AHRQ Quality Indicators

Pediatric 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

Version 3.0 (February 20, 2006)

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 Pediatric Quality Indicators (PDIs). These indicators capture volume and mortality for selected procedures, potentially preventable complications and iatrogenic events for children treated in hospitals, and potentially preventable hospitalizations for ambulatory care sensitive conditions. They can be used as a screening tool for problems that patients experience as a result of exposure to the healthcare system and that are likely amenable to prevention by changes at the system or provider level.

This document is the software documentation for the Pediatric 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. By making this tool available, we hope to assist others in producing information on health care quality more cost effectively.

Details on the development of the Pediatric Quality Indicators can be found in *Measures of Pediatric Health Care Quality based on Hospital Administrative Data*, available at http://www.qualityindicators.ahrq.gov/pdi_download.htm.

Acknowledgments

Support efforts, including refinement and enhancement of the AHRQ Quality Indicators and related products, are provided by the Support for Quality Indicators (SQI-II) contract team.

The following individuals from **Battelle Memorial Institute, Stanford University,** and **University of California (UC)** constitute the Support for Quality Indicators core team:

Sheryl Davies, M.A.
Bruce Ellis, M.S.
Jeffrey Geppert, J.D.
Mark Gritz, Ph.D.
Theresa Schaaf, P.M.P
Elaine Keller, M.Ed.
Kathryn McDonald, M.M.
Patrick Romano, M.D., M.P.H
Jeff Schoenborn, B.S.

The **Agency for Healthcare Research and Quality** Support for Quality Indicators team includes:

Marybeth Farquhar, Project Officer
Mamatha Pancholi, M.S., Project Officer
Mary B. Haines, Contract Officer

This product is based on the work of many individuals who contributed to its development and testing.

The following staff from the **Stanford University** performed the evidence review, facilitated clinician reviews, and completed the empirical evaluation for the new Pediatric Quality Indicators:

Project Team
Kathryn McDonald, M.M. (Stanford)
Patrick Romano, M.D., M.P.H. (UC-Davis)
Sheryl M. Davies, M.A. (Stanford)
Corinna Haberland, M.D. (Stanford)
Jeffrey Geppert, J.D. (Battelle)
Amy Ku, M.H.S.A.. (Stanford)
Kavita Choudhry, B.A. (Stanford)

We also wish to acknowledge the invaluable contribution of the clinical panelists and the peer reviewers of the evidence report; and the testers of the software products.

Table of Contents

Abstract ..... **i**

Acknowledgments ..... **ii**

1.0 Introduction **1**

2.0 Components of the Pediatric Quality Indicators Module **2**

3.0 Quick Reference **2**
3.1 Processing Steps 2
3.2 Pediatric Quality Indicator Module Details 5

4.0 Background **7**

5.0 Data Elements and Coding Conventions **8**
5.1 Input for the AHRQ Quality Indicators 8
5.2 Coding of Diagnoses, Procedures, DRGs and MDCs 9
5.3 Use of External Cause of Injury Codes 10
5.4 Missing Values 14
5.5 Treatment of Missing Data 14

6.0 User Options **15**

7.0 Producing Pediatric Quality Indicator Rates: Processing Steps **16**
7.1 Step 1. Identify outcomes in inpatient records 16
7.2 Step 2. Identify populations at risk 16
7.3 Step 3. Calculate observed (raw) Pediatric Quality Indicator rates 16

8.0 Program Descriptions **18**
8.1 Program 1: Modify Statements in the CONTROL_PDI.SAS code 18
8.2 Program 2: Run PDFMTS 19
8.3 Program 3: Run PDSAS1 19
8.4 Program 4: Run PDSASP2 20
8.5 Program 6: Run PDSASA2 24

9.0 Reviewing the Printed Output. **27**
9.1 PDSAS1 27
9.2 PDSASP2 27
9.3 PDSASA2 29

10.0 User Support and Information **31**

List of Figures

Figure 1. Processing Steps for the Pediatric Quality Indicators - Provider 3

Figure 2. Processing Steps for the Pediatric Quality Indicators - Area 4

List of Tables

Table 1. Pediatric Quality Indicator (PDI) Variables 5

Table 2. Prefixes for the Pediatric Quality Indicator (PDI) Variables 6

Table 3. Pediatric Quality Module Contents 6

Table 4. Data Elements and Coding Conventions 11

Table 5. Treatment of Missing Data Elements 14

Table 6. PDSASP2 Aggregation Possibilities 21

Table 7. PDSASA2 Aggregation Possibilities 26

Table 8. Provider Level Printed Output 28

Table 9. Area Level Printed Output 29

AHRQ Quality Indicators, SAS Software Documentation, Version 3.0: Pediatric Quality Indicators

1.0 Introduction

This documentation describes the software for implementing the Pediatric Quality Indicator (PDI) 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 PDIs is contained in the document *Measures of Pediatric Health Care Quality based on Hospital Administrative Data*, which includes information about the development of the indicators and their definitions. Detailed definitions, including all ICD-9-CM codes included in or excluded from the numerator and denominator for each indicator, are contained in a separate document *Pediatric Quality Indicators Technical Specifications.* Both documents *are,* available at http://www.qualityindicators.ahrq.gov/pdi_download.htm.

The software consists of a series of computer programs that perform the following functions:

- Assign and calculate PDIs from hospital discharge abstracts or UB (uniform billing) claims data.
- Print PDI 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.

This documentation includes:

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

Critical user information is highlighted with this symbol:

2.0 Components of the Pediatric Quality Indicators Module

As shown in Table 3 on page 6, the Pediatric Quality Indicators module consists of five SAS programs and one ASCII text file 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 PDI module programs. Most programs have names of the form PDSASi, PDSASAi, or PDSASPi. The first two characters "PD" of the program name indicate a Pediatric 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 (the Pediatric Quality Indicator module is not available in SPSS). 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 that is 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

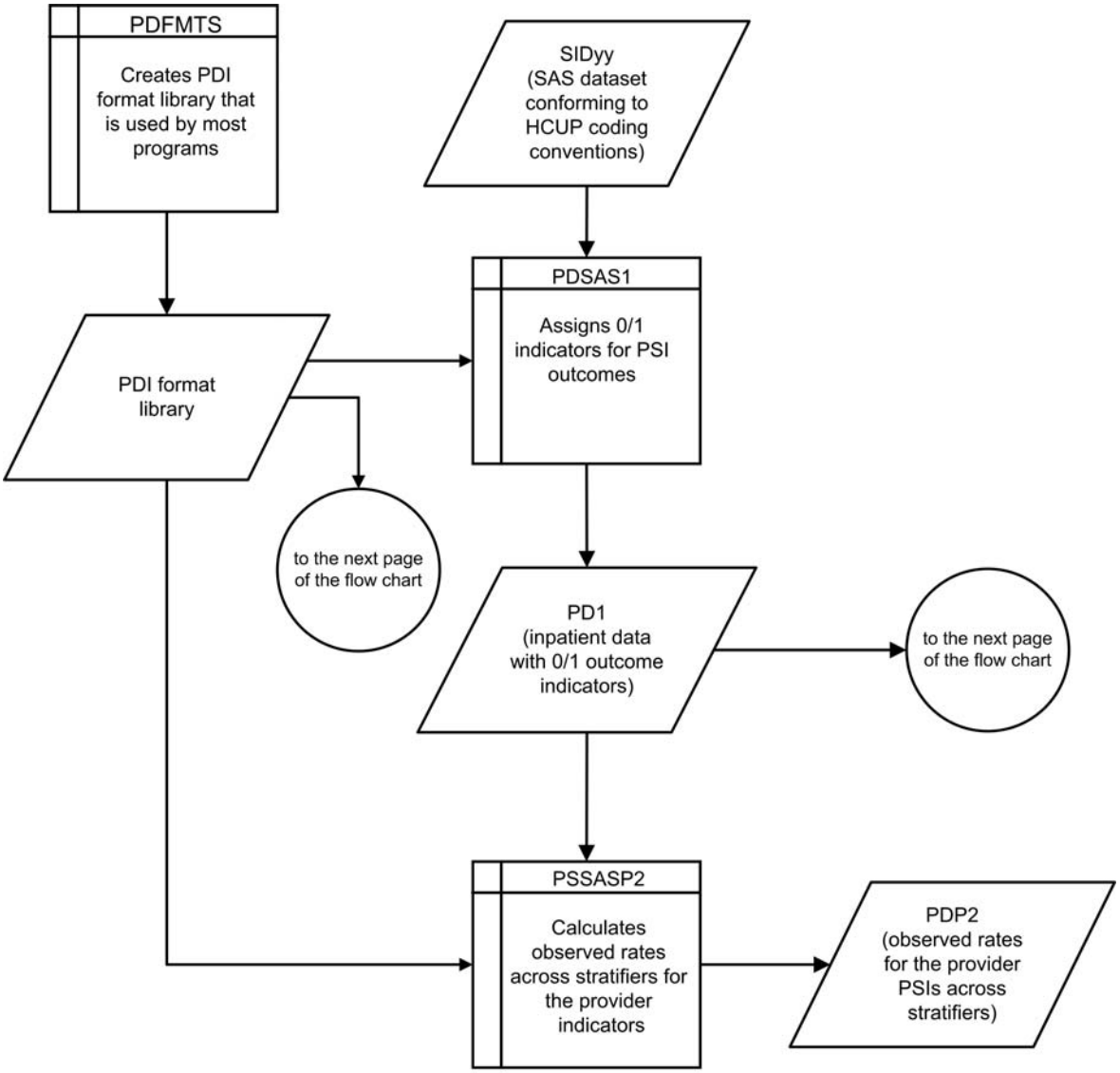
The subsequent four pages are intended to serve as a quick reference to assist in reading this documentation and in reviewing the PDI module outputs. Processing steps are shown first (Figure 1 and Figure 2) followed by a listing of the module indicator variables (Table 1), variable prefixes (Table 2), 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.

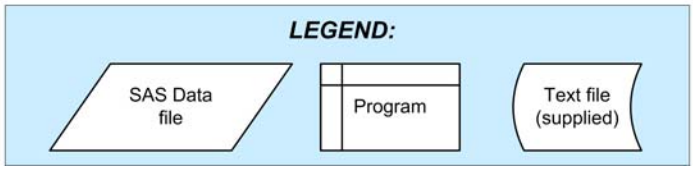
3.1 Processing Steps

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

[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.

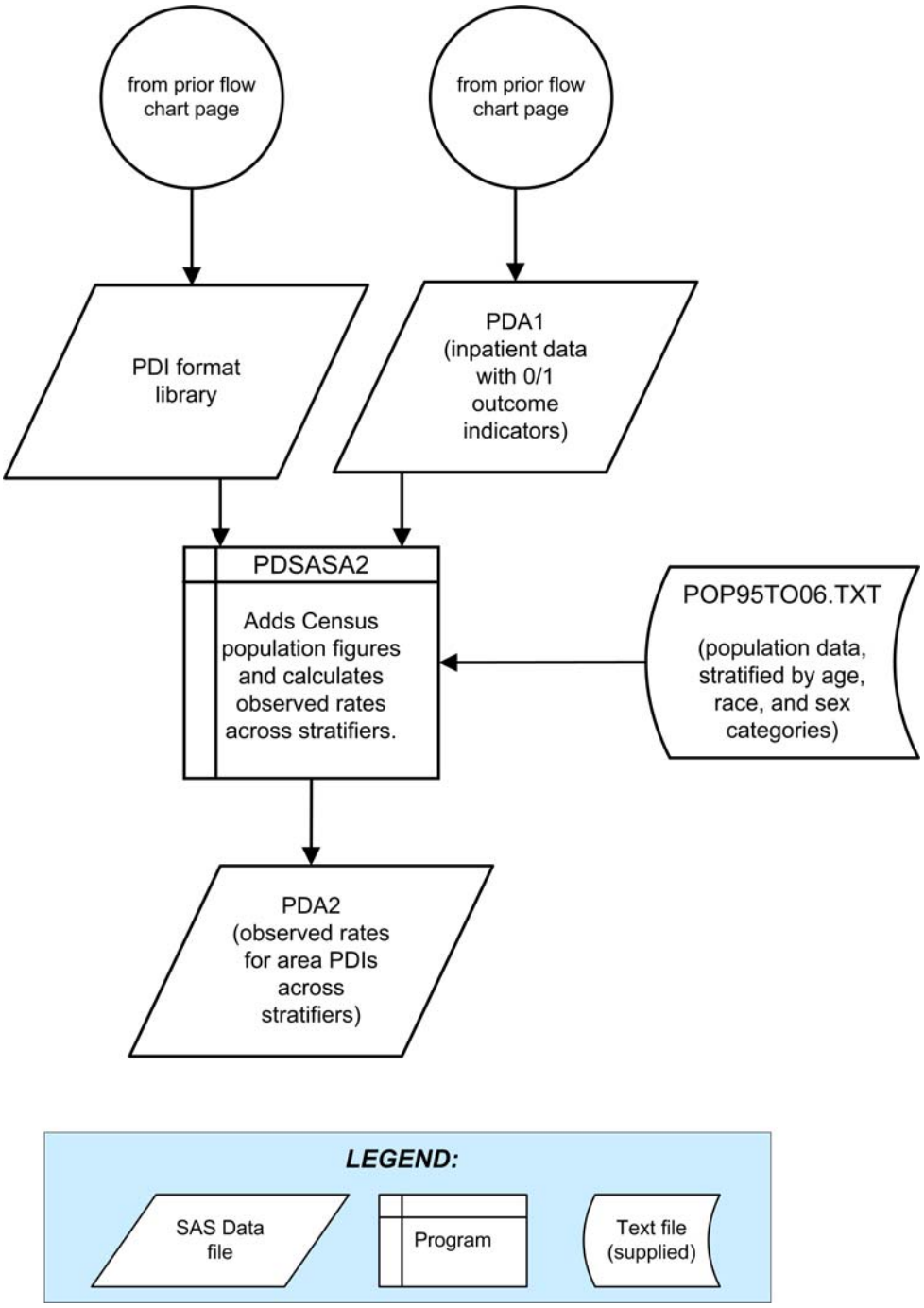
Figure 1. Processing Steps for the Pediatric Quality Indicators - Provider





NOTE: Each of the SAS Programs in Figure 1 incorporates the CONTROL_PDI.SAS program, which contains code the user **must** modify in order to run the PDI 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 Pediatric Quality Indicators - Area



3.2 Pediatric Quality Indicator Module Details

The following tables list the module indicator variables (Table 1), variable prefixes (Table 2), and module contents (Table 3).

Table 1. Pediatric Quality Indicator (PDI) Variables

PDI Number	Indicator
Pediatric Quality Provider Indicators	
1	Accidental Puncture or Laceration
2	Decubitus Ulcer
3	Foreign Body Left During Procedure
4	Iatrogenic Pneumothorax in Neonates
5	Iatrogenic Pneumothorax
6	Pediatric Heart Surgery Mortality
7	Pediatric Heart Surgery Volume
8	Postoperative Hemorrhage or Hematoma
9	Postoperative Respiratory Failure
10	Postoperative Sepsis
11	Postoperative Wound Dehiscence
12	Selected Infections due to Medical Care
13	Transfusion Reaction
Pediatric Quality Area Indicators	
14	Asthma Admission Rate
15	Diabetes Short-term Complications Admission Rate
16	Gastroenteritis Admission Rate
17	Perforated Appendix Admission Rate
18	Urinary Tract Infection Admission Rate

Table 2. Prefixes for the Pediatric Quality Indicator (PDI) Variables

Prefix	Contents	Examples	
		Provider Indicator # 8, Postoperative Hemorrhage or Hematoma	**Area Indicator # 14, Asthma**
T	Inpatient numerator (top)	TPPD08	TAPD14
P	Population denominator (pop)	PPPD08	PAPD14
O	Observed rate	OPPD08	OAPD14

Table 3. Pediatric Quality Module Contents

SAS programs (syntax files)	ASCII text files (data)
CONTROL_PDI.SAS	POP95TO06.TXT
PDFMTS.SAS	
PDSAS1.SAS	
PDSASP2.SAS	
PDSASA2.SAS	

† The ASCII text files are data files provided with the Pediatric 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.

4.0 Background

The PDI module contains 18 indicators that reflect the quality of care inside hospitals. These indicators serve as flags for potential quality problems rather than definitive measures of quality of care. The indicators include two groups of measures based on hospital stays.

1. There are 13 **Provider-based** Pediatric Quality Indicators for volume and in-hospital mortality for selected procedures and for medical conditions and surgical procedures that have been shown to have complication/adverse event rates that vary substantially across institutions and for which evidence suggests that high complication/adverse event rates may be associated with deficiencies in the quality of care. These indicators are measured as rates—outcome of interest / adverse events divided by the population at risk for the procedure or condition. The adverse event related Provider-based Indicators include only those cases where a secondary diagnosis code flags a potentially preventable complication.

   Four of the adverse event related indicators are for surgical discharges and seven are for either medical or surgical discharges. Four of the Provider-based Pediatric Quality Indicators (PDIs 2, 8, 9, 11), incorporate information about when procedures were performed (relative to the admission date) if this information is available. Note, however, that if the day of procedure information is missing, the computed rates for these indicators will be slightly lower than if the information was available. Admission type is used by two of the PDIs, postoperative hemorrhage or hematoma and postoperative respiratory failure (PDI #8 and PDI #9), to identify elective surgeries.

2. There are five **Area-based** Pediatric Quality Indicators, where geographic areas can be 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 MALEVL parameter reflects the change in OMB definitions for areas. Refer to page 9 for information on these area definitions and MALEVL parameter settings.

The 18 indicators in the PDI module are listed in Table 1 on page 5. See also *Pediatric Quality Indicators Technical Specifications* (http://www.qualityindicators.ahrq.gov/pdi_download.htm) for the definition of each indicator.

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 five Area-based Indicators are from the U.S. Census Bureau.

For information about how these indicators were identified, see the *Measures of Pediatric Health Care Quality based on Hospital Administrative Data* available at http://www.qualityindicators.ahrq.gov/pdi_download.htm.

[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).

5.0 Data Elements and Coding Conventions

5.1 Input for the AHRQ Quality Indicators

The PDI 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 PDI software are listed in Table 4. The PDI 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. Additional information on HCUP is available at the website http://www.ahrq.gov/data/hcup.

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

It is strongly recommend that users recode data elements in their input files to be consistent with the coding expected by the software. We do not recommend changing the Pediatric Quality Indicators 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) should be done rather than attempting to modifying all uses of the Sex data element in the PDI programs.

Not every value for every data element is referenced by the PDI software. For example, only two of the discharge disposition (DISP) data elements 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, to assist users of the uniform HCUP data files.

Two of the indicators (PDI #8 and 9) use admission type (ATYPE) to identify elective surgeries. If admission type (ATYPE) is not available in the user's data, the user may want to evaluate other data in the file to create a proxy to identify elective admission types.

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 PDI programs.

The data elements listed in Table 4 are those required for the input files of **all** of the SAS QI modules. When a variable is not required for the PDI SAS program the notation "Not used by the QI 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 PSTCO to emphasizes the importance of calculating the area PDIs by the location of the patient residence. If the user wants to calculate the area PDIs 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 PDIs using the population associated with the hospital location as the denominator, the values for this variable should be the individual hospital FIPS state/county codes.

If the provider 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.

Modified FIPS codes assignment for area denominators is an available option. 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 provider FIPS state/county code for analysis should be done with caution, and at larger levels of geographic area (i.e. Metro Area) 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 PDI area rates. They will be included in the output from the first program (PDSAS1.SAS).

The software will generate area PDI rates for each county included in the PSTCO data field. 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 of 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, DRGs and MDCs

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. PDI definitions only reflect codes valid after October 1, 1997, and therefore may not accurately analyze data collected before 1997.

- 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 PDI software 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 truncated versions 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 truncated versions 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) and Major Diagnostic Categories (MDCs) 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 and MDC effective on the discharge date. The software now refers to data elements DRG and MDC. Your data should be coded accordingly.

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

5.3 Use of External Cause of Injury Codes

External cause of injury codes - E-codes – are used to classify environmental events, circumstances, and conditions as the cause of injury, poisoning, or other adverse events. The use of E-codes is not always required by a state uniform billing committee or a state data organization. Users should be knowledgeable of the E-code requirements and practices of hospitals represented in the input data file. Several of the indicators use E-codes in their numerator or denominator definitions. See the documents *Measures of Pediatric Health Care Quality based on Hospital Administrative Data* and *Pediatric Quality Indicators Technical Specifications* (http://www.qualityindicators.ahrq.gov/pdi_download.htm) for additional information.

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 PDSAS1.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 the analysis.
AGEDAY	Age in Days (coded only when the age in years is less than 1)	Numeric	Age in days	If this data element is missing alternative logic will sometimes apply..
RACE	Race of Patient.	Numeric 1 2 3 4 5 6	 White Black Hispanic Asian or Pacific Island Native American Other	The values 1through 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 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 PDIs (01-13).
PSTCO	Location of Patient Residence or Hospital Location (FIPS State/County Code)	Numeric ssccc	Modified Federal Information Processing Standards State/county code[3]	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. May also be selected as a stratifier (see Table 6. PDSASP2 Aggregation Possibilities).
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).

[3] Federal Information Processing Standard, as defined by the U.S. Department of Commerce, National Institute of Standards and Technology (formerly National Bureau of Standards). Note: 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 as compared to the U.S. Census Bureau groupings. The AHRQ QI software uses the Modified FIPS code assignment of these areas. Failure to use the Modified FIPS codes assignment will result in the use of incorrect denominator estimates for area indicators. A list is available at http://www.census.gov/popest/geographic/codes02.pdf

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	The values 3 and 4 are referenced by the PDI code (to identify elective surgeries). PDIs 8 and 9 will be affected if ATYPE values are missing.
ASOURCE	Admission Source	Numeric 1 2 3 4 5	ER Another hospital Another facility incl LTC Court/law enforcement Routine/birth/other	The values 2 and 3 are referenced by the PDI code (to identify transfers from another hospital or facility)
LOS	Length of Stay	Numeric	Number of days from admission to discharge	
APR_DRG	APR_DRG Category	Numeric	APR-DRG from 3M software	Not used by the PDI program. If not present in the input data file it is not necessary to create a dummy variable.
SEVERTY	APR_DRG Severity Score	Numeric	APR-DRG Severity Score from 3M software	Not used by the PDI program. If not present in the input data file it is not necessary to create a dummy variable.
RISKMORT	APR_DRG Mortality Score	Numeric	APR-DRG Risk of Mortality Score from 3M software	Not used by the PDI program. If not present in the input data file it is not necessary to create a dummy variable.
DRG	Diagnosis Related Group	Numeric	DRG from federal (CMS) Grouper	
MDC	Major Diagnostic Category	Numeric	MDC from federal (CMS) grouper	
DX1 – DX30	ICD-9-CM Diagnosis Codes. DX1 is the principal diagnosis. DX2-DX30 are secondary diagnoses. Note: If e-codes are separated from secondary diagnoses in the input data file, the variable should be renamed and included as a secondary diagnosis variable (e.g., e-codes would be labeled as DX10 in a data file where the last secondary DX field is DX9).	String, 5 characters, left-justified (e.g. 020.2 -> 0202_ where _ indicates a space)	Diagnosis codes	Users must specify the number of diagnoses in the parameter &NDX in the CONTROL_PDI.SAS program to reflect the number of diagnoses.
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 SAS 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 5 Dx and the 2nd has 10, NDX would be 5 on the 1st and 10 on the 2nd.

[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
PR1 – PR30	ICD-9-CM Procedure Codes. PR1 is the principal procedure, PR2-PR30 are secondary procedures.	String, 4 characters, left-justified	Procedure codes	Users with more or fewer secondary procedures should modify the parameter &NPR in CONTROL_PDI.SAS to reflect the number of procedures.
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 SAS 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[5]	Necessary variables if the user sets the &PRDAY parameter in CONTROL_PDI.SAS to equal one. In this case, it is expected that the number of PRDAY variables agrees with the number of Procedure codes present. (See note below for method of calculation). These variables are not needed if the user sets the &PRDAY parameter in CONTROL_PDI.SAS to equal zero, indicating that there is no procedure day information available.
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	

* See http://hcup-us.ahrq.gov/toolssoftware/comorbidity/comorbidity.jsp.

[5] Variables PRDAY1 to PRDAY30 are defined as the number of days from date of admission to date of procedure for each procedure. For example, if the patient was admitted on June 15th and had two procedures - the principal procedure on June 15th and a second procedure on June 18th – then the value of PRDAY1 would be zero (0) and the value of PRDAY2 would be three (3). For more information, consult the HCUP data documentation at http://www.hcup-us.ahrq.gov/db/vars/prdayn/nisnote.jsp.

5.4 Missing Values

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

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 PDI programs do not distinguish among the different types of missing codes. Therefore, all types of missing values in the input data to the PDI 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	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).
ASOURCE	Admission Source			X		Case excluded from denominator where used in specification .
ATYPE	Admission Type	X				Case excluded from denominator where used in specification .
DISP	Disposition Status		X	X		Case excluded from denominator where used in specification .
DRG	Diagnosis Related Group (CMS DRG) in Effect on Discharge Date	X	X	X		Case excluded from denominator and from numerator where used in specification.
LOS	Length of Stay	X		X		Case excluded from denominator 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		X		Case excluded from denominator and from numerator where used in specification.
RACE	Race				X	Classified As "Other."

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

6.0 User Options

The PDI software reflects the development and implementation of the software with discharge data available to AHRQ through the HCUP program. Our 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 the PDI 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 PDIs based on original definitions is lost. Users are encouraged to identify ways to improve the PDI methodology and to share their suggestions with AHRQ for future updates.

AHRQ provides public access to HCUPnet - an interactive tool for identifying, tracking, analyzing, and comparing statistics on hospital care. HCUPnet queries generate statistics in a table format using data from the Nationwide Inpatient Sample (NIS) and State Inpatient Databases (SID) for those States that have agreed to participate. HCUPnet includes statistics based on the AHRQ Quality Indicators (QIs) which have been applied to the HCUP NIS. If users change definitions of the PDIs, it will not be possible to compare users' results to the national estimates in HCUPnet. HCUPnet may be accessed through the HCUP web site at http://hcup.ahrq.gov/HCUPnet.asp.

7.0 Producing Pediatric Quality Indicator Rates: Processing Steps

Each Pediatric Quality Indicator (PDI) expressed as a rate, is simply defined as:

Outcome of interest / Population at risk

[or]

Numerator / Denominator

Conceptually, three steps are necessary to produce the PDI 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 PDI measures.

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

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 PDI. 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.

7.2 Step 2. Identify populations at risk

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

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

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

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

The programs calculate observed PDI rates regardless of the number of cases available. However, PDI 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 PDI observed rates could be output at the hospital level, at the payer level, or at the hospital level by payer.

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

8.0 Program Descriptions

This section describes the five SAS programs that assign, calculate, and print the Pediatric 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 PDI 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 PDI rates, then the PDFMTS, CONTROL, and the PDSAS1 programs will need to be used, followed by PDSASP2 (for Provider observed rates) and/or PDSASA2 (for Area observed rates).

8.1 Program 1: Modify Statements in the CONTROL_PDI.SAS code

The CONTROL_PDI.SAS code contains all of the SAS statements that you need to modify in order to run the remaining PDI 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 PDSAS1, PDSASP2 and PDSASA2 programs are described below under each program.

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

All of the changes needed for the CONTROL_PDI.SAS code are listed in the following descriptions for programs 2 – 5. Each program description contains a section labeled "Changes:" that enumerates the modifications for CONTROL_PDI.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 PDI 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_PDI.SAS file.

CONTROL_PDI.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 PDSAS1 and "LIBNAME OUT1" points to the location of the output data set created by the PDSAS1 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_PDI.SAS changing "C:\pathname" to the single directory location that you wish to use.

There is a global PRINT parameter in CONTROL_PDI.SAS that allows you to print all of the output summary records at the end of the PDSASP2, and PDSASA2 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 on, set PRINT to have a value of 1 in CONTROL_PDI.SAS.

The global MALEVL parameter in CONTROL.PDI.SAS by default instructs all programs to define geographic areas by county for all areas in the input datasets. Refer to Page 9 for a list of values for the MALEVL parameter.

8.2 Program 2: Run PDFMTS

The PDFMTS 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 PDSAS1.SAS program, and by formats that map FIPS county codes to Metro Areas in the PDSAS1 and PDSASA2 programs. .

The PDI 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_PDI.SAS code.

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

8.3 Program 3: Run PDSAS1

The PDSAS1 program processes hospital discharge abstract data and flags inpatient records if they contain outcomes of interest. Outcome indicator names 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 11 for variable names and attributes for the input data file.

Partial definitions of the Pediatric 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 *Pediatric Quality Indicators Technical Specifications* (http://www.qualityindicators.ahrq.gov/pdi_download.htm).

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 PDFMT program.

Output:

1. SAS dataset containing inpatient records with input variables, stratifiers, comorbidity variables, and flag indicators (TPPDxx and TAPDxx) for the outcomes of interest that will later form the numerators for the PDI 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_PDI.SAS code.

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

3. In CONTROL_PDI.SAS, specify the names of the input and output files in the "INFILE1" and "OUTFILE1" statements.

The PDI 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_PDI.SAS.

If your variables are named differently from those used in the PDI software (see Table 4 on page 11), you MUST either rename those variables prior to running this program or modify PDSAS1 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.

8.4 Program 4: Run PDSASP2

The PDSASP2 program calculates the observed or raw rates for the Provider-level Pediatric Quality Indicators, using the data derived in a previous step (PDSAS1). These observed rates are stratified by combinations of hospitals, sex, age, race, and payer categories. The program first totals the indicator flags created by the PDSAS1 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 PDSAS1. This is a discharge-level file that contains inpatient records with input variables, stratifiers, and the 13 new flag indicators for the PDI Hospital outcomes of interest.

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

Output:

1. SAS dataset with summary records that contain observed rates (OPPDxx variables where xx refers to the indicator number), the counts of outcomes that formed the numerators of the rates (TPPDxx variables), and the hospital discharge totals that formed the denominators of the observed rates (PPPDxx 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 "Changes" 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 OPPDxx observed rates, the TPPDxx counts of outcomes that formed the numerators of the rates, and the PPPDxx 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 hospital-level summary records that shows statistics for the OPPDxx observed rates, the TPPDxx counts of outcomes that formed the numerators of the rates, and the PPPDxx counts of outcomes that formed the denominators of the rates. These means will only be generated if the user included a value of 64 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_PDI.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_PDI.SAS code.

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

3. In CONTROL_PDI.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 PDSAS1 program.

4. In CONTROL_PDI.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 6. The default values of 0 and 64 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 PDSAS1 program.

Table 6. PDSASP2 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

TYPELVLP	Stratification
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	ageday
17	ageday * race
18	ageday * payer
19	ageday * payer * race
20	ageday * sex
21	ageday * sex * race
22	ageday * sex * payer
23	ageday * sex * payer * race
24	ageday * age
25	ageday * age * race
26	ageday * age * payer
27	ageday * age * payer * race
28	ageday * age * sex
29	ageday * age * sex * race
30	ageday * age * sex * payer
31	ageday * age * sex * payer * race
32	bwht
33	bwht * race
34	bwht * payer
35	bwht * payer * race
36	bwht * sex
37	bwht * sex * race
38	bwht * sex * payer
39	bwht * sex * payer * race
40	bwht * age
41	bwht * age * race
42	bwht * age * payer
43	bwht * age * payer * race
44	bwht * age * sex
45	bwht * age * sex * race
46	bwht * age * sex * payer
47	bwht * age * sex * payer * race
48	bwht * ageday
49	bwht * ageday * race
50	bwht * ageday * payer
51	bwht * ageday * payer * race
52	bwht * ageday * sex
53	bwht * ageday * sex * race
54	bwht * ageday * sex * payer

TYPELVLP	Stratification
55	bwht * ageday * sex * payer * race
56	bwht * ageday * age
57	bwht * ageday * age * race
58	bwht * ageday * age * payer
59	bwht * ageday * age * payer * race
60	bwht * ageday * age * sex
61	bwht * ageday * age * sex * race
62	bwht * ageday * age * sex * payer
63	bwht * ageday * age * sex * payer * race
64	provider
65	provider * race
66	provider * payer
67	provider * payer * race
68	provider * sex
69	provider * sex * race
70	provider * sex * payer
71	provider * sex * payer * race
72	provider * age
73	provider * age * race
74	provider * age * payer
75	provider * age * payer * race
76	provider * age * sex
77	provider * age * sex * race
78	provider * age * sex * payer
79	provider * age * sex * payer * race
80	provider * ageday
81	provider * ageday * race
82	provider * ageday * payer
83	provider * ageday * payer * race
84	provider * ageday * sex
85	provider * ageday * sex * race
86	provider * ageday * sex * payer
87	provider * ageday * sex * payer * race
88	provider * ageday * age
89	provider * ageday * age * race
90	provider * ageday * age * payer
91	provider * ageday * age * payer * race
92	provider * ageday * age * sex
93	provider * ageday * age * sex * race
94	provider * ageday * age * sex * payer
95	provider * ageday * age * sex * payer * race
96	provider * bwht
97	provider * bwht * race
98	provider * bwht * payer
99	provider * bwht * payer * race
100	provider * bwht * sex
101	provider * bwht * sex * race

TYPELVLP	Stratification
102	provider * bwht * sex * payer
103	provider * bwht * sex * payer * race
104	provider * bwht * age
105	provider * bwht * age * race
106	provider * bwht * age * payer
107	provider * bwht * age * payer * race
108	provider * bwht * age * sex
109	provider * bwht * age * sex * race
110	provider * bwht * age * sex * payer
111	provider * bwht * age * sex * payer * race
112	provider * bwht * ageday
113	provider * bwht * ageday * race
114	provider * bwht * ageday * payer
115	provider * bwht * ageday * payer * race
116	provider * bwht * ageday * sex
117	provider * bwht * ageday * sex * race
118	provider * bwht * ageday * sex * payer
119	provider * bwht * ageday * sex * payer * race
120	provider * bwht * ageday * age
121	provider * bwht * ageday * age * race
122	provider * bwht * ageday * age * payer
123	provider * bwht * ageday * age * payer * race
124	provider * bwht * ageday * age * sex
125	provider * bwht * ageday * age * sex * race
126	provider * bwht * ageday * age * sex * payer
127	provider * bwht * ageday * age * sex * payer * race

0 and 64 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
64 – provides rates for providers within your state
72 – provides rates for age groups within these providers

5. In CONTROL_PDI.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_PDI.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 PDTEXTP2" statement.

8.5 Program 6: Run PDSASA2

The PDSASA2 program calculates the observed or raw rates for the area-level Pediatric Quality Indicators, using the data derived in a previous step (PDSAS1). These observed rates are stratified by

combinations of area, sex, age, and race categories. The program first totals the seven Area indicator flags created by the PDSAS1 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 PDSAS1. This is a discharge-level file that contains inpatient records with input variables, stratifiers, and the six new flag indicators for the PDI 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 PDFMT program.

Output:

1. SAS dataset with summary records that contain observed rates (OAPDxx variables where xx refers to the indicator number), the counts of outcomes that formed the numerators of the rates (TAPDxx variables), and the residential population totals that formed the denominators of the observed rates (PAPDxx 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 "Changes" 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 OAPDxx observed rates, the TAPDxx counts of outcomes that formed the numerators of the rates, and the PAPDxx 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 OAPDxx observed rates, the TAPDxx counts of outcomes that formed the numerators of the rates, and the PAPDxx 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_PDI.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_PDI.SAS code.

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

3. In CONTROL_PDI.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 PDSAS1 program.

4. In CONTROL_PDI.SAS, specify the path (including the file name) for the ASCII population text file in the "FILENAME POPFILA2" statement. The file POP95TO06.TXT is currently provided along with the PDI module software. The user should set POPYEAR to the year that best matches the user’s discharge data file.

5. In CONTROL_PDI.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 inTable 7. The default values of 0 and 8 will provide an overall total and area-level totals.

   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 PDSAS1 program.

Table 7. PDSASA2 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_PDI.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_PDI.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 PDTEXTA2” statement.

9.0 Reviewing the Printed Output.

This section contains tips for reviewing some of the printed output from the PDI 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. .

The final output of the PDI module is a PROC PRINT from PDSASP2 (for Provider-level Indicators) and PDSASA2 (for Area-level Indicators). All interim printouts are for checking and trouble-shooting. .

9.1 PDSAS1

The initial printout from the PDSAS1 program contains **PROC MEANS** output for all of the numeric variables (including the comorbidity indicators) in the output discharge-level dataset. It will contain information for the newly constructed TAPDxx and TPPDxx flag variables that will later form the numerators for the indicator rates. For each TAPDxx and TPPDxx 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 five Area Indicators (TAPD21-TAPD27), the MEAN, MINIMUM and MAXIMUM will usually be one since the flag variables have either been set to missing ('.') or to a value of one. The Provider Indicators (TPPD01-TPPD20,) will have a value of one, zero, or missing ('.'). For these indicators, a value of zero was assigned to the TPPDxx 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. For example, TPPD20 = 1 indicates a patient who had an obstetric trauma from a Cesarean section, while TPPD20 = 0 identifies a patient who had a C-section but no trauma complication.
- For the Provider Indicators, the MEANs will contain a close approximation of the eventual overall observed indicator rates. The values will change slightly after PDSASP2 has applied additional parts of the indicator definitions.
- N lists the number of observations in the dataset with non-missing values. For the seven Area Indicators, N for TAPDxx will be the same as the SUM. For the Provider Indicators, N will contain the denominator for the observed indicator rate.

The PDSAS1 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 PDSASP2

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 6) 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 PDSASP2 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 OPPDxx rates, the PPPDxx denominators, and the TPPDxx 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 5 in "Changes" under the PDSASP2 program on page 26). In this case, _TYPE_ always assumes the value of 64, since only the provider-level records are selected.

- The N statistic for _TYPE_ contains the number of records in the output summary data set. A TPPDxx 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 PPPDxx 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 TPPD01-TPPD13 numerators will 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 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 TPPDxx and PPPDxx 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_PDI.SAS program is set to 1, the subsequent **PROC PRINT** output contains a complete dump of the output summary file. Listed for each record are the stratification values, the PPPDxx population denominators for the 13 indicators, the TPPDxx outcome numerators for the 13 indicators and the 13 OPPDxx observed rates.

*The **PROC PRINT** at the end of this program provides your **final output**. (This printout appears if the "PRINT" parameter in the CONTROL_PDI.SAS program is set to 1.)*

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 PDI number.

Table 8. 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 = 64).
HOSPID	Identifier for each provider in the dataset.
BWHTCAT	Birth weight stratification category - See Table 6 for TYPELVLP settings.
AGEDCAT	Age in Days stratification category - See Table 6 for TYPELVLP settings.
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.
TPPDxx	Number of cases in the numerator.
PPPDxx	Number of cases in the denominator (population at risk).
OPPDxx	Observed (raw) rate - Numerator divided by Denominator.

Data will appear under the column headers, BWHTCAT, AGEDCAT, AGECAT, SEXCAT, PAYCAT, and RACECAT, if you specify these levels of aggregation (shown in Table 6).

.

9.3 PDSASA2

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.

- The printout from the PDSASA2 program contains **PROC MEANS** for all of the numeric variables in the output summary dataset. It will contain information for the newly constructed OAPDxx rates, the PAPDxx denominators, and the TAPDxx 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 "Changes" under the PDSASA2 program on page 26). 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 TAPDxx 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 TAPDxx 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 TAPDxx and PAPDxx 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_PDI.SAS program is set to 1, the subsequent **PROC PRINT** output contains a complete dump of the output summary file. Listed for each record are the stratification values, the PAPDxx population denominators for the seven indicators, the TAPDxx outcome numerators for the seven indicators, and the seven OAPDxx observed rates.

Table 9. 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.
AGECAT	Age stratification category - See Table 7 for TYPELVLA settings.
SEXCAT	Gender stratification category - See Table 7 for TYPELVLA settings.
PAYCAT	Payer stratification category - See Table 7 for TYPELVLA settings.
RACECAT	Race stratification category - See Table 7 for TYPELVLA settings.
TAPDxx	Number of cases in the numerator.
PAPDxx	Number of cases in the denominator (population at risk).
OAPDxx	Observed (raw) rate - Numerator divided by Denominator.

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 rates by 100,000 to express them as a rate per 100,000 population (e.g., 0.000039 * 100,000 = 3.9 technical difficulties with procedure per 100,000 population).

10.0 User Support and Information

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

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

AHRQ also offer 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.