 | 2 | 0.00 | .060% | 2 |
| R0312: LABORATORY PATHOLOGICAL - HISTOLOGY | $28 | .004% | $0.00 | 1 | 0.00 | .060% | 1 |
| R0314: LABORATORY PATHOLOGICAL - BIOPSY | $221 | .004% | $0.00 | 2 | 0.00 | .060% | 2 |
| R0389: BLOOD - OTHER BLOOD | $153 | .004% | $0.00 | 2 | 0.00 | .060% | 1 |
| R0409: OTHER IMAGING SERVICES - OTHER | $288 | .004% | $0.00 | 1 | 0.00 | .060% | 1 |
| R0420: PHYSICAL THERAPY - GENERAL CLASSIFICATION | $1,061 | .004% | $0.00 | 13 | 0.00 | .060% | 13 |
| R0424: PHYSICAL THERAPY - EVALUATION OR RE-EVALUATION | $205 | .004% | $0.00 | 2 | 0.00 | .060% | 1 |
| R0459: EMERGENCY ROOM - OTHER | $43 | .004% | $0.00 | 1 | 0.00 | .060% | 1 |
| R0481: CARDIOLOGY - CARDIAC CATH LAB | $4,182 | .004% | $0.00 | 5 | 0.00 | .060% | 5 |
| R0482: CARDIOLOGY - STRESS TEST | $136 | .004% | $0.00 | 1 | 0.00 | .060% | 1 |
| R0621: MEDICAL/SURGICAL SUPPLIES - SUPPLIES INCIDENT TO RADIOLOGY | $68 | .004% | $0.00 | 2 | 0.00 | .060% | 1 |
| R0749: EEG (ELECTROENCEPHALOGRAM) - OTHER | $1,190 | .004% | $0.00 | 1 | 0.00 | .060% | 1 |
| R0760: TREATMENT OR OBSERVATION ROOM - GENERAL CLASSIFICATION | $64 | .004% | $0.00 | 2 | 0.00 | .060% | 2 |
| R0842(D): CAPD OUTPATIENT - HOME SUPPLIES | $570 | .004% | $0.00 | 2 | 0.00 | .060% | 1 |
| R0859(D): CCPD OUTPATIENT - OTHER | $600 | .004% | $0.00 | 2 | 0.00 | .060% | 1 |
| R0920: OTHER DIAGNOSTIC SERVICES - GENERAL CLASSIFICATION | $1,286 | .004% | $0.00 | 2 | 0.00 | .060% | 2 |
| R0929: OTHER DIAGNOSTIC SERVICES - OTHER | $298 | .004% | $0.00 | 3 | 0.00 | .060% | 2 |

## 1999 Medicare Charges for 2442413 Outpatient CAPD Sessions for 18200 Patients at 1550 Certified Facilities

| REVCENTER | Total charge by this revenue center | % of patients w srv>1 in this rev center | Charge per session | Total number of units on bills | # of units per session | % of facilities used this rev center | # of times this rev center occurs |
|---|---|---|---|---|---|---|---|
| R0841(D): CAPD COMPOSITE OR OTHER RATE OTHER RATE | $136,599,153 | 80.1% | $55.93 | 2,290,027 | 0.94 | 94.3% | 105,222 |
| R0635(E): DRUGS REQUIRING SPECIFIC IDENTIFICATION -- EPO 10,000 UNITS OR MORE - | $25,117,937 | 58.3% | $10.28 | 157,038 | 0.06 | 83.0% | 42,892 |
| R0636: DRUGS REQUIRING SPECIFIC IDENTIFICATION -- DRUGS REQUIRING DETAILED CODIN | $2,773,512 | 44.2% | $1.14 | 88,196 | 0.04 | 75.5% | 23,117 |
| R0845(D): CAPD OUTPATIENT - SUPPORT SERVICES | $3,588,484 | 29.8% | $1.47 | 148,016 | 0.06 | 48.2% | 31,786 |
| R0634(E): DRUGS REQUIRING SPECIFIC IDENTIFICATION --EPO UNDER 10,000 UNITS -- E | $5,465,825 | 26.7% | $2.24 | 1,418,843 | 0.58 | 60.5% | 17,644 |
| R0270: MEDICAL/SURGICAL SUPPLIES - GENERAL CLASSIFICATION | $96,120 | 25.6% | $0.04 | 28,830 | 0.01 | 52.5% | 10,890 |
| 0771: PREVENTATIVE CARE SERVICES - VACCINE ADMINISTRATION | $19,642 | 15.7% | $0.01 | 4,477 | 0.00 | 37.6% | 4,457 |
| R0300: LABORATORY - GENERAL CLASSIFICATION | $975,374 | 7.83% | $0.40 | 1,022,897 | 0.42 | 10.7% | 20,945 |
| R0301: LABORATORY - CHEMISTRY | $740,723 | 6.04% | $0.30 | 19,057 | 0.01 | 6.91% | 18,185 |
| R0304(D): LABORATORY - NON-ROUTINE DIALYSIS | $851,089 | 5.31% | $0.35 | 18,118 | 0.01 | 6.78% | 17,243 |
| R0305: LABORATORY - HEMATOLOGY | $73,409 | 3.22% | $0.03 | 2,576 | 0.00 | 4.71% | 2,553 |
| R0306: LABORATORY - BACTERIOLOGY & MICROBIOLOGY | $98,963 | 2.81% | $0.04 | 2,367 | 0.00 | 5.29% | 2,265 |
| R0302: LABORATORY - IMMUNOLOGY | $52,493 | 1.93% | $0.02 | 987 | 0.00 | 3.49% | 978 |
| R0272: MEDICAL/SURGICAL SUPPLIES - STERILE SUPPLY | $18,419 | 1.73% | $0.01 | 1,002,679 | 0.41 | 4.78% | 685 |
| R0309: LABORATORY - OTHER LABORATORY | $36,169 | 1.06% | $0.01 | 955 | 0.00 | 2.19% | 947 |
| R0730: EKG/ECG (ELECTROCARDIOGRAM) - GENERAL CLASSIFICATION | $11,263 | .901% | $0.00 | 186 | 0.00 | 6.13% | 176 |
| R0250: PHARMACY - GENERAL CLASSIFICATION | $48,838 | .742% | $0.02 | 1,286 | 0.00 | 2.97% | 242 |
| R0307: LABORATORY - UROLOGY | $9,757 | .610% | $0.00 | 325 | 0.00 | 1.03% | 314 |
| R0940: OTHER THERAPEUTIC SERVICES - GENERAL CLASSIFICATION | $3,875 | .588% | $0.00 | 154 | 0.00 | .129% | 155 |
| R0320: RADIOLOGY DIAGNOSTIC - GENERAL CLASSIFICATION | $24,373 | .577% | $0.01 | 154 | 0.00 | 3.16% | 138 |
| R0303(D): LABORATORY - RENAL PATIENT (HOME) | $71,306 | .538% | $0.03 | 1,769 | 0.00 | .646% | 1,746 |
| R0390: BLOOD STORAGE AND PROCESSING - GENERAL CLASSIFICATION | $22,691 | .505% | $0.01 | 579 | 0.00 | 2.19% | 340 |
| R0851(D): CCPD OUTPATIENT--COMPOSITE OR OTHER RATE OTHER RATE | $290,342 | .418% | $0.12 | 1,635 | 0.00 | 2.26% | 149 |
| R0324: RADIOLOGY DIAGNOSTIC - CHEST X-RAY | $6,317 | .286% | $0.00 | 62 | 0.00 | 1.94% | 61 |
| R0855(D): CCPD OUTPATIENT - SUPPORT SERVICES | $6,416 | .275% | $0.00 | 2,313 | 0.00 | 1.74% | 66 |
| R0399: BLOOD STORAGE AND PROCESSING - OTHER BLOOD STORAGE AND PROCESSING | $6,978 | .264% | $0.00 | 358 | 0.00 | .516% | 337 |
| R0259: PHARMACY - OTHER PHARMACY | $35,886 | .242% | $0.01 | 492 | 0.00 | .839% | 100 |
| R0258: PHARMACY - IV SOLUTIONS | $7,259 | .132% | $0.00 | 44 | 0.00 | .646% | 31 |
| R0391: BLOOD STORAGE AND PROCESSING - BLOOD ADMINISTRATION | $7,071 | .126% | $0.00 | 55 | 0.00 | 1.23% | 37 |
| R0835(D): PERITONEAL DIALYSIS OUTPATIENT OR HOME -SUPPORT SERVICES SUPPORT SERV | $14,342 | .110% | $0.01 | 150 | 0.00 | .129% | 62 |
| R0849(D): CAPD OUTPATIENT - OTHER | $25,848 | .093% | $0.01 | 93 | 0.00 | .452% | 25 |
| R0825(D): HEMODIALYSIS OUTPATIENT OR HOME--SUPPORT SERVICES DIALYSIS - SUPPORT | $6,156 | .088% | $0.00 | 115 | 0.00 | .129% | 94 |
| R0922: OTHER DIAGNOSTIC SERVICES - ELECTROMYELOGRAM | $12,092 | .088% | $0.00 | 166 | 0.00 | .452% | 28 |
| R0480: CARDIOLOGY - GENERAL CLASSIFICATION | $12,347 | .077% | $0.01 | 43 | 0.00 | .387% | 37 |
| R0271: MEDICAL/SURGICAL SUPPLIES - NONSTERILE SUPPLY | $748 | .066% | $0.00 | 46 | 0.00 | .581% | 17 |
| R0450: EMERGENCY ROOM - GENERAL CLASSIFICATION | $2,650 | .055% | $0.00 | 10 | 0.00 | .452% | 10 |
| R0510: CLINIC - GENERAL CLASSIFICATION | $2,151 | .055% | $0.00 | 27 | 0.00 | .323% | 12 |
| R0921: OTHER DIAGNOSTIC SERVICES - PERIPHERAL VASCULAR LAB | $5,493 | .055% | $0.00 | 14 | 0.00 | .646% | 12 |
| R0329: RADIOLOGY DIAGNOSTIC - OTHER | $2,418 | .044% | $0.00 | 19 | 0.00 | .387% | 17 |
| R0310: LABORATORY PATHOLOGICAL - GENERAL CLASSIFICATION | $554 | .033% | $0.00 | 13 | 0.00 | .387% | 9 |
| R0260: IV THERAPY - GENERAL CLASSIFICATION | $612 | .027% | $0.00 | 3 | 0.00 | .194% | 8 |
| R0385: BLOOD - LEUKOCYTES | $2,686 | .027% | $0.00 | 21 | 0.00 | .194% | 10 |
| R0761: TREATMENT OR OBSERVATION ROOM - TREATMENT ROOM (EFF 9/93) | $677 | .027% | $0.00 | 2 | 0.00 | .258% | 9 |
| R0402: OTHER IMAGING SERVICES - ULTRASOUND | $1,443 | .022% | $0.00 | 4 | 0.00 | .258% | 4 |
| R0710: RECOVERY ROOM - GENERAL CLASSIFICATION | $1,586 | .022% | $0.00 | 18 | 0.00 | .258% | 4 |
| R0762: TREATMENT OR OBSERVATION ROOM - OBSERVATION ROOM (EFF 9/93) | $1,814 | .022% | $0.00 | 88 | 0.00 | .258% | 4 |
| R0840(D): CAPD OUTPATIENT -- GENERAL DIALYSIS (CAPD) OUTPATIENT - GENERAL CLASS | $8,223 | .022% | $0.00 | 34 | 0.00 | .194% | 4 |

## 1999 Medicare Charges for 2442413 Outpatient CAPD Sessions for 18200 Patients at 1550 Certified Facilities

| REVCENTER | Total charge by this revenue center | % of patients w srv>1 in this rev center | Charge per session | Total number of units on bills | # of units per session | % of facilities used this rev center | # of times this rev center occurs |
|---|---|---|---|---|---|---|---|
| R0279: MEDICAL/SURGICAL SUPPLIES - OTHER DEVICES | $41 | .016% | $0.00 | 6 | 0.00 | .065% | 5 |
| R0360: OPERATING ROOM SERVICES - GENERAL CLASSIFICATION | $9,686 | .016% | $0.00 | 27 | 0.00 | .194% | 4 |
| R0370: ANESTHESIA - GENERAL CLASSIFICATION | $1,849 | .016% | $0.00 | 139 | 0.00 | .194% | 3 |
| R0381: BLOOD - PACKED RED CELLS | $627 | .016% | $0.00 | 6 | 0.00 | .194% | 4 |
| R0803(D): INPATIENT RENAL DIALYSIS -CAPD CONTINUOUS AMBULATORY PERITONEAL DIALY | $3,343 | .016% | $0.00 | 19 | 0.00 | .194% | 8 |
| R0251: PHARMACY - GENERIC DRUGS | $185 | .011% | $0.00 | 6 | 0.00 | .129% | 3 |
| R0321: RADIOLOGY DIAGNOSTIC - ANGIOCARDIOGRAPHY | $4,355 | .011% | $0.00 | 3 | 0.00 | .129% | 3 |
| R0340: NUCLEAR MEDICINE - GENERAL CLASSIFICATION | $1,704 | .011% | $0.00 | 4 | 0.00 | .129% | 2 |
| R0460: PULMONARY FUNCTION - GENERAL CLASSI- FICATION | $87 | .011% | $0.00 | 2 | 0.00 | .129% | 2 |
| R0740: EEG (ELECTROENCEPHALOGRAM) - GENERAL CLASSIFICATION | $402 | .011% | $0.00 | 2 | 0.00 | .129% | 2 |
| R0844(D): CAPD OUTPATIENT - MAINTENANCE/100% | $94 | .011% | $0.00 | 2 | 0.00 | .065% | 2 |
| R0252: PHARMACY - NONGENERIC DRUGS | $563 | .005% | $0.00 | 2 | 0.00 | .065% | 1 |
| R0311: LABORATORY PATHOLOGICAL - CYTOLOGY | $300 | .005% | $0.00 | 2 | 0.00 | .065% | 2 |
| R0312: LABORATORY PATHOLOGICAL - HISTOLOGY | $28 | .005% | $0.00 | 1 | 0.00 | .065% | 1 |
| R0314: LABORATORY PATHOLOGICAL - BIOPSY | $221 | .005% | $0.00 | 2 | 0.00 | .065% | 2 |
| R0350: COMPUTED TOMOGRAPHIC (CT) SCAN - GENERAL CLASSIFICATION | $802 | .005% | $0.00 | 1 | 0.00 | .065% | 1 |
| R0351: CT SCAN - HEAD SCAN | $479 | .005% | $0.00 | 1 | 0.00 | .065% | 1 |
| R0352: CT SCAN - BODY SCAN | $2,996 | .005% | $0.00 | 2 | 0.00 | .065% | 1 |
| R0459: EMERGENCY ROOM - OTHER | $43 | .005% | $0.00 | 1 | 0.00 | .065% | 1 |
| R0481: CARDIOLOGY - CARDIAC CATH LAB | $4,182 | .005% | $0.00 | 5 | 0.00 | .065% | 5 |
| R0482: CARDIOLOGY - STRESS TEST | $136 | .005% | $0.00 | 1 | 0.00 | .065% | 1 |
| R0842(D): CAPD OUTPATIENT - HOME SUPPLIES | $570 | .005% | $0.00 | 2 | 0.00 | .065% | 1 |
| R0889(D): MISCELLANEOUS DIALYSIS - OTHER | $1,380 | .005% | $0.00 | 7 | 0.00 | .065% | 2 |
| R0929: OTHER DIAGNOSTIC SERVICES - OTHER | $298 | .005% | $0.00 | 3 | 0.00 | .065% | 2 |

## 1999 Medicare Charges for 1503654 Outpatient CCPD Sessions for 14121 Patients at 1394 Certified Facilities

| REVCENTER | Total charge by this revenue center | % of patients w srv>1 in this rev center | Charge per session | Total number of units on bills | # of units per session | % of facilities used this rev center | # of times this rev center occurs |
|---|---|---|---|---|---|---|---|
| R0851(D): CCPD OUTPATIENT--COMPOSITE OR OTHER RATE OTHER RATE | $79,875,805 | 65.8% | $53.12 | 1,250,029 | 0.83 | 91.6% | 54,878 |
| R0635(E): DRUGS REQUIRING SPECIFIC IDENTIFICATION -- EPO 10,000 UNITS OR MORE - | $21,825,725 | 63.7% | $14.52 | 4,103,496 | 2.73 | 83.3% | 38,225 |
| R0636: DRUGS REQUIRING SPECIFIC IDENTIFICATION -- DRUGS REQUIRING DETAILED CODIN | $2,001,025 | 49.9% | $1.33 | 82,032 | 0.05 | 75.4% | 21,685 |
| R0855(D): CCPD OUTPATIENT - SUPPORT SERVICES | $5,351,953 | 49.4% | $3.56 | 253,320 | 0.17 | 60.1% | 47,797 |
| R0270: MEDICAL/SURGICAL SUPPLIES - GENERAL CLASSIFICATION | $66,523 | 30.3% | $0.04 | 26,344 | 0.02 | 54.7% | 10,022 |
| R0634(E): DRUGS REQUIRING SPECIFIC IDENTIFICATION --EPO UNDER 10,000 UNITS -- E | $3,008,040 | 23.6% | $2.00 | 42,842 | 0.03 | 55.5% | 12,103 |
| 0771: PREVENTATIVE CARE SERVICES - VACCINE ADMINISTRATION | $17,772 | 21.3% | $0.01 | 4,829 | 0.00 | 43.4% | 4,796 |
| R0300: LABORATORY - GENERAL CLASSIFICATION | $512,162 | 6.38% | $0.34 | 12,906 | 0.01 | 8.76% | 12,321 |
| R0304(D): LABORATORY - NON-ROUTINE DIALYSIS | $509,615 | 4.32% | $0.34 | 12,294 | 0.01 | 5.82% | 11,580 |
| R0301: LABORATORY - CHEMISTRY | $364,634 | 3.70% | $0.24 | 8,603 | 0.01 | 5.75% | 8,269 |
| R0306: LABORATORY - BACTERIOLOGY & MICROBIOLOGY | $52,835 | 1.88% | $0.04 | 1,205 | 0.00 | 4.45% | 1,083 |
| R0305: LABORATORY - HEMATOLOGY | $30,014 | 1.80% | $0.02 | 1,095 | 0.00 | 3.81% | 1,059 |
| R0272: MEDICAL/SURGICAL SUPPLIES - STERILE SUPPLY | $9,428 | 1.66% | $0.01 | 1,358 | 0.00 | 4.60% | 413 |
| R0302: LABORATORY - IMMUNOLOGY | $42,313 | 1.17% | $0.03 | 488 | 0.00 | 2.95% | 471 |
| R0730: EKG/ECG (ELECTROCARDIOGRAM) - GENERAL CLASSIFICATION | $10,997 | 1.10% | $0.01 | 183 | 0.00 | 5.10% | 177 |
| R0309: LABORATORY - OTHER LABORATORY | $37,049 | .864% | $0.02 | 768 | 0.00 | 2.01% | 762 |
| R0250: PHARMACY - GENERAL CLASSIFICATION | $17,589 | .489% | $0.01 | 573 | 0.00 | 2.01% | 121 |
| R0320: RADIOLOGY DIAGNOSTIC - GENERAL CLASSIFICATION | $10,213 | .489% | $0.01 | 88 | 0.00 | 2.23% | 86 |
| R0390: BLOOD STORAGE AND PROCESSING - GENERAL CLASSIFICATION | $21,828 | .482% | $0.01 | 597 | 0.00 | 2.30% | 338 |
| R0307: LABORATORY - UROLOGY | $6,453 | .382% | $0.00 | 202 | 0.00 | .718% | 200 |
| R0324: RADIOLOGY DIAGNOSTIC - CHEST X-RAY | $4,011 | .283% | $0.00 | 42 | 0.00 | 1.65% | 42 |
| R0922: OTHER DIAGNOSTIC SERVICES - ELECTROMYELOGRAM | $16,449 | .255% | $0.01 | 385 | 0.00 | .503% | 52 |
| R0303(D): LABORATORY - RENAL PATIENT (HOME) | $41,007 | .234% | $0.03 | 708 | 0.00 | .503% | 693 |
| R0850(D): CCPD OUTPATIENT - GENERAL (CCPD) OUTPATIENT - GENERAL CLASSIFICATION | $19,687 | .135% | $0.01 | 135 | 0.00 | .431% | 33 |
| R0259: PHARMACY - OTHER PHARMACY | $19,715 | .127% | $0.01 | 338 | 0.00 | .503% | 43 |
| R0835(D): PERITONEAL DIALYSIS OUTPATIENT OR HOME -SUPPORT SERVICES SUPPORT SERV | $15,544 | .127% | $0.01 | 164 | 0.00 | .144% | 69 |
| R0258: PHARMACY - IV SOLUTIONS | $6,652 | .113% | $0.00 | 21 | 0.00 | .503% | 26 |
| R0271: MEDICAL/SURGICAL SUPPLIES - NONSTERILE SUPPLY | $431 | .078% | $0.00 | 27 | 0.00 | .718% | 17 |
| R0329: RADIOLOGY DIAGNOSTIC - OTHER | $2,697 | .078% | $0.00 | 19 | 0.00 | .359% | 19 |
| R0251: PHARMACY - GENERIC DRUGS | $4,112 | .064% | $0.00 | 154 | 0.00 | .144% | 15 |
| R0310: LABORATORY PATHOLOGICAL - GENERAL CLASSIFICATION | $1,494 | .064% | $0.00 | 29 | 0.00 | .287% | 23 |
| R0381: BLOOD - PACKED RED CELLS | $1,112 | .064% | $0.00 | 18 | 0.00 | .359% | 9 |
| R0399: BLOOD STORAGE AND PROCESSING - OTHER BLOOD STORAGE AND PROCESSING | $1,757 | .057% | $0.00 | 22 | 0.00 | .359% | 20 |
| R0260: IV THERAPY - GENERAL CLASSIFICATION | $1,216 | .050% | $0.00 | 11 | 0.00 | .144% | 10 |
| R0279: MEDICAL/SURGICAL SUPPLIES - OTHER DEVICES | $770 | .050% | $0.00 | 28 | 0.00 | .144% | 13 |
| R0480: CARDIOLOGY - GENERAL CLASSIFICATION | $5,046 | .050% | $0.00 | 21 | 0.00 | .216% | 21 |
| R0261: IV THERAPY - INFUSION PUMP | $925 | .042% | $0.00 | 15 | 0.00 | .072% | 9 |
| R0510: CLINIC - GENERAL CLASSIFICATION | $356 | .042% | $0.00 | 9 | 0.00 | .144% | 9 |
| R0391: BLOOD STORAGE AND PROCESSING - BLOOD ADMINISTRATION | $743 | .035% | $0.00 | 11 | 0.00 | .359% | 9 |
| R0402: OTHER IMAGING SERVICES - ULTRASOUND | $898 | .035% | $0.00 | 5 | 0.00 | .216% | 5 |
| R0761: TREATMENT OR OBSERVATION ROOM - TREATMENT ROOM (EFF 9/93) | $442 | .035% | $0.00 | 0 | 0.00 | .144% | 6 |
| R0319: LABORATORY PATHOLOGICAL - OTHER | $286 | .021% | $0.00 | 3 | 0.00 | .072% | 3 |
| R0350: COMPUTED TOMOGRAPHIC (CT) SCAN - GENERAL CLASSIFICATION | $2,226 | .021% | $0.00 | 3 | 0.00 | .216% | 3 |
| R0352: CT SCAN - BODY SCAN | $2,476 | .021% | $0.00 | 3 | 0.00 | .216% | 3 |
| R0921: OTHER DIAGNOSTIC SERVICES - PERIPHERAL VASCULAR LAB | $577 | .021% | $0.00 | 4 | 0.00 | .216% | 3 |
| R0252: PHARMACY - NONGENERIC DRUGS | $465 | .014% | $0.00 | 3 | 0.00 | .072% | 2 |
| R0341: NUCLEAR MEDICINE - DIAGNOSTIC | $2,489 | .014% | $0.00 | 6 | 0.00 | .144% | 6 |

1999 Medicare Charges for 1503654 Outpatient CCPD Sessions for 14121 Patients at 1394 Certified Facilities

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|---|---|---|---|---|---|---|---|
| R0385: BLOOD - LEUKOCYTES | $796 | .014% | $0.00 | 8 | 0.00 | .144% | 4 |
| R0762: TREATMENT OR OBSERVATION ROOM - OBSERVATION ROOM (EFF 9/93) | $1,252 | .014% | $0.00 | 91 | 0.00 | .144% | 3 |
| R0845(D): CAPD OUTPATIENT - SUPPORT SERVICES | $90 | .014% | $0.00 | 2 | 0.00 | .072% | 2 |
| R0351: CT SCAN - HEAD SCAN | $503 | .007% | $0.00 | 1 | 0.00 | .072% | 1 |
| R0389: BLOOD - OTHER BLOOD | $153 | .007% | $0.00 | 2 | 0.00 | .072% | 1 |
| R0409: OTHER IMAGING SERVICES - OTHER | $288 | .007% | $0.00 | 1 | 0.00 | .072% | 1 |
| R0410: RESPIRATORY SERVICES - GENERAL CLASSIFICATION | $682 | .007% | $0.00 | 13 | 0.00 | .072% | 2 |
| R0450: EMERGENCY ROOM - GENERAL CLASSIFICATION | $750 | .007% | $0.00 | 2 | 0.00 | .072% | 2 |
| R0460: PULMONARY FUNCTION - GENERAL CLASSI- FICATION | $687 | .007% | $0.00 | 6 | 0.00 | .072% | 3 |
| R0621: MEDICAL/SURGICAL SUPPLIES - SUPPLIES INCIDENT TO RADIOLOGY | $68 | .007% | $0.00 | 2 | 0.00 | .072% | 1 |
| R0760: TREATMENT OR OBSERVATION ROOM - GENERAL CLASSIFICATION | $64 | .007% | $0.00 | 2 | 0.00 | .072% | 2 |
| R0859(D): CCPD OUTPATIENT - OTHER | $600 | .007% | $0.00 | 2 | 0.00 | .072% | 1 |
| R0889(D): MISCELLANEOUS DIALYSIS - OTHER | $106 | .007% | $0.00 | 2 | 0.00 | .072% | 2 |