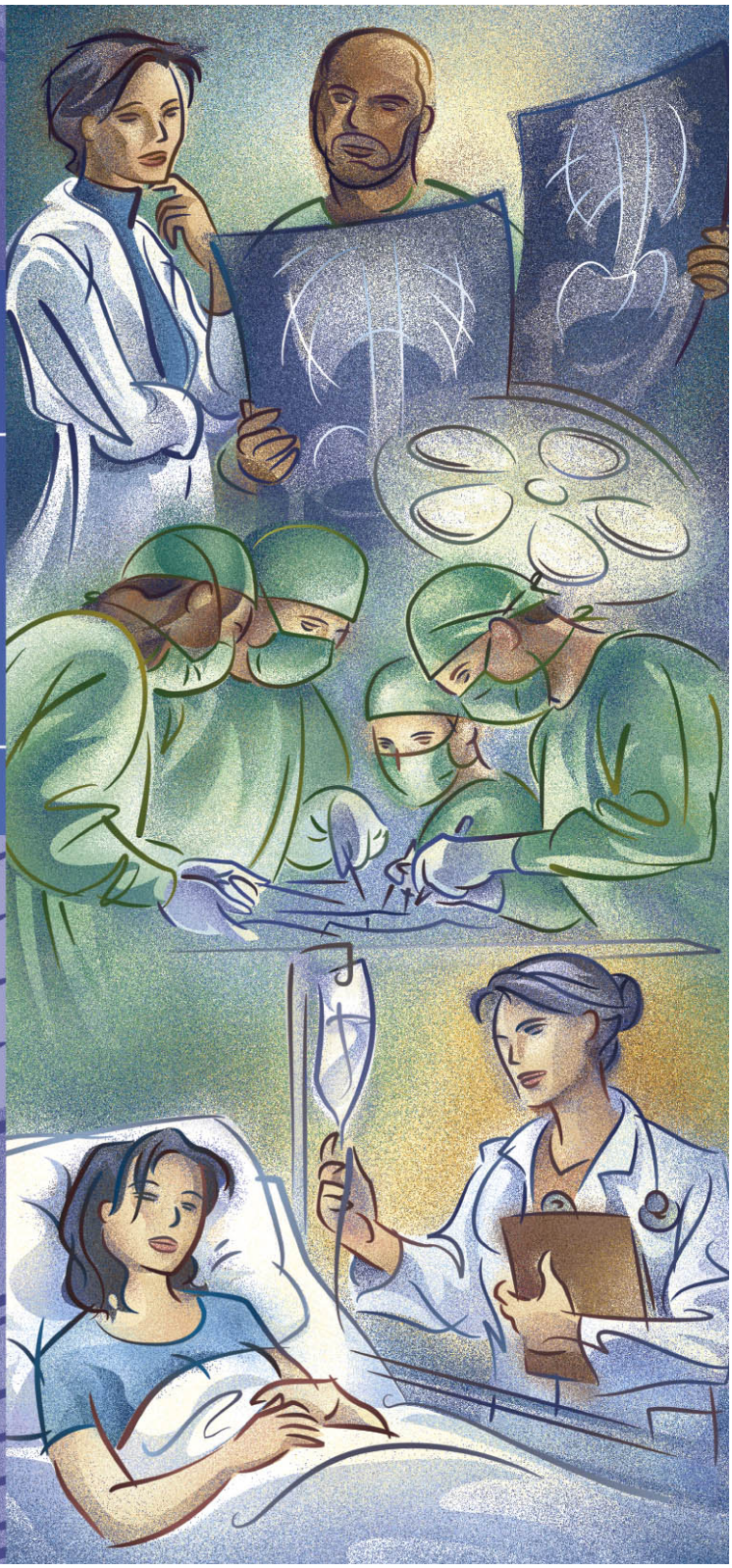
AHRQ

AHRQ QUALITY INDICATORS

Inpatient Quality Indicators

SOFTWARE DOCUMENTATION



AHRQ Quality Indicators

Inpatient Quality Indicators: Software Documentation, Version 3.0, SAS

Department of Health and Human Services
Agency for Healthcare Research and Quality
http://www.qualityindicators.ahrq.gov

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Abstract

The value of information on health care quality has never been so widely recognized; yet many organizations lack the resources and/or expertise to build a quality information program from the ground up. Recognizing this, the AHRQ Quality Indicators were developed specifically to meet the short-term needs for information on health care quality using standardized, user-friendly methods and existing sources of data.

This module of the AHRQ Quality Indicators was designed to capitalize on the availability of administrative data on inpatient stays to produce information for Inpatient Quality Indicators (IQIs). These measures include:

- ***volume*** of certain intensive, high-technology, or highly complex procedures for which evidence suggests that institutions performing more of these procedures may have better outcomes;
- ***mortality*** for inpatient procedures and for inpatient conditions; and
- ***utilization*** indicators which examine procedures whose use varies significantly across hospitals and for which questions have been raised about overuse, underuse, or misuse.

This document is the software documentation for the Inpatient Quality Indicators software Version 3.0, which is provided on the AHRQ Web site. The software was developed in SAS, for use on a personal computer. AHRQ's goal, by making this tool publicly available, is to assist users in producing information on health care quality more cost effectively.

Details on the development of the Inpatient Quality Indicators can be found in *Guide to Inpatient Quality Indicators: Quality of Care in Hospitals - Volume, Mortality, and Utilization*. Detailed definitions of the IQIs, with complete listings of the ICD-9-CM and DRG codes specifically included or excluded, are contained in the document, *Inpatient Quality Indicators Technical Specifications.*

The section called "Interpreting the Results." has been removed from this document. The *Guide to Inpatient Quality Indicators* contains a new section, “Using Different Types of QI Rates”. All of the documents mentioned are available at http://www.qualityindicators.ahrq.gov/iqi_download.htm.

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AHRQ Quality Indicators, Software Documentation, Version 3.0: Inpatient Quality Indicators

1.0 Introduction

This documentation describes the software for implementing the Inpatient Quality Indicator (IQI) module of the AHRQ Quality Indicators Version 3.0, and highlights features of the analytic approach of particular interest to new users. Detailed information about the Inpatient Quality Indicators (IQI) is contained in the companion document *Guide to Inpatient Quality Indicators* which includes information about the development of the indicators and their definitions. The *Inpatient Quality Indicators Technical Specifications* document contains detailed definitions. See Appendix A for links to these and other documents as well as Web sites that may be of interest to IQI users.

The section called "Interpreting the Results" has been removed from this document. The *Guide to Inpatient Quality Indicators* has a new section, "Using Different Types of QI Rates."

The software consists of a series of computer programs that:

- Assign and calculate IQIs from hospital discharge abstracts or UB (uniform billing) claims data.
- Print IQI results in SAS format or as an ASCII text file (comma delimited) that can be imported into word processing documents, spreadsheets, or graphics software, at the user's option.
- Provide four options for stratifying rates by geographic areas.
- Create smoothed rates that reduce fluctuations over time due to random variation.

This documentation includes:

- A discussion of the data elements necessary to produce the AHRQ IQIs and the uniform coding conventions recommended for those elements.
- Descriptions of the IQI processing steps in nontechnical language.
- Detailed descriptions of the functions of each IQI SAS program.
-

Critical user information is highlighted with this symbol:

2.0 Components of the Inpatient Quality Indicators Module

As shown in Table 3 on page 6, the Inpatient Quality Indicators module consists of seven SAS programs and 5 ASCII text files that contain auxiliary data. These programs and text files are described in the subsequent sections of this document. The programs were developed for use in Statistical Analysis System (SAS)[1], version 6.12 or higher, on a Windows personal computer.

A note on the naming conventions for the Inpatient Quality Indicators (IQI) module programs. Most programs have names of the form IQSASi, IQSASAi, or IQSASPi. The first two characters "IQ" of the program name indicate an Inpatient Quality Indicators program, to distinguish it from other modules that have been or will be released from AHRQ. The next three characters of the program name are "SAS" and are present to distinguish the program from SPSS versions of the software. In the programs that are specific to either Area or Provider indicators, the sixth character of the program name is either "A" or "P". The sixth character is an "A" if it is for the production of Area indicator rates that use county or Office of Management and Budget (OMB) defined metropolitan or micropolitan area (Metro Area) populations as denominators. The sixth character is a "P" if it is a program for the production of Provider indicator rates that use subsets of the hospital discharge population. The last character (i) of the variable name designates the number of the specific program.

3.0 Quick Reference

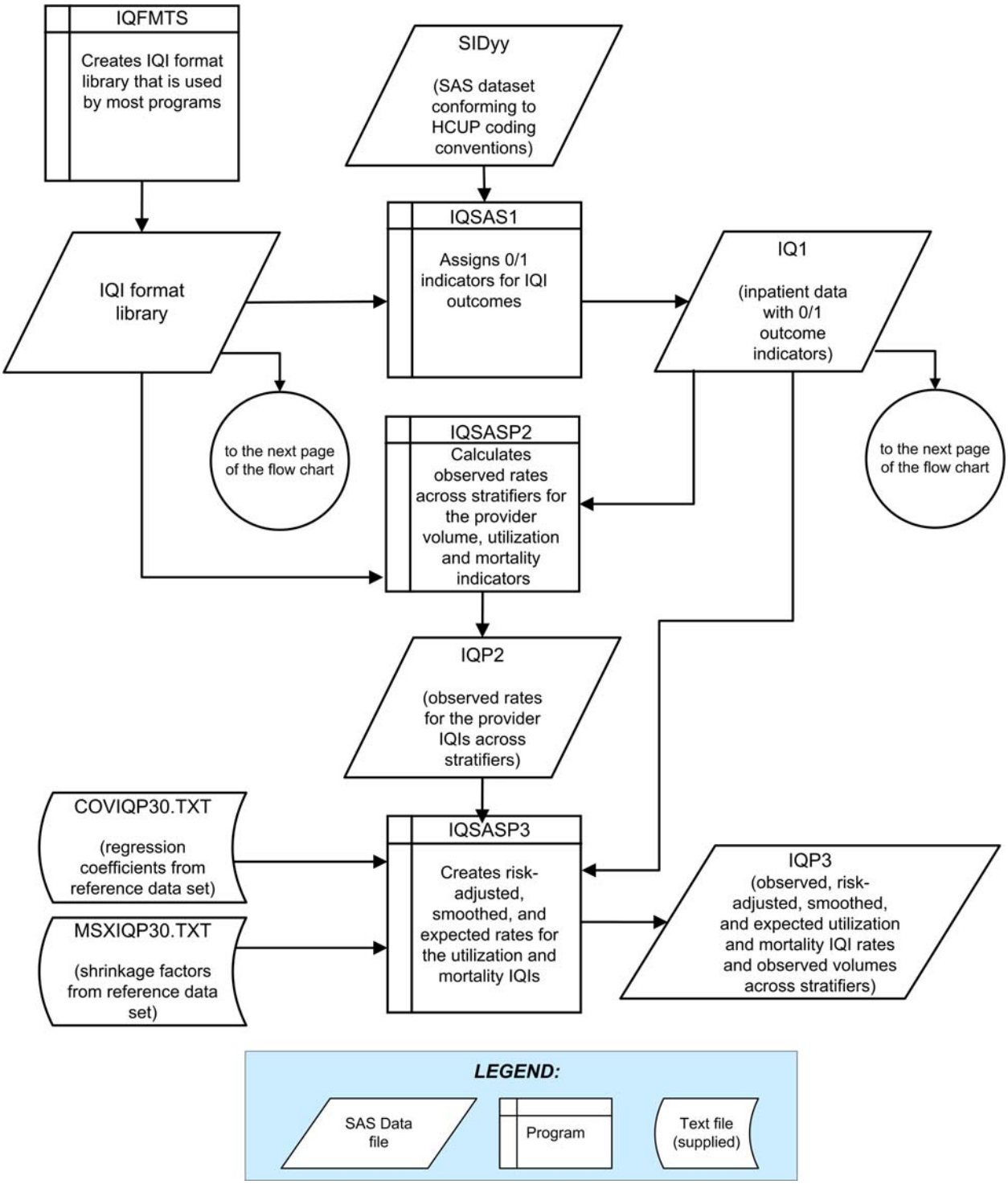
The subsequent four pages are intended to serve as a quick reference to assist in reading this documentation and in reviewing the Inpatient Quality Indicator (IQI) module outputs. Processing steps are shown first (Figures 1 and 2) followed by a listing of the module variables (Table 1), variable prefixes (Table 2), and module contents (Table 3). One suggestion is to print these pages in duplex mode on two sheets of paper so that they can then be easily referred to as the need arises.

3.1 Processing Steps

Figure 1 shows processing steps for the Inpatient Quality Provider Indicators, while Figure 2 shows steps for the Inpatient Quality Area Indicators.

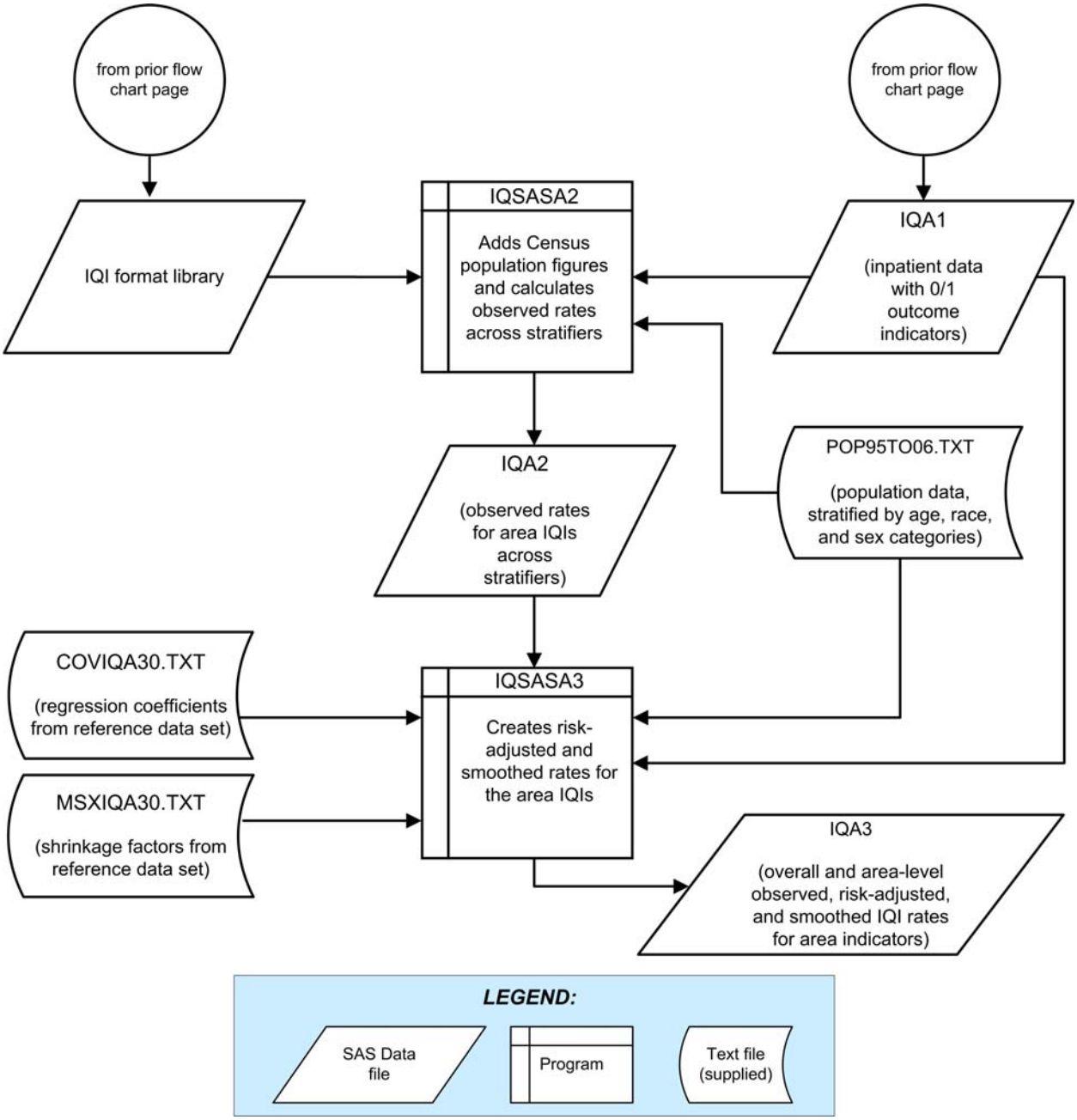
[1] SAS is a statistical program distributed by the SAS Institute, Inc. (http://www.sas.com).The company may be contacted directly regarding the licensing of their products. The SAS Institute, Inc. does not have any affiliation with AHRQ nor involvement in the development of the AHRQ QIs.

Figure 1. Processing Steps for the Inpatient Quality Provider Indicators



NOTE: Each of the SAS Programs in Figure 1 incorporates the CONTROL_IQI.SAS program, which contains code the user must modify in order to run the IQI software. The modifications include such items as specifying the name and location of the input data set, the population data set, and the output data set.

Figure 2. Processing Steps for the Inpatient Quality Area Indicators



3.2 Inpatient Quality Indicator Module Details

Table 1. Inpatient Quality Indicator (IQI) Variables

Type		IQI number	Indicator	Age categories 18 to 39	40 to 64	65 +
Provider	Volumes	1	Esophageal resection			
		2	Pancreatic resection			
		4	AAA repair			
		5	CABG	No		
		6	PTCA[a]	No		
		7	Carotid endarterectomy			
	Post-procedural mortality Rates	8	Esophageal resection			
		9	Pancreatic resection			
		11	AAA repair			
		12	CABG	No		
		30	*PTCA[b]*	No		
		31	*Carotid endarterectomy[b]*			
		13	Craniotomy			
		14	Hip replacement			
	In-Hospital Mortality rates	15	AMI			
		32	AMI, Without Transfer Cases			
		16	CHF			
		17	Stroke			
		18	GI hemorrhage			
		19	Hip fracture			
		20	Pneumonia			
	Utilization rates	21	Cesarean delivery			
		33	Primary Cesarean delivery			
		22	VBAC (Vaginal Birth After Cesarean), Uncomplicated			
		34	VBAC, All			
		23	Laparoscopic Cholecystectomy			
		24	Incidental appendectomy among elderly	No	No	
		25	Bi-lateral cardiac catheterization			
Area	Utilization rates	26	CABG	No		
		27	PTCA	No		
		28	Hysterectomy			
		29	Laminectomy			

[a] PTCA = percutaneous transluminal coronary angioplasty
[b] PTCA and carotid endarterectomy mortality are not recommended as stand-alone indicators, but are suggested as companion measures to the corresponding volume measures.

Table 2. Prefixes for the Inpatient Quality Indicator (IQI) Variables

Prefix	Contents	EXAMPLES	
		Provider indicator # 8, Esophageal resection	Area indicator # 26, CABG utilization
T	Inpatient numerator (top)	TPIQ08	TAIQ26
P	Population denominator (pop)	PPIQ08	PAIQ26
O	Observed Rate (not applicable to IQI #1-7)	OPIQ08	OAIQ26
E	Expected rate	EPIQ08	N/A
R	Risk-adjusted Rate (not applicable to IQI #1-7)	RPIQ08	RAIQ26
L	Lower limit of confidence interval of risk-adjusted rate	LPIQ08	N/A
U	Upper limit of confidence interval of risk-adjusted rate	UPIQ08	N/A
S	Smoothed rate	SPIQ08	N/A
X	Standard error of smoothed rate	XPIQ08	N/A

Table 3. Inpatient Quality Module Contents

SAS programs	ASCII text files
CONTROL_IQI.SAS	POP95TO06.TXT
IQFMTS.SAS	COVIQP30.TXT
IQSAS1.SAS	COVIQA30.TXT
IQSASP2.SAS	MSXIQP30.TXT
IQSASP3.SAS	MSXIQA30.TXT
IQSASA2.SAS	
IQSASA3.SAS	

The ASCII text files are data files provided with the Inpatient Quality module and are necessary for the programs to run. There is no need to convert these files to SAS format for use with the software.

The parameter reference files of MSXIQP30.TXT and MSXIQA30.TXT are not interchangeable between SAS and SPSS software. Users should verify they are running the software with the ASCII text files as listed in Table 3 of the applicable, e.g., SAS or SPSS, software manuals.

4.0 Background

The Inpatient Quality Indicator module contains 30 indicators that reflect the quality of care inside hospitals. Two of the mortality indicators—indicators 30 and 31—are computed by the software but are recommended for use only with the corresponding volume measures, (these two IQIs increase the total number of indicators generated by the software to 32). These indicators serve as flags for potential quality problems rather than definitive measures of quality of care. The indicators include three groups of measures based on hospital stays.

1. There are six **Volume** indicators for inpatient procedures for which there is evidence that a higher volume of procedures is associated with lower mortality. A nontrivial number of these procedures are performed by institutions that do not meet recommended volume thresholds. For more information refer to the *Guide to Inpatient Quality Indicators* (see Appendix A.) The volume indicators are measured as counts of admissions in which particular procedures were performed.

2. There are 13 Inpatient **Mortality** indicators for medical conditions and surgical procedures that have been shown to have mortality rates that vary substantially across institutions and for which evidence suggests that high mortality may be associated with deficiencies in the quality of care. These indicators are measured as rates, the number of deaths divided by the number of admissions for the procedure or condition. Two additional mortality indicators—IQI #30 PTCA and IQI #31 carotid endarterectomy—are computed but are recommended to be used only with the corresponding volume measures (for an overall total of 15 mortality indicators).

   Eight of these mortality indicators are for procedures, six of which are also measured by a volume indicator.

   The other seven mortality indicators are associated with medical conditions, most of which (except for GI bleeding and pneumonia) are highly concentrated on older patients 50 years of age or older. Hip fracture is more common among elderly women.

3. There are eleven **Utilization** indicators for procedures for which there are questions of overuse, underuse, or misuse. The procedures being examined are ones whose use varies significantly across hospitals and areas, and for which high or low rates of use are likely to represent inappropriate or inefficient delivery of care, leading to worse outcomes, higher costs, or both. These indicators are measured as rates, such as # of C-sections per births in a hospital, # of laparoscopic cholecystectomy per admissions with cholecystectomy.

   Seven of the utilization indicators are rates based on the hospitalized population. Four other utilization indicators are rates based on an area's residential population. Two of these area utilization indicators (for CABG and PTCA) have counterparts in the set of volume indicators.

   For the four area-based utilization indicators, geographic areas are defined at the user's option in one of four ways:
   - County level with U.S. Census FIPS[2]
   - County level with modified FIPS
   - Metro Area with OMB 1999 definition
   - Metro Area with OMB 2003 definition.

   The MSALEVL parameter has been renamed to MALEVL to reflect the change in OMB definitions for areas. Refer to page 11 for information on these area definitions and MALEVL parameter settings..

The indicators in the IQI module are listed in Table 1 on page 5. See also the *Guide to Inpatient Quality Indicators* for the descriptions of each indicator and the *Inpatient Quality Indicators Technical Specifications* for the detailed definition of each indicator. See Appendix A for links to these and other documents.

[2] Federal Information Processing Standard, as defined by the U.S. Department of Commerce, National Institute of Standards and Technology (formerly National Bureau of Standards).

The data required for measuring these indicators come from hospital discharge abstracts or billing claims (administrative data) which are readily available within hospitals or from many state data organizations. The residential population data for the four area-based utilization indicators are from the U.S. Census Bureau.

The software generates observed, risk-adjusted, smoothed, and expected rates for all but the volume indicators. Observed rates are the raw rates. Risk-adjusted and expected rates are derived from applying the average casemix of a reference population file that reflects a large proportion of the U.S. hospitalized or residential population. Smoothed rates are estimates with removal of fluctuations over time due to random variation.

5.0 Data Elements and Coding Conventions

5.1 Input for the AHRQ Quality Indicators

The IQI software was written to process data from discharge data abstracts that contain information about hospital stays. The specific data elements that are needed for the IQI software are listed in

Table 4. The IQI module was tested on data from the AHRQ Healthcare Cost and Utilization Project (HCUP). HCUP is an ongoing Federal-State-private collaboration to build uniform databases from administrative hospital-based data collected by State data organizations and hospital associations.

The input data files for the Inpatient Quality Indicators software must be in SAS.

It is strongly recommended that users recode data elements in their input files to be consistent with the coding expected by the software. This will minimize the number of internal changes that will be necessary in the IQI software. For example, recoding the SEX data element in the input file to be consistent with the coding described in

Table 4 (i.e., 1 for male and 2 for female) is easier than modifying all uses of the Sex data element in the IQI programs.

Not every value for every data element is referenced by the IQI software. For example, only two of the discharge disposition (DISP) data element values are used in the software (DISP value "2" for short-term hospital and value "20" for died in the hospital). However, the complete set of standardized values is included, based on HCUP specifications (see Appendix A) to assist users of the uniform HCUP data files.

To minimize internal changes to the software, all required elements should be present in the input data file. If a required element is not available, a dummy element should be provided. Failure to provide a dummy element will result in errors during the execution of the IQI programs.

The data elements listed in

Table 4 are those required for the input files of **all** the SAS and SPSS QI modules. When a variable is not required for the program the notation "Not used by the IQI program" will be present in the Comments column. Standardizing the variables and data values in the input data file will be helpful for users who have access to both statistical software packages as well as users working to standardize their input file specifications for use with any of the AHRQ QI software modules.

The data element HOSPSTCO has been renamed to PSTCO to emphasize the importance of calculating the area IQIs by the location of the patient residence. If the user wants to calculate the area IQIs based on the population of the Metro Area or county associated with the patient residence, the values for this variable should be the FIPS state/county code associated with each individual patient's place of residence. If the patient information is not available or the user wants to calculate the IQIs using the population associated with the hospital location as the denominator, the values for this variable should be the individual hospital FIPS[3] state/county codes.

If the hospital FIPS code is used in PSTCO, users should be aware that rates may be biased for hospitals which serve as regional referral centers. These hospitals are likely to treat patients from outside the Metro Area, county or even the state in which the facility is located.

Users no longer have to use the Modified FIPS codes assignment for area denominators. However, that option is still available. In the modified FIPS codes certain independent cities (Baltimore City, Carson City and St. Louis City), and areas within Hawaii and Virginia, are assigned to different area groupings in the Modified FIPS categories.

Using the patient FIPS state/county code for analysis may more accurately reflect the true population at risk. Using the hospital FIPS state/county code for analysis should be done with caution, and at larger levels of geographic area (i.e. MA) to minimize the bias with patients that come from a different county than the hospital location.

It is possible that some records in the input data file may be missing the patient FIPS code. Users should be aware that any records with missing values (in the PSTCO data field) are excluded from the calculations of observed, risk-adjusted and smoothed IQI area rates. They will be included in the output from the first program (IQSAS1.SAS.)

The software will generate area IQI rates for each county included in the PSTCO data field. If using the hospital FIPS state/county code for analysis, users are encouraged to limit cases in their input file to those patients discharged from the geographic area of interest. For example, if you are using data from the state of Wisconsin and are interested in generating a rate for Wisconsin, you should remove the cases where the patient's county of residence (FIPS code) is from another state. Otherwise the total or overall rate will include the population at risk from the counties outside Wisconsin.

The software provides the user with the option of producing output by Metro Area or by county. When Metro Area is selected, urban areas are always defined by Metro Areas. When county is selected urban areas will be defined by county. Rural areas are always defined by county.

In the software programs, the MALEVL parameter should be set as follows:

0-County level with U.S. Census FIPS
1-County level with modified FIPS
2-Metro Area with OMB 1999 definition
3-Metro Area with OMB 2003 definition.

The metropolitan area definitions are from three different sources. 1) The "modified FIPS" definition is from the Area Resource File. The mapping is from county to modified FIPS county (e.g., Baltimore city to Baltimore county); 2). The "1999 OMB" definition is from the federal Office of Management and Budget

(OMB) circular 99-04, (Last Revised May 6, 2002). The mapping is from county to Metropolitan Statistical Area (MSA), except in New England where counties are assigned to NECMAs (New England County Metropolitan Area). OMB defines NECMAs as a county-based alternative to the city- and town-based New England MSAs and CMSAs (Consolidated MSAs). For example, Hampden and Hampshire counties in Western Massachusetts are assigned to the Springfield MA NECMA, even though Holland town in Hampden County is part of the Boston MSA; and 3) the "2003 OMB" definition is from the federal Office of Management and Budget (OMB) circular 03-04, (Last Revised December 4, 2005). The mapping is from county to either Metropolitan Statistical Area or Micropolitan Statistical Area.

5.2 Coding of Diagnoses, Procedures, and DRGs

Diagnoses and procedures must be coded using the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM).

Significant modifications to ICD-9-CM codes occurred in the early 1990s. IQI definitions only reflect codes valid after October 1, 1994, and therefore may not accurately analyze data collected before October 1994.

- Diagnoses and procedure codes should be in character strings.

- Diagnosis and procedure codes should not contain any decimal points.

- Diagnosis and procedure codes should be left justified. Diagnosis codes with fewer than five digits should be padded with spaces (not zeros) on the right. Procedure codes with fewer than four digits should be padded with spaces (not zeros) on the right.

The IQI programs assume accurate and specific coding of ICD codes. If an ICD code is specified using 5 digits, the software recognizes only 5-digit versions of that code and not versions truncated at 3 or 4 digits. Similarly, if an ICD code is specified using 4 digits, the software recognizes only 4-digit versions of that code and not versions truncated at 3 digits. For example, 4281 is the ICD-9-CM diagnosis code for left heart failure. If your data are coded less specifically (i.e., 428 is used to designate "heart failure"), these less specific codes are not recognized by the software and will result in undercounting cases.

- Diagnosis-related groups (DRGs) are those derived from the Centers for Medicare & Medicaid Services (previously Health Care Financing Administration) Medicare grouper. The software expects that you will be using the DRG effective on the discharge date. The software now refers to data elements DRG and MDC. Your data should be coded accordingly. The software may be modified at the user's option to use other types of DRGs. However, the impact of using other types of DRGs should be evaluated carefully before making such a change.

Version 3.0 of the software accounts for ICD-9-CM and DRG coding effective through FY2006 (or through September 30, 2006).

5.3 APR-DRG Variables

It is recommended that users either use their own 3M® APR® DRG Grouper software or download and run the 3M® APR® DRG Limited License Grouper for SAS® software on their patient data before running the IQI SAS programs. The Limited License Grouper software is available on the AHRQ Inpatient Quality Indicators download page (see Appendix A for link.)

The Grouper software creates APR-DRG categories, and associated severity and mortality data elements. These APR-DRG variables are used to enhance the risk-adjustment of selected IQI provider indicators.

APR-DRG software must be downloaded and run separately.

*Users who wish to use APR-DRG results to risk-adjust the provider IQI rates should run the APR-DRG software on their patient data **before** running the IQI programs.*

Table 4. Data Elements and Coding Conventions

Variable name	Description	Format	Value description	Comments
KEY	Sequence number. Unique case identifier.	Numeric	User defined unique numeric identifier for each discharge record	Not used by the QI programs, but should be present to facilitate possible exploration; allows user to link the records from the IQSAS1.SAS program output file back to the original input data file.
AGE	Age in years at admission	Numeric	Age in years	If this data element is missing the discharge record will be excluded from analysis.
AGEDAY	Age in days (coded only when the age in years is less than 1)	Numeric	Age in days	Not used in the PSI program. If not present in the input data file it is not necessary to create a dummy variable.
RACE	Race of patient.	Numeric 1 2 3 4 5 6	 White Black Hispanic Asian or Pacific Island Native American Other	The values of 1-5 are used directly in the QI software. All other ethnicity codes are mapped to an 'other' category.
SEX	Sex of patient	Numeric 1 2	 Male Female	If this data element is missing the discharge record will be excluded from the analysis.
PAY1	Expected primary payer	Numeric 1 2 3 4 5 6	 Medicare Medicaid Private, incl. HMO Self-pay No charge Other	The values of 1, 2, 3, and 4 are used directly in the QI software. All other payer codes are mapped to an 'other' category This data element is used to stratify only the Provider-level IQIs (IQI01-IQI25, IQI30-IQI34).
PSTCO	Location of patient residence or hospital location (FIPS† State/county code)	Numeric ssccc	Modified Federal Information Processing Standards State/county code	See Appendix A for link to most recent list of codes. If this data element is missing the discharge record will be excluded from rate calculations.
HOSPID	Data Source hospital number	Numeric	Hospital identification number	Used to facilitate data exploration and possible trouble shooting.
DISP	Disposition of patient	Numeric 1 2 3 4 5 6 7 20	 Routine Short-term hospital Skilled nursing facility Intermediate care Another type of facility Home health care Against medical advice Died in the hospital	The values 2 and 20 are referenced by the QI code (to identify transfers to another short-term hospital, and patients who died in the hospital).

Variable name	Description	Format	Value description	Comments
ATYPE	Admission Type	Numeric 1 2 3 4 5 6	Emergency Urgent Elective Newborn Trauma Center[4] Other	Not used by the IQI program. If not present in the input data file it is **not** necessary to create a dummy variable.
ASOURCE	Admission Source	Numeric 1 2 3 4 5	ER Another hospital Another facility incl LTC Court/law enforcement Routine/birth/other	The value 2 is referenced by the QI code (to identify transfers from another short-term hospital).
LOS	Length of Stay	Numeric	Number of days from admission to discharge	Not used by the IQI program. If not present in the input data file it is **not** necessary to create a dummy variable.
APR_DRG	APR-DRG category	Numeric	APR-DRG from 3M software.	Although the IQI module will operate without these variables, users should run version 20 APR-DRG software on their raw data to assign this variable to each case. See Section 5.3 on page 12.
SEVERTY	APR-DRG Severity Score	Numeric	APR-DRG Severity Score from 3M software.	See Section 5.3 on page 12.
RISKMORT	APR-DRG Mortality Score	Numeric	APR-DRG Risk of Mortality Score from 3M Software.	See Section 5.3 on page 12.
DRG	Diagnosis Related Group	Numeric	DRG from federal (CMS) DRG Grouper	
MDC	Major Diagnostic Category	Numeric	MDC from federal (CMS) DRG grouper	
DX1 – DX30	ICD-9-CM diagnosis codes. DX1 is the principal diagnosis, DX2-DX30 are secondary diagnoses.	String, 5 character	Diagnosis codes	Users must specify the number of diagnoses in the parameter &NDX in CONTROL_IQI.SAS program.
NDX	Count of the number of diagnoses (DX) on the discharge record	Numeric	Count of diagnoses (principal and all secondary diagnoses)	Not used by the IQI SAS program (used by the SPSS program). If not present in the input data file it is **not** necessary to create a dummy variable. Definition is: If the 1st discharge record has 1 Pr and the 2nd has 2, NPR would be 1 for the 1st record and 2 for the 2nd.
PR1 – PR30	ICD-9-CM procedure codes. PR1 is the principal diagnosis, PR2-PR30 are secondary procedures.	String, 4 character	Procedure code	Users with more or fewer secondary procedures should modify the parameter &NPR in CONTROL_IQI.SAS to reflect the number of diagnoses.

[4] The ATYPE value "5" was used to indicate delivery only in the 1988 to 1997 HCUP data files. The UB standards currently use "5" to indicate Trauma Center.

Variable name	Description	Format	Value description	Comments
NPR	Count of the number of procedures (PR) on the discharge record	Numeric	Count of procedures (principal and all secondary procedures)	Not used by the IQI SAS program (used by the SPSS program). If not present in the input data file it is **not** necessary to create a dummy variable. Definition is: If the 1st discharge record has 1 Pr and the 2nd has 2, NPR would be 1 for the 1st record and 2 for the 2nd.
PRDAY1 – PRDAY30	Days from admission to procedure. PR1 is the principal procedure, PR2-PR30 are secondary procedures.	Numeric	Days from Admission to Procedure	Not used by the IQI program. If not present in the input data file it is **not** necessary to create a dummy variable.
YEAR	Year of discharge. The patient's year of discharge. For example, a patient discharged on July 7, 2004 would have a discharge year of '2004.'	Numeric	YYYY Discharge year should be within the range of 1997 to 2006.	
DQTR	Quarter of discharge. The calendar quarter of the patient's discharge. For example, a patient discharged on July 7, 2004 would have a discharge quarter of '3.'	Numeric	1 January-March 2 April-June 3 July-September 4 October-December	
	AHRQ comorbidity variables			Required if Risk-Adjusted PSI rates are desired.

†Federal Information Processing Standard, as defined by the U.S. Department of Commerce, National Institute of Standards and Technology (formerly National Bureau of Standards).

5.4 Missing Values

The IQI programs do not distinguish among different types of missing values.

Cases that are missing data in fields used for indicator definitions or for risk adjustment (such as age and sex) will be excluded from analysis.

Data files of hospital discharge abstract data may have numeric data elements coded using special SAS missing "dot" values. For example, besides the standard SAS value of "." for missing data, there might also be present values of ".A" for invalid data, ".B" for data unavailable from a particular source, ".C" for inconsistent data. However, the IQI programs do **not** distinguish among the different types of missing codes. Therefore, all types of missing values in the input data to the IQI module can be represented by a single value - missing data (.) for numeric variables and blank (' ') for alphanumeric (or character) variables.

5.5 Treatment of Missing Data

The software is designed to handle missing data in a particular manner; specifically the software requires confirmation for the assignment of a poor outcome or negative event. For instance, in order to be assigned as a death, each case must actually be coded as a death. Missing data is considered neutral. Missing data for some elements results in the exclusion of that case from the denominator. For a few other elements, the case is retained. Table 5 lists the impact of missing data for each data element.

Table 5. Treatment of Missing Data Elements

Variable	Label	D	N	E	S	Treatment of Missing Data
AGE	Age In Years At Admission	X	X		X	Case excluded from all analysis (e.g., dropped from the denominator of the discharge based indicators and from numerator of all population based measures).
AGEDAY	Age in days (coded only when the age in years is less than 1)	X				The value is treated as if it was less than 30 days.
ASOURCE	Admission Source			X		Case excluded from denominator where used in specification (e.g., IQI 32).
DISP	Disposition Status		X	X		Case excluded from denominator where used in specification (e.g., IQI 15).
DRG	Diagnosis Related Group (CMS DRG) in Effect on Discharge Date	X	X			Case excluded from denominator (e.g., IQI 13) and from numerator (e.g., IQI 24) where used in specification.
Sex	Patient Gender	X	X		X	Case excluded from all analysis (e.g., dropped from the denominator of the discharge based indicators and from numerator of all population based measures).
PSTCO	Location of Patient Residence or Hospital Location Modified FIPS State/County Code	X				Dropped from denominator in rate calculations (stratified by county or Metro Area), case will appear in calculation of the overall rate.
MDC	Major Diagnostic Category (CMS MDC) In Effect On Discharge Date	X				Case excluded from denominator (e.g., IQI 01) where used in specification.
RACE	Race				X	Classified As “Other.”

D – Denominator; N – Numerator; E – Exclusion; S – Stratification

6.0 User Options

The IQI software reflects the development and implementation of the software with discharge data available to AHRQ through the HCUP program. The goal was to develop the tools, illustrate their use, and then encourage others to adopt and use the tools for their own applications. As a result, users are encouraged to consider how AHRQ may modify or enhance the IQI software to better serve their measurement needs and interests.

Modifications to the definitions of outcomes of interest (numerators) or populations at risk (denominators) are possible but not desirable. Maintaining consistent definitions is important. Once definitions are altered, the ability to make comparisons of IQIs based on original definitions is lost. Users are encouraged to identify ways to improve the IQI methodology and to share their suggestions with AHRQ for future updates.

AHRQ provides national estimates using the IQIs through its web-based query system, HCUPnet (http://hcup.ahrq.gov/HCUPnet.asp). If users change definitions of the IQIs, it will not be possible to compare users' results to the national estimates in HCUPnet.

7.0 Producing Inpatient Quality Indicator Rates: Processing Steps

Each Inpatient Quality Indicator (IQI) expressed as a rate, is simply defined as:

Outcome of interest / Population at risk

[or]

Numerator / Denominator

Conceptually, five steps are necessary to produce the IQI rates. The following describes the steps and how the software performs them.

7.1 Step 1. Identify outcomes in inpatient records

Inpatient records are marked to indicate whether they contain the outcome of interest (numerator or "top") for each of the AHRQ IQI measures.

This is done by setting a series of flag variables, each of which corresponds to the numerator for a particular IQI. For example, if the inpatient record meets the conditions for inclusion in the outcome for IQI #1, then the outcome indicator for IQI #1 is set to one.

This step requires one pass through the discharge-level data and outputs a discharge-level data file containing the flag indicator variables for the outcomes for each IQI. This output file also contains the original input variables, with the exception of the diagnosis and procedure variables which have been removed to reduce the size of the output file.

The first six Inpatient Quality Indicators are volume measures, and for these QIs this first step is all that is necessary. The remaining steps two though five are relevant for the remaining indicators which are rates as opposed to total volume measures.

7.2 Step 2. Identify populations at risk

For the Provider IQIs, the populations at risk (the denominators for calculating the IQI rates, or "pop") are derived from the hospital discharge records.

For the four Area IQIs, the populations at risk (the denominators for calculating the IQI rates) are derived from Census population figures.

7.3 Step 3. Calculate observed (raw) Inpatient Quality Indicator rates

Using the output data from step 1 and either hospital discharge or U.S. Census population data from step 2, the IQI rates are calculated for user-specified combinations of stratifiers. These stratifiers include hospitals, age groups, race/ethnicity categories, sex, and payer categories for the Provider IQIs, and areas (Metro Areas/counties), age groups, race/ethnicity categories, and sex for the Area IQIs.

The programs calculate observed IQI rates regardless of the number of cases available. However, IQI rates based on only a few cases should be interpreted with caution.

In some performance measurement work, it is often recommended that rates be suppressed when there are fewer than 30 cases in the denominator. This exclusion rule serves two purposes:

- It eliminates unstable estimates based on too few cases.

- It helps protect the identities of hospitals and patients.

This step outputs the observed rates for user-specified categories, alone or in combination. For example, Provider IQI observed rates could be output at the hospital level, at the payer level, or at the hospital level by payer.

7.4 Step 4. Risk adjust the Inpatient Quality Indicator rates

Regression coefficients from a reference population database (reflecting a large proportion of the U.S. population) are applied to the observed rates in the risk-adjustment process. These reference population file regression coefficients are provided as part of the IQI module. The risk-adjusted rates will then reflect the age and sex distribution (and the APR-DRG distribution for the provider indicators) of data in the reference population file rather than the distribution for the hospitals or areas present in the users' data. This will allow risk-adjusted rates produced by various users to be compared directly to one another. The regression coefficients were derived from HCUP's Year 2003 State Inpatient Data (SID) for 38 states. The code to generate these reference population means and coefficients are not part of the IQI module.

The programs calculate risk-adjusted IQI rates regardless of the number of cases available. However, IQI rates based on only a few cases should be interpreted with caution.

7.5 Step 5. Create MSX smoothed rates

Shrinkage factors are applied to the risk-adjusted rates for each IQI in a process called multivariate signal extraction (MSX). These shrinkage factors were calculated from the HCUP Year 2003 SID of 38 states. For each IQI, the shrinkage estimate reflects a 'reliability adjustment' unique to each indicator. The less reliable the IQI over time and across hospitals or areas, the more the estimate 'shrinks' the IQI toward the overall area mean. The resulting rate will appear "smoother" than the raw rate, meaning the year-to-year fluctuations in performance are likely to be reduced. More information is contained in the *Guide to Inpatient Quality Indicators*. The shrinkage factors are provided as part of the IQI software and do not need to be calculated by users.

These five steps reflect the IQI module production in a nutshell. The next section of this document describes the specifics of each software component of the IQI module software.

8.0 Program Descriptions

This section describes the seven SAS programs that assign, calculate, and print the Inpatient Quality Indicators.

For each program there is a description, a list of input and output files, and an explanation of changes to the program that may be required. The flow of data through the IQI module programs is shown in the flowcharts in Figure 1 and Figure 2 that begin on page 3.

If you desire to create and examine observed IQI rates, then the IQFMTS, CONTROL_IQI, and the IQSAS1 programs will need to be used, followed by IQSASP2 (for Provider observed rates and volume indicators) and/or IQSASA2 (for Area observed rates). If you also wish to create risk-adjusted and smoothed IQI rates, then you will also need to run the IQSASP3 and/or the IQSASA3 program.

8.1 Program 1: Modify Statements in the CONTROL_IQI.SAS Code

The CONTROL_IQI.SAS code contains all of the SAS statements that you need to modify in order to run the remaining IQI module programs (with one exception noted below). This is where you specify, for example, the path names or locations of all your input and output data sets. There is also a TITLE line that the user can fill in. The items that need to be changed in order to run the IQSAS1, IQSASP2, IQSASP3, IQSASA2, and IQSASA3 programs are described below each program.

*The CONTROL_IQI.SAS code is automatically inserted into the remaining programs when they are executed. You do **not** need to run CONTROL_IQI.SAS as a separate program.*

All of the changes needed for the CONTROL_IQI.SAS code are listed in the following descriptions for programs 2 – 7. Each program description contains a section labeled "Changes:" that enumerates the modifications for CONTROL_IQI.SAS that are associated with that particular program.

*Lines of code to be modified are identified by the phrase "<===USER MUST modify" which means the user **must** make the change or by "<===USER MAY modify" which means the modification is optional.*

In all of the remaining programs included with the IQI module, there is one line of code near the beginning of each program that needs to be modified. This line of code starts with the phrase "FILENAME CONTROL". You ***must*** modify this line to point to the path name where you stored your modified copy of the CONTROL_IQI.SAS file.

CONTROL_IQI.SAS has a collection of parameters that allow you to read in data from and write out data to different locations or pathnames. For example, "LIBNAME1 IN1" points to the location of your input data set for program IQSAS1 and "LIBNAME OUT1" points to the location of the output data set created by the IQSAS1 program. The parameters allow these locations to be different from one another. However, if you wish to read in and write out all of the data to the same location, it is easiest to just make a global change in CONTROL_IQI.SAS changing "C:\pathname" to the single directory location that you wish to use.

There is a global PRINT parameter in CONTROL_IQI.SAS that as a default prints all of the output summary records at the end of the IQSASP2, IQSASP3, IQSASA2, and IQSASA3 programs. These printouts may be quite large if you have a large database with a large number of hospitals and if you choose the results to be finely stratified. If you wish to turn these prints off, set PRINT to have a value of zero in CONTROL_IQI.SAS.

The global MALEVL parameter in CONTROL_IQI.SAS by default instructs all programs to define geographic areas by county for all areas in the input datasets. Refer to Page 11 for a list of values for the MALEVL parameter.

8.2 Program 2: Run IQFMTS

The IQFMTS program defines a format library, which contains the diagnosis and procedure screens necessary for assigning the outcomes of interest. This format library is used by most of the succeeding programs.

The first few formats in this program are for the stratifiers (age, sex, race/ethnicity, payer). These are followed by formats that are used for the identification of outcomes of interest in the IQSAS1 program, and by formats that map FIPS county codes to Metro Areas in the IQSAS1, IQSASA2, and IQSASA3 programs. At the end of the program are formats used to assign age categories for the risk adjustment process implemented in IQSASP3 and IQSASA3, and formats used with APR-DRG categories in IQSASP3.

The IQI module Version 3.0 contains formats that incorporate ICD-9-CM and DRG coding through September 30, 2006.

Input: None.

Output: Permanent SAS format library (FMTLIB).

Changes:

1. You must modify the "FILENAME CONTROL" statement at the beginning of the program to change the path so that it points to your location of the CONTROL_IQI.SAS code.

2. In CONTROL_IQI.SAS, specify the location (path) of the format library in the "LIBNAME LIBRARY" statement.

8.3 Program 3: Run IQSAS1

The IQSAS1 program processes hospital discharge abstract data and flags inpatient records if they contain outcomes of interest. Outcome indicator names, or numerators, have prefix of "T" (Top). Stratifier variables are constructed at the beginning of the program.

This program assumes that the input data file (consisting of inpatient discharge abstract data) conforms to specific variable names, attributes, and coding conventions. See

Table 4 on page 14 for variable names and attributes for the input data file.

Partial definitions of the Inpatient Quality Indicators are given in Table 1 on page 5. This table is presented to assist those individuals who desire to examine the software source code statements. Complete definitions of the indicators are given in the document *Inpatient Quality Indicators Technical Specifications.* This information was formerly in Appendix A of the *Guide to Inpatient Quality Indicators*.

Input:

1. User supplied SAS inpatient data set consisting of administrative hospital discharge abstract data. This data set is a discharge level file with an array of diagnosis and procedure codes, among other data elements.

2. SAS format library (FMTLIB) created from the IQFMT program.

Output:

1. SAS dataset containing inpatient records with input variables, stratifiers, and flag indicators (TPIQxx and TAIQxx) for the outcomes of interest that will later form the numerators for the IQI rates.

2. PROC MEANS (with N, NMISS, MIN, MAX, MEAN, and SUM) of all of the numeric variables in the output data file and a PROC CONTENTS of the output data file are output to hardcopy.

3. A PROC PRINT of the first 24 observations in the output data file is output to hardcopy.

Changes:

1. The “FILENAME CONTROL” statement at the beginning of the program must be changed to reflect the location of the CONTROL_IQI.SAS code.

2. In CONTROL_IQI.SAS, specify the locations (paths) of the input and output files in the “LIBNAME IN1” and “LIBNAME OUT1” statements.

3. In CONTROL_IQI.SAS, specify the names of the input and output files in the “INFILE1” and “OUTFILE1” statements.

4. To define urban areas by Metro Area rather than by county, change the MALEVL parameter in CONTROL_IQI.SAS from 0 to 1, 2 or 3. Rural areas will be defined by county no matter how MALEVL is specified. Refer to page 11 for a list of values for the MALEVL parameter.

5. *The IQI module assumes that your starting SAS data set contains 30 diagnoses, and 30 procedures. If these numbers are different in your input inpatient data, then modify the NDX and NPR parameters in CONTROL_IQI.SAS.*

6. *If your variables are named differently from those used in the IQI software (see*

Table 4 on page 14), you MUST either rename those variables prior to running this program or modify IQSAS1 to include the renaming of your variables to match those expected by the software. Similarly, if your variables are not the same type, i.e., character or numeric, as those expected by the software (see

Table 4), you MUST modify your variables prior to running this program.

7. If you wish to utilize APR-DRG variables in the later IQSASP3 program to risk-adjust the provider indicators, then in CONTROL_IQI.SAS, set the APRDRGFG flag parameter to one. If you do not intend to run IQSASP3 to risk-adjust the provider indicators or if you do not have the APR-DRG variables available to you, then set APRDRGFG to zero. See Table 6 below.

8. If you wish to risk-adjust the provider indicators by later running the IQSASP3 program, then in CONTROL_IQI.SAS, set the three APRDRG, SEVERE, and MORTAL parameters to be the names of the DRG category variable, the severity measure, and the mortality indicator created by APR-DRG software. If you do not intend to utilize APR-DRG software, then set the three APRDRG, SEVERE, and MORTAL parameters to equal zero. See Table 6 below.

Table 6. How to Set Up IQI Parameters and Your Data for Using APR-DRG Variables

	If you do not intend to risk-adjust the provider indicators	*If you are going to run IIQSASP3 to risk adjust the provider indicators:*	
		If you have APR-DRG software available	*If you do not have APR-DRG software available*
Preliminary data processing	None	Run APR-DRG software to create APR-DRGs, and mortality and severity indicators	None
Setting the APRDRGFG parameter in CONTROL_IQI.SAS	Set to equal zero.	Set to equal one.	Set to equal zero.
Setting the APR_DRG, SEVERTY, and RISKMORT parameters in CONTROL_IQI.SAS	No action required.	Set to equal the names of the variables output from the APR-DRG software.	Set to equal zero.

8.4 Program 4: Run IQSASP2

For all but the volume indicators (IQIs 01-07), the IQSASP2 program calculates the observed or raw rates for the provider-level Inpatient Quality Indicators, using the data derived in a previous step (IQSAS1). These observed rates are stratified by combinations of providers, sex, age, race, and payer categories. The program first totals the indicator flags created by the IQSAS1 program and then for each of the desired stratifiers divides these totals by the hospital discharges in the universe for the indicator. The population denominators are stored in variables with names that have a prefix of “P” (Pop). The Observed rates are stored in variables that have a prefix of “O”.

Input:

1. The SAS dataset that was created in the IQSAS1. This is a discharge-level file that contains inpatient records with input variables, stratifiers, and the 30 new flag indicators for the IQI Provider outcomes of interest.

2. SAS format library (FMTLIB) created from the IQFMT program.

Output:

1. SAS dataset with summary records that contain observed rates (OPIQxx variables where xx refers to the indicator number), the counts of outcomes that formed the numerators of the rates (TPIQxx variables), and the hospital discharge totals that formed the denominators of the observed rates (PPIQxx variables). The output file has records summarized to the various combinations of stratifiers specified in the TYPELVLP parameter that is described in item 4 in the “Changes” section below. Note that the observed rates and the denominator totals are not generated for the Provider volume indicators (IQIs 01-07).

2. An optional ASCII (comma delimited) text file that the user can then import into a spreadsheet. This text file contains the same information as the SAS output dataset. The text file will contain the OPIQxx observed rates, the TPIQxx counts of outcomes that formed the numerators of the rates, and the PPIQxx counts of outcomes that formed the denominators of the rates. The different records/rows in the text file will correspond to the different TYPELVLP stratification combinations.

3. A PROC MEANS (with N, NMISS, MIN, MAX, MEAN, and SUM) of the provider-level summary records that shows statistics for the OPIQxx observed rates, the TPIQxx counts of outcomes that formed the numerators of the rates, and the PPIQxx counts of outcomes that formed the denominators of the rates. These means will only be generated if the user included a value of 16 for the TYPELVLP parameter discussed in item 4 in the "Changes" section below.

4. A PROC CONTENTS of the output SAS summary dataset is output to hardcopy.

5. A PROC PRINT of the output summary dataset is provided at the end of the hardcopy printout. This printout may be quite large depending on the number and the types of stratifications that the user requests with the TYPELVLP parameter discussed in item 4 in the "Changes" section below. If the user does not wish to generate this printout, then the global "PRINT" parameter in CONTROL_IQI.SAS code should be set to zero.

Changes:

1. The "FILENAME CONTROL" statement at the beginning of the program must be changed to reflect the location of the CONTROL_IQI.SAS code.

2. In CONTROL_IQI.SAS, specify the locations (paths) of the input and output SAS files in the "LIBNAME INP2" and "LIBNAME OUTP2" statements.

3. In CONTROL_IQI.SAS, specify the names of the input and output files in the "INFILEP2" and "OUTFILP2" statements. The name that you specify with INFILEP2 should be for the file that you created using the IQSAS1 program.

4. In CONTROL_IQI.SAS, specify the levels of aggregation for the observed rates. This is done by specifying numbers between 0 and 31 in the "%LET TYPELVLP =" statement. Each number from 0 to 31 corresponds to a different level or combination of levels as show in Table 7. The default values of 0, 16, will provide an overall total and provider-level totals.

If TYPELVLP includes the value 0, then the first observation in the output summary datafile will contain the overall totals and observed rates for the entire database created with the IQSAS1 program.

Table 7. IQSASP2 Aggregation Possibilities

TYPELVLP	Stratification								
0	**Overall**								
1									Race
2							Payer		
3							Payer	*	Race
4					Sex				
5					Sex	*			Race
6					Sex	*	Payer		
7					Sex	*	Payer	*	Race
8			Age						
9			Age	*					Race
10			Age	*			Payer		
11			Age	*			Payer	*	Race
12			Age	*	Sex				
13			Age	*	Sex	*			Race
14			Age	*	Sex	*	Payer		
15			Age	*	Sex	*	Payer	*	Race
16	**Provider**								
17	Provider	*							Race
18	Provider	*					Payer		
19	Provider	*					Payer	*	Race
20	Provider	*			Sex				
21	Provider	*			Sex	*			Race
22	Provider	*			Sex	*	Payer		
23	Provider	*			Sex	*	Payer	*	Race
24	Provider	*	Age						
25	Provider	*	Age	*					Race
26	Provider	*	Age	*			Payer		
27	Provider	*	Age	*			Payer	*	Race
28	Provider	*	Age	*	Sex				
29	Provider	*	Age	*	Sex	*			Race
30	Provider	*	Age	*	Sex	*	Payer		
31	Provider	*	Age	*	Sex	*	Payer	*	Race

0 and 16 TYPELVLP (overall and provider) are default values for the level of computation in the software.

For example, if you are using a state inpatient hospital database, you might specify the following TYPELVLP values:

0 – provides overall rates for your entire state
8 – provides overall rates for your state, broken down by age groups
16 – provides rates for providers within your state
24 – provides rates for age groups within these providers

5. In CONTROL_IQI.SAS, if you wish to create an ASCII (comma delimited) text file that you can import into a spreadsheet, then set the TEXTP2 parameter to 1. Otherwise, the default value of zero for TEXTP2 will skip around the code that would generate this file.

6. In CONTROL_IQI.SAS, if you wish to create an ASCII (comma delimited) text file that you can import into a spreadsheet, then specify the path (including the file name) for this ASCII text file in the "FILENAME IQTEXTP2" statement.

8.5 Program 5: Run IQSASP3

The IQSASP3 program calculates risk-adjusted rates by patient age, sex and APR-DRG, if available, for each IQI and then calculates smoothed rates. The risk-adjusted and smoothed rates are not calculated for the Provider volume indicators, IQIs 01-07, just as observed rates were not calculated for these indicators.

The programs calculate risk-adjusted IQI rates regardless of the number of cases available. However, IQI rates based on only a few cases should be interpreted with caution.

The output file has records summarized to the various combinations of stratifiers that were specified in the TYPELVLP parameter of the preceding IQSASP2 program. See Table 7 on page 28.

Input:

1. SAS format library (FMTLIB) created from the IQFMT program.

2. The discharge-level file that was created with the IQSAS1 program.

3. The SAS dataset with summary records that was created with the IQSASP2 program.

4. A text file (COVIQP30.TXT) containing regression coefficients from a regression that was run on a reference SID dataset. These coefficients will be used in the risk adjustment process. This file is provided to you as part of the IQI module. The text file does not need to be converted to a SAS file for use with the software.

5. A text file (MSXIQP30.TXT) containing three arrays for use in the smoothing process. The arrays contain noise estimates, signal estimates, and mean area rates for each IQI. This file is provided to you as part of the IQI module. The text file does not need to be converted to a SAS file for use with the software.

Output:

1. A SAS dataset with an overall summary record and with provider-level summary records that contain the three types of indicator rates, along with the components of the initial raw rates. Specifically, the file contains the observed rates (OPIQxx variables), the risk-adjusted rates (RPIQxx variables), the smoothed rates (SPIQxx variables), the expected rates (EPIQxx variables), the counts of outcomes that formed the numerators of the observed rates (TPIQxx variables), and the hospital discharge totals that formed the denominators of the observed rates (PPIQxx variables).

2. An optional ASCII (comma delimited) text file that the user can then import into a spreadsheet. This text file contains the same information as the SAS output dataset. The text file will contain the OPIQxx observed rates and their TPIQxx and PPIQxx numerator and denominator components, the RPIQxx risk-adjusted rates, the SPIQxx smoothed rates, and the EPIQxx expected rates. Each record or row in the text file will correspond to a specification group.

3. A PROC MEANS (with N, NMISS, MIN, MAX, MEAN, and SUM) of the provider-level summary records that shows statistics for the observed, risk-adjusted and smoothed rates, and statistics for the counts of outcomes that formed the numerators and denominators of the observed rates.

These means will only be generated if the user included a value of 16 for the TYPELVLP parameter of the preceding IQSASP2 program. See Table 7 on page 28.

4. A PROC CONTENTS of the output SAS summary dataset is output to hardcopy.

5. A PROC PRINT of the output summary dataset is provided at the end of the hardcopy printout. This printout may be quite large depending on the number and the types of stratifications that the user requested with the TYPELVLP parameter of the preceding IQSASP2 program. See Table 7 on page 28. If the user does not wish to generate this printout, then the global "PRINT" parameter in CONTROL_IQI.SAS code should be set to zero.

Changes:

1. The "FILENAME CONTROL" statement at the beginning of the program must be changed to reflect the location of the CONTROL_IQI.SAS code.

2. In CONTROL_IQI.SAS, specify the locations (paths) of the input and output SAS files in the "LIBNAME INP3" and "LIBNAME OUTP3" statements.

3. In CONTROL_IQI.SAS, specify in the "INFILP3X" statement the name of the discharge-level file that you created with the IQSAS1 program.

4. In CONTROL_IQI.SAS, specify in the "FILENAME COVARP" statement the path (including the file name) for the ASCII text file that contains regression coefficients from a regression that was run on the reference SID dataset. This file is provided as part of the IQI module. The name of the file is COVIQP30.TXT.

5. In CONTROL_IQI.SAS, specify in the "FILENAME MSXP" statement the path (including the file name) for the ASCII text file that contains the estimates to smooth the indicator rates. This file is provided as part of the IQI module. The name of the file is MSXIQP30.TXT.

6. In CONTROL_IQI.SAS, specify in the "INFILP3Y" statement the name of the summary file that you created with the IQSASA2 program.

7. In CONTROL_IQI.SAS, specify in the "OUTFILP3" statement the name that you wish the output file to have.

8. In CONTROL_IQI.SAS, if you wish to create an ASCII (comma delimited) text file that you can import into a spreadsheet, then set the TEXTP3 parameter to 1. Otherwise, the default value of zero for TEXTA3 will skip around the code that would generate this file.

9. In CONTROL_IQI.SAS, if you wish to create an ASCII (comma delimited) text file that you can import into a spreadsheet, then specify the path (including the file name) for this ASCII text file in the "FILENAME IQTEXTP3" statement.

8.6 Program 6: Run IQSASA2

The IQSASA2 program calculates the observed or raw rates for the area-level Inpatient Quality Indicators, using the data derived in a previous step (IQSAS1). These observed rates can be stratified by combinations of area, sex, age, and race categories. The program first totals the four area indicator flags created by the IQSAS1 program, and then for each of the desired stratifiers divides these totals by the pertinent residential population. The population denominators are stored in variables with names that have a prefix of "P" (Pop). The Observed rates are stored in variables that have a prefix of "O".

Input:

1. The SAS dataset that was created in the IQSAS1. This is a discharge-level file that contains inpatient records with input variables, stratifiers, and the four new flag indicators for the IQI Area outcomes of interest.

2. A text file with Census area residential populations, stratified by area, age, sex, and ethnicity categories. The file POP95TO06.TXT is currently provided along with the IQI module software. The user should set POPYEAR to the year that best matches the user's discharge data file.

   *Users do **not** need to convert the ASCII text file to a SAS dataset for use with the software.*

3. SAS format library (FMTLIB) created from the IQFMT program.

Output:

1. SAS dataset with summary records that contain observed rates (OAIQxx variables where xx refers to the indicator number), the counts of outcomes that formed the numerators of the rates (TAIQxx variables), and the residential population totals that formed the denominators of the observed rates (PAIQxx variables). The output file has records summarized to the various combinations of stratifiers specified in the TYPELVLA parameter that is described in item 5 in the "Changes" section below.

2. An optional ASCII (comma delimited) text file that the user can then import into a spreadsheet. This text file contains the same information as the SAS output dataset. The text file will contain the OAIQxx observed rates, the TAIQxx counts of outcomes that formed the numerators of the rates, and the PAIQxx residential population totals. The different records/rows in the text file will correspond to the different TYPELVLA stratification combinations.

3. A PROC MEANS (with N, NMISS, MIN, MAX, MEAN, and SUM) of the area-level summary records that shows statistics for the OAIQxx observed rates, the TAIQxx counts of outcomes that formed the numerators of the rates, and the PAIQxx residential populations totals. These means will only be generated if the user included a value of 8 for the TYPELVLA parameter discussed in item 5 in the "Changes" section below.

4. A PROC CONTENTS of the output SAS summary dataset is output to hardcopy.

5. A PROC PRINT of the output summary dataset is provided at the end of the hardcopy printout. This printout may be quite large depending on the number and the types of stratifications that the user requests with the TYPELVLA parameter discussed in item 5 in the "Changes" section below. If the user does not wish to generate this printout, then the global "PRINT" parameter in CONTROL_IQI.SAS code should be set to zero.

Changes:

1. The “FILENAME CONTROL” statement at the beginning of the program must be changed to reflect the location of the CONTROL_IQI.SAS code.

2. In CONTROL_IQI.SAS, specify the locations (paths) of the input and output SAS files in the “LIBNAME INA2” and “LIBNAME OUTA2” statements.

3. In CONTROL_IQI.SAS, specify the names of the input and output files in the “INFILEA2” and “OUTFILA2” statements. The name that you specify with INFILEA2 should be for the file that you created using the IQSAS1 program.

4. In CONTROL_IQI.SAS, specify the path (including the file name) for the ASCII population text file in the "FILENAME POPFILA2" statement. The file name will be POP95TO06TXT. The user should set POPYEAR to the year that best matches the user’s discharge data file

5. In CONTROL_IQI.SAS, specify the levels of aggregation for the observed rates. This is done by specifying numbers between 0 and 15 in the “%LET TYPELVLA =” statement. Each number from 0 to 15 corresponds to a different level or combination of levels as show in Table 8. The default values of 0, 8 will provide an overall total and area-level totals.

WARNING: *TYPELVLA must include the values 0 (overall) and 8 (area) if you wish to subsequently run program IQSASA3 for risk-adjusted and smoothed rates.*

If TYPELVLA includes the value 0, then the first observation in the output summary datafile will contain the overall totals and observed rates for the entire database created with the IQSAS1 program.

Table 8. IQSASA2 Aggregation Possibilities

TYPELVLA	Stratification						
0	**Overall**						
1							Race
2					Sex		
3					Sex	*	Race
4			Age				
5			Age	*			Race
6			Age	*	Sex		
7			Age	*	Sex	*	Race
8	**Area**						
9	Area	*					Race
10	Area	*			Sex		
11	Area	*			Sex	*	Race
12	Area	*	Age				
13	Area	*	Age	*			Race
14	Area	*	Age	*	Sex		
15	Area	*	Age	*	Sex	*	Race

0 and 8 TYPELVLA (overall and area) are default values for the level of computation in the software.

For example, if you are using a state inpatient hospital database, you might specify the following TYPELVLA values:

0 – provides overall rates for your entire state
4 – provides overall rates for your state, broken down by age groups
8 – provides rates for areas within your state
12 – provides rates for age groups within these areas

6. In CONTROL_IQI.SAS, if you wish to create an ASCII (comma delimited) text file that you can import into a spreadsheet, then set the TEXTA2 parameter to 1. Otherwise, the default value of zero for TEXTA2 will skip around the code that would generate this file.

7. In CONTROL_IQI.SAS, if you wish to create an ASCII (comma delimited) text file that you can import into a spreadsheet, then specify the path (including the file name) for this ASCII text file in the "FILENAME IQTEXTA2" statement.

8.7 Program 7: Run IQSASA3

The IQSASA3 program calculates age and sex risk-adjusted rates for each area-based IQI (overall rates and rates by area), and then calculates smoothed rates.

Input:

1. SAS format library (FMTLIB) created from the IQFMT program.

2. The discharge-level file that was created with the IQSAS1 program.

3. The SAS dataset with summary records that was created with the IQSASA2 program.

4. A text file with Census area residential populations, stratified by area, sex, and discrete age categories. One file is currently provided along with the IQI module software. The file is POP95TO06. The user should set POPYEAR to the year that best matches the user's discharge data file. The text file does not need to be converted to a SAS file for use with the software.

5. A text file (COVIQA30.TXT) containing regression coefficients from a regression that was run on the reference SID dataset. These coefficients will be used in the risk adjustment process. This file is provided to you as part of the IQI module. The text file does not need to be converted to a SAS file for use with the software.

6. A text file (MSXIQA30.TXT) containing three arrays for use in the smoothing process. The arrays contain noise estimates, signal estimates, and mean area rates for each IQI. This file is provided to you as part of the IQI module. The text file does not need to be converted to a SAS file for use with the software.

Output:

1. A SAS dataset with an overall summary record and with area-level summary records that contain the three types of indicator rates, along with the components of the initial raw rates. Specifically, the file contains the observed rates (OAIQxx variables), the risk-adjusted rates (RAIQxx variables), the smoothed rates (SAIQxx variables), the counts of outcomes that formed the numerators of the observed rates (TAIQxx variables), and the residential population totals that formed the denominators of the observed rates (PAIQxx variables).

2. An optional ASCII (comma delimited) text file that the user can then import into a spreadsheet. This text file contains the same information as the SAS output dataset. The text file will contain the OAIQxx observed rates and their TAIQxx and PAIQxx components, the RAIQxx risk-adjusted rates, and the SAIQxx smoothed rates. Each record or row in the text file will correspond to a different area.

3. Output to hardcopy are PROC MEANS (with N, NMISS, MIN, MAX, MEAN, and SUM) of risk-adjusted and smoothed rates in two intermediate work files and of all of the numeric variables in the final output data file. The printout also contains a PROC CONTENTS of the output SAS dataset. A PROC PRINT of the output dataset is provided only if the "PRINT" parameter in CONTROL_IQI.SAS code is set to one.

6. A PROC MEANS (with N, NMISS, MIN, MAX, MEAN, and SUM) of the area-level summary records that shows statistics for the OAIQxx observed rates and their TAIQxx and PAIQxx components, the RAIQxx risk-adjusted rates, and the SAIQxx smoothed rates.

7. A PROC CONTENTS of the output SAS summary dataset is output to hardcopy.

8. A PROC PRINT of the output summary dataset is provided at the end of the hardcopy printout. If the user does not wish to generate this printout, then the global “PRINT” parameter in CONTROL_IQI.SAS code should be set to zero.

Changes:

1. The “FILENAME CONTROL” statement at the beginning of the program must be changed to reflect the location of the CONTROL_IQI.SAS code.

2. In CONTROL_IQI.SAS, specify the locations (paths) of the input and output SAS files in the “LIBNAME INA3” and “LIBNAME OUTA3” statements.

3. In CONTROL_IQI.SAS, specify in the “INFILA3X” statement the name of the discharge-level file that you created with the IQSAS1 program.

4. In CONTROL_IQI.SAS, specify the path (including the file name) for the ASCII population text file in the "FILENAME POPFILE3" statement. The file name will is POP95TO96.. These files are provided along with the software. The file used should be the one that is closest to the year associated with your particular data. These files contain Census residential estimates by area, gender, and discrete age categories.

5. In CONTROL_IQI.SAS, specify in the "FILENAME COVARA" statement the path (including the file name) for the ASCII text file that contains regression coefficients from a regression that was run on reference SID dataset. The name of the file is COVIQA30.TXT.

6. In CONTROL_IQI.SAS, specify in the "FILENAME MSXA" statement the path (including the file name) for the ASCII text file that contains the estimates to smooth the indicator rates. The name of the file is MSXIQA30.TXT.

7. In CONTROL_IQI.SAS, specify in the “INFILA3Y” statement the name of the summary file that you created with the IQSASA2 program.

8. In CONTROL_IQI.SAS, specify in the “OUTFILA3” statement the name that you wish the output file to have.

9. In CONTROL_IQI.SAS, if you wish to create an ASCII (comma delimited) text file that you can import into a spreadsheet, then set the TEXTA3 parameter to 1. Otherwise, the default value of zero for TEXTA3 will skip around the code that would generate this file.

10. In CONTROL_IQI.SAS, if you wish to create an ASCII (comma delimited) text file that you can import into a spreadsheet, then specify the path (including the file name) for this ASCII text file in the "FILENAME IQTEXTA3” statement.

9.0 Reviewing the Printed Output

This section contains tips for reviewing some of the printed output from the IQI module. These tips are oriented toward explaining the interrelationships between printout items from different programs and hopefully will help to reveal the nature and structure of the module outputs. For guidance in interpreting the results, see the Interpretations Guide.

The final output of the IQI module is a PROC PRINT from IQSASP3 (for provider-level indicators) and IQSASA3 (for area-level indicators). All interim printouts are for checking and trouble-shooting. However, if you have elected to refrain from risk-adjusting and smoothing the data, then the final outputs will be the PROC PRINT at the end of the IQSASP2 and/or IQSASA2 programs.

9.1 IQSAS1

The initial printout from the IQSAS1 program contains **PROC MEANS** for all of the numeric variables in the output discharge-level dataset. It will contain information for the newly constructed TAIQxx and TPIQxx flag variables that will later form the numerators for the indicator rates. For each TAIQxx and TPIQxx flag variable:

- The SUM will contain the total number of observations in the dataset that were found to have the particular outcome of interest.

- For the six Provider volume indicators (TPIQ01-TPIQ02 TPIQ04-TPIQ07) and the four Area indicators (TAIQ26-TAIQ29), the MEAN, MINIMUM, and MAXIMUM will usually be the value one since the flag variables have either been set to missing ('.') or to a value of one. The remainder of the Provider indicators (TPIQ08-TPIQ09 TPIQ11-TPIQ25, and TPIQ30-TPIQ34) have a value of one, zero, or missing ('.'). For these indicators, a value of zero was assigned to the TPIQxx flag if a particular observation was part of the population at risk for a particular indicator but did not have the particular outcome of interest. So for example, TPIQ21 = 1 indicates a patient who had a Cesarean section, while TPIQ21 = 0 identifies a patient who had a delivery but not a C-section.

- For the Provider indicators TPIQ08-TPIQ09 TPIQ11-TPIQ25 and TPIQ30-TPIQ34, the MEANs will contain a close approximation of the eventual overall observed indicator rates. The values will change slightly after IQSASP2 has applied additional parts of the indicator definitions.

- N lists the number of observations in the dataset with non-missing values. For the six provider-based volume indicators and the four area-based indicators, N for TPIQxx or TAIQxx will be the same as the SUM. For the other provider-based indicators, N will contain the denominator for the observed indicator rate. Note: the N's or denominators for six of the mortality indicators (# 8-12, 30, and 31) will be similar to the Ns and SUMs for the six volume indicators (TPIQ01-TPIQ02 TPIQ04-TPIQ07), but often they will not be exactly identical since the mortality indicators exclude discharges that were transferred to other hospitals.

The IQSAS1 printout also contains a **PROC CONTENTS** that lists all of the variables in the output dataset, including the character variables that are present, and a **PROC PRINT** of the first 24 observations in the output dataset.

9.2 IQSASP2

The purpose of this printout is to provide the observed rates for all provider-level indicators. The default printout shows results by provider, but other levels of output (as shown in Table 7) can be specified as well. Note that risk-adjusted and smoothed rates are shown in the output from the next program.

The printout from the IQSASP2 program contains **PROC MEANS** on the provider-level summary records for all of the numeric variables in the output summary dataset. It will contain information for the newly constructed OPIQxx rates, the PPIQxx denominators, and the TPIQxx numerators.

- The _TYPE_ variable described in the MEANS table identifies the stratification level for the records in the output data set. The _TYPE_ variable corresponds to the TYPELVLP parameter values that were specified (see item 4 in the "Changes" section for the IQSASP2 program on page 32). In this case, _TYPE_ always assumes the value of 16, since only the provider-level records are selected.

- The N statistic for _TYPE_ contains the number of providers in the output summary data set. A TPIQxx numerator variable with a value for N that is lower than the N value for _TYPE_ indicates that there were no outcomes of interest for some of the providers. Similarly, a PPIQxx denominator variable with a lower value for N than _TYPE_ indicates that for some providers, there were no hospital discharges with the outcome of interest.

- The MINIMUM value for the TPIQ08-TPIQ25, TPIQ30, and TPIQ31 numerators will usually be zero since values of zero were assigned for observations that were part of the population for the rate denominator but did not have the particular outcome of interest to be included in the rate numerator. For the volume indicators, (TPIQ01-TPIQ07), the MINIMUM value will be one or higher.

*For the observed rates, the User should **NOT** report the MEANS displayed here, but instead should refer to the overall means in the output dataset that are also present in the subsequent PROC PRINT. The MEANS given here are means of hospital means; i.e., all hospitals are given equal weight, regardless of the number of discharges in the different hospitals.*

- The SUMs for the counter variables TPIQxx and PPIQxx will contain overall file totals for these data elements. The SUMs for the observed rates have no intuitive meaning.

If the "PRINT" parameter in the CONTROL_IQI.SAS program is set to one, the subsequent **PROC PRINT** output contains a complete dump of the output summary file. Listed for each record are the stratification values, the PPIQxx population denominators for the 30 provider indicators, the TPIQxx outcome numerators for the 30 provider indicators, and the 30 OPIQxx observed rates.

9.3 IQSASP3

*The **PROC PRINT** at the end of this program provides your **final output**. (This printout appears if the "PRINT" parameter in the CONTROL_IQI.SAS program is set to one.)*

The following table lists the column headers shown on the printed output and describes each. Each indicator is reported in a separate section. Values of "xx" correspond to the two-digit IQI number.

Table 9. Provider Level Printed Output

Column Heading	Description
Obs	Observation 1 (with HOSPID = ".") is the overall average for the entire dataset (TYPELVLP = 0). The remaining observations are individual providers, or hospitals (TYPELVLP = 16).
HOSPID	Identifier for each provider in the dataset.
AGECAT	Age stratification category - See Table 6 for TYPELVLP settings.
SEXCAT	Gender stratification category - See Table 6 for TYPELVLP settings.
PAYCAT	Payer stratification category - See Table 6 for TYPELVLP settings.
RACECAT	Race stratification category - See Table 6 for TYPELVLP settings.
TPIQxx	Number of cases in the numerator.
PPIQxx	Number of cases in the denominator (population at risk).
OPIQxx	Observed (raw) rate - Numerator divided by Denominator.
EPIQxx	Expected rate - Rates the provider would have if it performed the same as the reference population given the provider's actual case-mix (e.g., age, gender, modified DRG and comorbidities)
RPIQxx	Risk-adjusted rate - Accounts for the difference between the case-mix of the reference population and the provider's case-mix.
LPIQxx	Lower limit of confidence interval of risk-adjusted rate.
UPIQxx	Upper limit of confidence interval of risk-adjusted rate.
SPIQxx	Smoothed rate - Rates with removal of fluxuation over time.
XPIQxx	Standard error of smoothed rate.

Observation 1 (with HOSPID = .) is the overall average for the entire dataset (TYPELVL = 0). The remaining observations are individual providers, or hospitals (TYPELVL = 16). Data will appear under the column headers, AGECAT, SEXCAT, PAYCAT, and RACECAT, if you specify these levels of aggregation (shown in Table 7).

You may wish to express the results in more understandable terms:

- Multiply the mortality rates by 100 to express them as a percentage (e.g., 0.0338 * 100 = 3.4% mortality for CABG).

- Multiply the utilization rates by 100 to express them as a percentage (e.g., 0.2040 * 100 = 20.4% C-section rate)

The MEANS table is generated from the permanent provider-based output file and is provided for trouble-shooting and understanding your data, but not for reporting. The means are provided just for the provider level summary records.

- The N for all but the TPIQxx counter variables should contain the number of providers in the user's database.

- The MEANS, MINIMUMs, and MAXIMUMs have their normal meaning and provide comparisons among the different hospitals or providers in your database.

*For the (observed, risk-adjusted, or smoothed) rates, the User should **NOT** report the MEANS displayed here, but instead refer to the overall means in the output dataset in the PROC PRINT labeled "FINAL OUTPUT." The MEANS given here are means of hospital means; i.e., all hospitals are given equal weight, regardless of the number of discharges in the different hospitals.*

- Note: The denominators for six of the mortality indicators (# 8 - 12, 30, and 31) will be similar to the totals for the six volume indicators (TPIQ01-TPIQ07), but often they will not be exactly identical since the mortality indicators exclude discharges that were transferred to other hospitals.

- If the "PRINT" parameter in the CONTROL_IQI.SAS program is set to one, at the end of the printout is a **PROC PRINT** on the final provider-based output file. Listed for each level of stratification are the stratifiers, the numerator and denominator totals for the observed rates, and the observed, risk-adjusted, and smoothed rates.

9.4 IQSASA2

The purpose of this printout is to provide the observed rates for all area-level indicators. The default printout shows overall results and results by area, but other levels of output (as shown in Table 7) can be specified as well. Note that risk-adjusted and smoothed rates are shown in the output from the next program.

The printout from the IQSASA2 program contains **PROC MEANS** for all of the numeric variables in the output summary dataset. It will contain information for the newly constructed OAIQxx rates, the PAIQxx denominators, and the TAIQxx numerators.

- The _TYPE_ variable described in the first row of the MEANS table identifies the stratification level for the records in the output data set. The _TYPE_ variable corresponds to the TYPELVLA parameter values that were specified (see item 5 in the "Changes" section for the IQSASA2 program on page 32). In this case, _TYPE_ always assumes the value of 8, since only the area-level records are selected.

- The N statistic for _TYPE_ contains the number of areas in the output summary data set. A TAIQxx numerator variable with a lower value for N than _TYPE_ indicates that there were no outcomes of interest for some of the areas.

- The MINIMUM value for the TAIQxx numerators will be one or higher.

*For the observed rates, the User should **NOT** report the MEANS displayed here, but instead should refer to the overall means in the output dataset that are also present in the subsequent PROC PRINT. The MEANS given here are means of the area means; i.e., all areas are given equal weight, regardless of the population in the different areas.*

- The SUMs for the counter variables TAQIxx and PAIQXX will contain overall file totals for these data elements. The SUMs for the observed rates have no intuitive meaning.

If the "PRINT" parameter in the CONTROL_IQI.SAS program is set to one, the subsequent **PROC PRINT** output contains a complete dump of the output summary file. Listed for each record are the stratification values, the PAIQxx population denominators for the four indicators, the TAIQxx outcome numerators for the four indicators, and the four OAIQxx observed rates.

9.5 IQSASA3

The PROC PRINT at the end of this program provides your final output. (This printout appears if the "PRINT" parameter in the CONTROL_IQI.SAS program is set to one.)

The following table lists the column headers shown on the printed output and describes each. Each indicator is reported in a separate section. Values of "xx" correspond to the two-digit IQI number.

Table 10. Area Level Printed Output

Column Heading	Description
Obs	Observation 1 is the overall average for the entire dataset (TYPELVLA = 0). The remaining observations are individual areas (TYPELVLA = 8).
Area	Identifier in the dataset for area.
TAIQxx	Number of cases in the numerator.
PAIQxx	Number of cases in the denominator (population at risk).
OAIQxx	Observed (raw) rate - Numerator divided by Denominator.
RPIQxx	Risk-adjusted rate - Accounts for the difference between the case-mix of the reference population and the area's case-mix.
SPIQxx	Smoothed rate - Rates with removal of fluxuation over time.

Observation 1 (with AREA = *blank*) is the overall average for the entire dataset (TYPELVL = 0). The remaining observations are individual areas (TYPELVL = 8).

You may wish to express the results in more understandable terms:

- Multiply the utilization rates by 100,000 to express them as a rate per 100,000 population (e.g., 0.000494 * 100,000 = 49.4 hysterectomies per 100,000 population).

The MEANS table is generated from the permanent area-based output file. The means are provided just for the area-level summary records.

- The N for all but the TAIQxx counter variables should contain the number of different areas (Metro Areas and counties) in your database.

- The MEANs, MINIMUMs, and MAXIMUMs have their normal meaning and provide comparisons among the different areas in your database. Note that the MAXIMUMs for the counter variables (the TAIQxx and PAIQxx variables) are associated with specific areas, and therefore these MAXIMUMs may not match those in the prior IQSAS2 printouts since that run typically will include a record for the entire database.

*For the (observed, risk-adjusted, or smoothed) rates, the User should **NOT** report the MEANS displayed here, but instead refer to the overall means in the output dataset that are also present in the subsequent PROC PRINT. The MEANS given here are means of area means; i.e., all areas are given equal weight, regardless of the number of discharges in the different areas.*

- The SUMs of the counter variables (the TAIQxx and PAIQxx variables) yield the overall database totals.

10.0 Benchmark Timings

The benchmark runtimes given below are from runs made on a Windows XP workstation, with a Pentium 4 CPU 2.80 GHz processor, 512 MB of RAM, and an IDE hard drive. The dataset used contained 757,624 observations with 15 diagnosis fields and 15 procedure fields.

Step	Run time (in seconds)
Run IQFMTS to create the format library	2
Run IQSAS1	157
Run IQSASP2	21
Run IQSASP3	86
Run IQSASA2	10
Run IQSASA3	185

11.0 User Support

Technical assistance is available, through an electronic user support system monitored by the QI support team, to support users in their application of the IQI software. The same e-mail address may be used to communicate to AHRQ any suggestions for IQI enhancements, general questions, and any QI related comments you may have. AHRQ welcomes your feedback.

The Internet address for user support and feedback is: support@qualityindicators.ahrq.gov

AHRQ also offers a listserv to keep you informed on the Quality Indicators (QIs). The listserv is used to announce any QI changes or updates, new tools and resources, and to distribute other QI related information. This is a free service. Simply follow the process described below to begin receiving important QI information. All you need is a computer, Internet access, and an E-mail address. It works just like other electronic distribution lists.

Here's how to register:

1. Send an E-mail message to: listserv@qualityindicators.ahrq.gov.
2. On the subject line, type: Subscribe. For example:

   Subscribe

3. In the body of the message type: sub Quality_Indicators-L and your full name. For example:

   sub Quality_Indicators-L John Doe

4. You will receive a message confirming that you are signed up.

If you have any questions, contact AHRQ QI Support at the e-mail noted above. You should receive an automatic response e-mail message confirming receipt of your e-mail. If you do not receive a confirmation message, call (888) 512-6090.

Appendix A: Links

The following links may be helpful to users of the AHRQ Inpatient Quality Indicators.

Inpatient Quality Indicators Version 3.0 Documents and Software

Available at http://www.qualityindicators.ahrq.gov/iqi_download.htm

Title	***Description***
Guide to Inpatient Quality Indicators	Describes how the IQIs were developed and provides detailed evidence for each indicator.
Inpatient Quality Indicators Technical Specifications	Provides detailed definitions of each IQI, including all ICD-9-CM and DRG codes that are included in or excluded from the numerator and denominator. Note that exclusions from the denominator are automatically applied to the numerator.
IQI Covariates used in Risk Adjustment	Tables for each IQI provide the stratification and coefficients used to calculate the risk-adjusted rate for each strata.
SAS® IQI Software Documentation	This software documentation provides detailed instructions on how to use the SAS ® version of the IQI software including data preparation, calculation of the IQI rates, and interpretation of output.
SPSS® IQI Software Documentation	This software documentation provides detailed instructions on how to use the SPSS® version of the IQI software including data preparation, calculation of the IQI rates, and interpretation of output.
Change Log to IQI Documents and Software	The Change Log document provides a cumulative summary of all changes to the IQI software, software documentation, and other documents made since the release of version 2.1 of the software in March 2003. Changes to indicator specifications that were not a result of new ICD-9-CM and DRG codes, are also described in the Change Log.
Fiscal year 2006 Coding Changes	This document summarizes the changes to the indicator definitions resulting from FY 2006 changes to ICD-9-CM coding and DRG changes. These changes will only affect data from FY 2006 (October 1, 2005) or later.
SAS® IQI Software	Requires the SAS® statistical program distributed by the SAS Institute, Inc. The company may be contacted directly regarding the licensing of its products: http://www.sas.com
3M® APR® DRG Limited License Grouper for SAS®	Creates APR-DRG variables for use with SAS version of IQI software. Instructions for running the software are included in the Zip file.
SPSS® IQI Software	Requires the SPSS® statistical program distributed by SPSS, Inc. The company may be contacted directly regarding the licensing of its products: http://www.spss.com

AHRQ QI Windows Application

The AHRQ QI Windows Application calculates rates for all of the AHRQ Quality Indicators modules and does not require either SAS® or SPSS®. It is available at:

http://www.qualityindicators.ahrq.gov/winqi_download.htm

Additional Documents

The following documents are available within the "Documentation" section of the **AHRQ QI Downloads** Web page:

http://www.qualityindicators.ahrq.gov/downloads.htm

- *Refinement of the HCUP Quality Indicators (Technical Review), May 2001*
- *Refinement of the HCUP Quality Indicators (Summary), May 2001*
- *Measures of Patient Safety Based on Hospital Administrative Data - The Patient Safety Indicators, August 2002*
- *Measures of Patient Safety Based on Hospital Administrative Data - The Patient Safety Indicators (Summary), August 2002*

In addition, these documents may be accessed at the AHRQ QI Documentation Web page:

http://www.qualityindicators.ahrq.gov/documentation.htm

- *Guidance for Using the AHRQ Quality Indicators for Hospital-level Public Reporting or Payment, August 2004*
- *AHRQ Summary Statement on Comparative Hospital Public Reporting, December 2005*
- *Appendix A: Current Uses of AHRQ Quality Indicators and Considerations for Hospital-level*
- *Comparison of Recommended Evaluation Criteria in Five E*xisting National Frameworks

The following documents can be viewed or downloaded from the page:

http://www.qualityindicators.ahrq.gov/newsletter.htm

- *2006 Area Level Indicator Changes*
- *Considerations in Public Reporting for the AHRQ QIs*
- *June 2005 Newsletter* - Contains the article, "Using Different Types of QI Rates"

Other Tools and Information

IQI rates can be calculated using the modified Federal Information Processing Standards (FIPS) State/county code. A list of codes is available at:

http://www.census.gov/popest/geographic/codes02.pdf

AHRQ provides a free, on-line query system based on HCUP data that provides access to health statistics and information on hospital stays at the national, regional, and State level. It is available at:

http://hcup.ahrq.gov/HCUPnet.asp

Information on the 3M™ APR-DRG system is available at:

http://www.3m.com/us/healthcare/his/products/coding/refined_drg.jhtml