AHRQ Quality Indicators Software Instructions, CloudQI (PSI and PQE) Windows® Application v2024

Prepared for:

Agency for Healthcare Research and Quality
U.S. Department of Health and Human Services
5600 Fishers Ln
Rockville, MD 20857
https://qualityindicators.ahrq.gov/

Contract No. 75Q80119C00008

July 2024

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Executive Summary

The Agency for Healthcare Research and Quality (AHRQ) Quality Indicators (QIs) were developed specifically to meet the short-term needs for information on healthcare quality using standardized, user-friendly methods and existing sources of administrative data. The AHRQ QI program is unique in that it provides free, publicly available software tools that allow users to calculate the AHRQ QI rates based on their own administrative data using a standard desktop computer. Each version of the QIs is released with software in two different platforms: a SAS®[1] application and Microsoft Windows® applications. The SAS QI software was first released in the late 1990s. It consists of several modules of SAS code and requires a SAS license to run.

The Windows-based software was expanded in 2024 to include a new version named CloudQI, first released as a beta software in 2023. CloudQI is released in addition to WinQI, which was first released in 2005. The Windows-based software was created to provide an easy-to-use, low-cost option for calculating the QIs that is not dependent on licensed software. WinQI is developed on Microsoft® Visual Studio using C# and .NET. WinQI runs on the Windows operating system and requires only freely available software components: AHRQ-produced software, Microsoft .NET (for runtime environment and core software libraries), and Microsoft SQL Server® Express (for data storage and manipulation). Table 1 lists the differences between SAS QI v2024 and WinQI v2024. CloudQI also uses Microsoft .NET (for runtime environment and core software libraries) but no Microsoft SQL Server® Express is needed to install it. Both the SAS QI v2024 and Windows v2024 software (WinQI and CloudQI) are available as 64-bit applications. These 64-bit applications are targeted for Windows 8 up to Windows 11 operating systems.

All versions of the QI software are updated on an annual basis to reflect changes in the AHRQ QI *Technical Specifications*. New software versions and updated technical specifications are released simultaneously. Routine annual updates include changes based on the *International Classification of Diseases, 10th Revision, Clinical Modification* (ICD-10-CM), Medicare Severity Diagnosis-Related Groups (MS-DRGs), and Major Diagnostic Categories (MDCs); new U.S. Census population files; and newly derived risk adjustment parameters.

The AHRQ QIs are organized around five collections (modules) of indicators: Prevention Quality Indicators (PQIs), Inpatient Quality Indicators (IQIs), Patient Safety Indicators (PSIs), Pediatric Quality Indicators (PDIs), and Prevention Quality Indicators in Emergency Department Settings (PQEs).

Detailed specifications for each indicator, with complete listings of diagnosis and procedure code definitions, are contained in the AHRQ QI Technical Specifications, available at

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[1]SAS® is a statistical software package distributed by the SAS Institute Inc. SAS and all other SAS Institute Inc., product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA. The company may be contacted directly regarding the licensing of its products. The SAS Institute Inc., has no affiliation with AHRQ or involvement in the development of the AHRQ QIs. For more information, visit the SAS Institute website at http://www.sas.com.

https://qualityindicators.ahrq.gov/. Each module also includes additional documentation on the risk adjustment models and national benchmark estimates of numerators, denominators, and observed rates for each indicator. Additional documentation on the empirical methods used to create and calculate each indicator is also available. Appendix D contains links to these documents and additional documentation on the AHRQ QIs.

Table 1. Differences Between SAS QI v2024 and WinQI v2024

SAS QI v2024	WinQI v2024
Requires licensed SAS software.	Requires free downloadable software.
User can modify the software.	User is unable to modify the software.
Data load and error checking are at the discretion of the user.	Includes data load and error-checking functions.
User must run a set of programs for each module, and all indicators in a module are displayed in output.	Four modules of indicators (IQI, PSI, PDI, PQI) may be (but are not required to be) calculated in a single program, user can select which indicators to output.
Area-level indicator denominators are adjusted based on the combination of county, age, gender, and race in the numerator (adjustments are generally small [<0.01% in absolute terms]).	Area-level indicator denominators are not adjusted.
Area-level reports in SAS QI drop the discharges from the numerator count that have missing or incorrect patient county codes.	Area-level reports in WinQI include the discharges in the numerator count that have missing or incorrect patient county codes.
Hospital-level reports in SAS QI drop the discharges from the numerator count that have missing or incorrect hospital IDs.	Hospital-level reports in WinQI include the discharges in the numerator count that have missing or incorrect hospital IDs.

Integration of PSI and PQE modules into a single platform, CloudQI:

In v2023, AHRQ introduced an updated edition of its Windows software, CloudQI PSI [Beta]. Alongside this release, a new module named PQE was released as a standalone software, named v2023 ED PQI [Beta]. Both software products were built on AHRQ's latest technology platform, CloudQI, positioned as the future platform of AHRQ QI windows software tools. In v2024, the two beta software products (CloudQI PSI and ED PQI) mentioned above are now integrated as a unified product named v2024 CloudQI software. In its initial phase, this integrated software product encompasses two modules, PSI and PQE, with plans to integrate additional AHRQ QI modules such as IQI, PQI, and PDI in subsequent phases.

The CloudQI platform has been developed to overcome the limitations of its predecessor, the WinQI tool. The inclusion of "Cloud" in its nomenclature indicates that the software can be installed within an internal or public secured cloud, enabling remote access and distributed usage through a web browser. Additionally, akin to WinQI, CloudQI can also be installed on a desktop for single-user access.

The novel architecture of CloudQI provides automatic updates of future versions without requiring complete reinstallation. This stands in contrast to WinQI, where users must first uninstall and then install new or prior versions based on their needs. Such flexibility is a

significant enhancement in the new tool, allowing users to switch between versions seamlessly from within the software itself. Overall, the CloudQI software offers superior versatility compared to WinQI. The table below compares WinQI and CloudQI.

Table 2. WinQI and CloudQI Comparison

WinQI v2024	CloudQI v2024
The software incorporates four modules of indicators – IQI, PDI, PSI, and PQI	The software incorporates two modules of indicators – PSI and PQE
The software requires reinstallation for updating with any new or prior version of WinQI.	Data version updates (fiscal year updates) can be easily downloaded from within the CloudQI application itself. No separate installation is required for these updates. For more detailed information on the CloudQI installation process, please refer to CloudQI installation in Section 1.1.
The software requires the Microsoft SQL server database to be installed and managed, which makes installation cumbersome and complicated.	The installation process is simple. There is no need for database installation.
The software can only be installed on a desktop for a single user.	The software can be installed on an internal or public secured cloud as a hosted application, which in turn allows users to access it remotely through a web browser. Like WinQI, CloudQI can also be installed on a desktop for single-user access.
The software can only be accessed on a desktop running Microsoft Windows operating system.	The software installed on a local cloud (server) can be accessed remotely via a browser on a desktop running any operating system, such as Microsoft Windows or MacOS.
During the crosswalk step of the import process, users can choose to exclude rows for certain blank data fields, such as Race and Discharge Disposition. This exclusion will affect the denominator of the data set. As a result, the denominator count may differ between WinQI and CloudQI.	During the crosswalk step of the import process, users **cannot** exclude rows for the blank data fields, such as Race and Discharge Disposition. However, users can mark these blank fields as missing.
Hospital Reports' stratification options are: Age Category, Five-year age group, Sex, Year, Quarter, Hospital ID, Payer, and Race, Birth weight, Pediatric age category, Pediatric age in days category, Risk category, and custom columns available in the input file and mapped to the QI variables.	Stratification options are limited to Hospital ID, Age Category, Sex, Payer, and Race, in alignment with the SAS QI software.

WinQI v2024	CloudQI v2024
PSI 17 rates are calculated with the PSI module.	PSI 17 rates are not calculated because CloudQI doesn't currently include pediatric quality indicators.
Program Option configuration screens include Database, Logging, Performance, and Other.	Limited Program Option configurations are available. These include "Logging" and "Others".
Users can update the software for fiscal year version (FY version) releases, requiring a re-installation of the software.	Users have the convenience of updating the software for future fiscal year (FY) version releases without the need for re-installation. For version upgrade notifications, the machine with the installed application must be connected to the internet; otherwise, these notifications will be disabled. In such cases, users can download the latest version from the AHRQ QI website and reinstall the software.
Users are unable to switch between versions.	Users can switch between versions. See Section 7.2.9.
A notification icon for FY version updates is unavailable.	A notification icon for FY version updates is available. See Section 7.2.8.

Acknowledgments

The AHRQ QI v2024 software program uses the Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID) for 2019-2021 and State Emergency Department Databases (SEDD) for 2021 to compile reference (general or standard) population data, develop the AHRQ QIs, and create risk adjustment models with parameter estimates based on national estimates that can be used at the local level, and to establish national benchmarks. HCUP is a family of healthcare databases and related software tools and products developed through a Federal-state-industry partnership and sponsored by AHRQ. HCUP databases bring together the data collection efforts of state data organizations, hospital associations, private data organizations, and the Federal Government to create a national information resource of encounter-level healthcare data. HCUP databases comprise the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services; medical practice patterns; access to healthcare programs; and outcomes of treatments at the national, state, and local market levels. In total, the HCUP SID encompasses 97 percent of all annual discharges in the United States.

The AHRQ QI program would like to acknowledge the HCUP partner organizations participating in the HCUP SID and SEDD: **Alaska** Department of Health**, Arizona** Department of Health Services, **Arkansas** Department of Health, **California** Department of Health Care Access and Information, **Colorado** Hospital Association, **Connecticut** Hospital Association, **Delaware** Division of Public Health, **District of Columbia** Hospital Association, **Florida** Agency for Health Care Administration, **Georgia** Hospital Association, **Hawaii** Laulima Data Alliance , **Hawaii** University of Hawaii at Hilo, **Illinois** Department of Public Health, **Indiana** Hospital Association, **Iowa** Hospital Association, **Kansas** Hospital Association, **Kentucky** Cabinet for Health and Family Services, **Louisiana** Department of Health , **Maine** Health Data Organization, **Maryland** Health Services Cost Review Commission, **Massachusetts** Center for Health Information and Analysis, **Michigan** Health & Hospital Association, **Minnesota** Hospital Association, **Mississippi** State Department of Health, **Missouri** Hospital Industry Data Institute, **Montana** Hospital Association, **Nebraska** Hospital Association, **Nevada** Center for Health Information Analysis, **New Hampshire** Department of Health & Human Services, **New Jersey** Department of Health, **New Mexico** Department of Health, **New York** State Department of Health, **North Carolina** Department of Health and Human Services, **North Dakota** (data provided by the Minnesota Hospital Association), **Ohio** Hospital Association, **Oklahoma** State Department of Health, **Oregon** Apprise Health Insights**, Pennsylvania** Health Care Cost Containment Council, **Rhode Island** Department of Health, **South Carolina** Revenue and Fiscal Affairs Office, **South Dakota** Association of Healthcare Organizations, **Tennessee** Hospital Association, **Texas** Department of State Health Services, **Utah** Department of Health, **Vermont** Association of Hospitals and Health Systems, **Virginia** Health Information, **Washington** State Department of Health, **West Virginia** Department of Health and Human Resources, **Wisconsin** Department of Health Services, and **Wyoming** Hospital Association.

For more information on HCUP, visit http://www.hcup-us.ahrq.gov.

1. Installation

1.1. Before You Begin

You will need Administrator permission to install the software. If you don't have administrator permissions, you may need information technology (IT) support when installing the software. You will need to download the latest CloudQI installer. Please check your system to ensure it meets the minimum requirements (see next section).

The CloudQI architecture allows you to run CloudQI software v2024 on a browser, such as Internet Explorer (IE), Google Chrome, Firefox, etc. This enables users to access CloudQI software not only on machines running MS Windows operating systems (OS), but also Apple Mac OS. For users to access the CloudQI software on a Mac machine, the software must be installed on a server and ports opened for users to access the application using a URL on a browser. Detailed instructions appear below (Section 1.3).

1.2. Hardware and software requirements

> **The CloudQI software has been tested on the following configuration:**

- 64-bit Microsoft Windows 8, 10, and 11

- .NET Core 7

- Internet Browser, (e.g., Google Chrome [recommended]), Firefox, Edge)
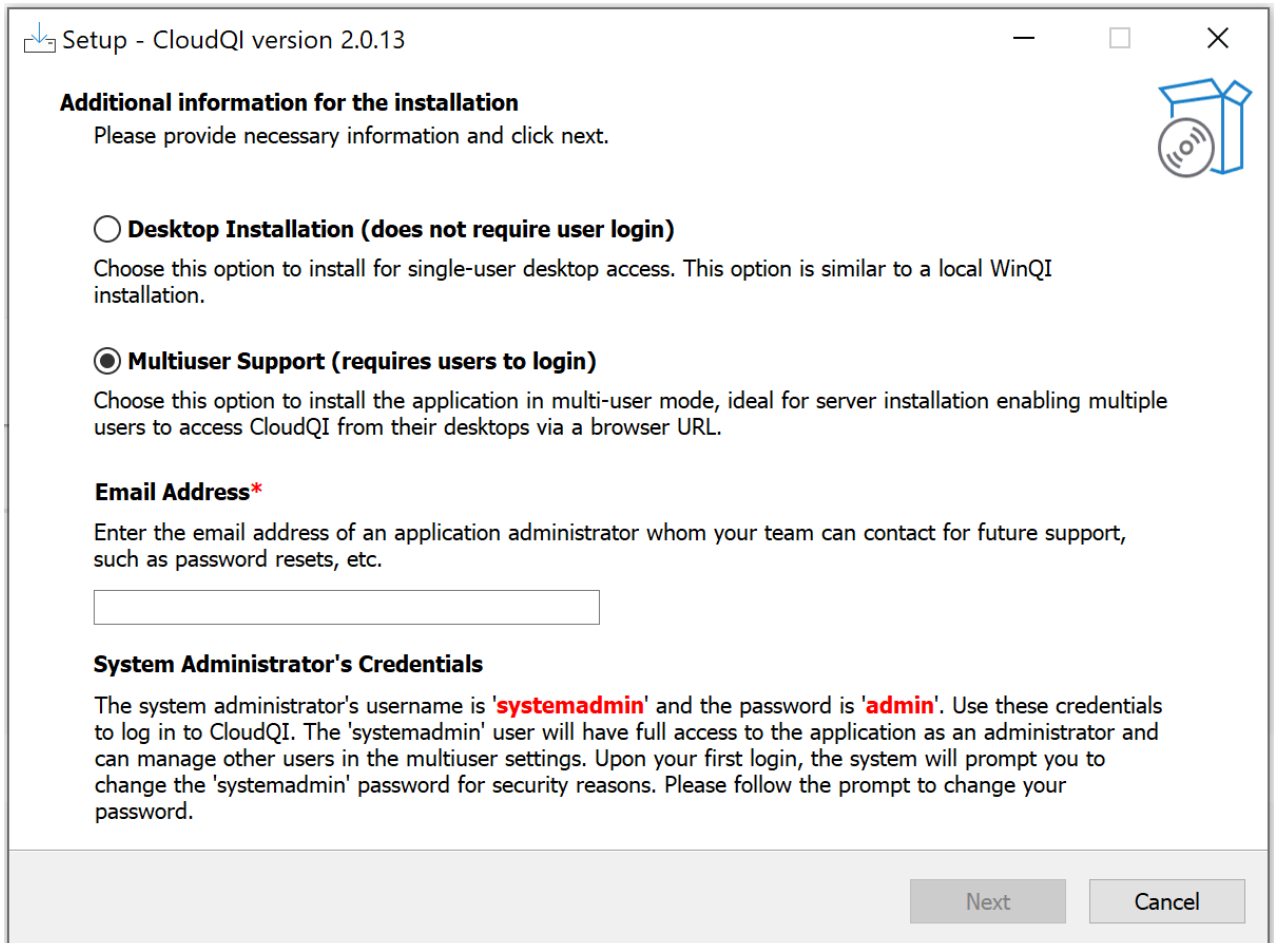
> **Approximate disk space requirements:**

- Microsoft .NET Framework v4.6.1: 115 MB

  – CloudQI Application: 110 MB

  – CloudQI data: 100 MB is typical, but it can go up to 10 GB, depending on the number of discharge records you wish to process and how many input files you may have stored in the software. If you need to free up space on your machine, consider deleting some previously uploaded files from the following folder:
  C:\Users\[username]\AppData\Roaming\AHRQ\CloudQI\UploadFiles

1.3. Installation process

Starting with v2024, the CloudQI software can be installed in one of the two modes as shown in Screenshot 1:

Screenshot 1: Installation Options

Desktop Installation (does not require login): CloudQI is installed on a desktop using the installer. This will function similarly to the WinQI application installed on your desktop.

Multiuser Support (requires login): CloudQI is installed on a server. This option requires you to log in with your credentials that are managed by your application administrator. It provides multiple concurrent users the ability to access the application remotely via a desktop browser. This requires setup by a server administrators. See Section 1.3.2.

1.3.1. Desktop Installation

The installation for CloudQI is a simple two-step process:

To Install:

Step 1: Download the CloudQI Installer from the AHRQ QI website.

Step 2: Extract the downloaded installer and double-click the setup file – "setup.exe". You may choose where you want to install CloudQI. The default installation location is "*C:\Program Files (x86)\CloudQI*"

Note: this does **NOT** require you to uninstall any previous versions of WinQI you may have installed on your machine. CloudQI can be installed and run in parallel to WinQI on your desktop.

After installation, launch the application:

Once installed, there are two ways to access the application:

1. Option 1: Double click the CloudQI icon on your desktop or via the Start menu on your computer.
2. Option 2: Go to "C:\Program Files (x86)\CloudQI\1.0" and double-click on "cloudqi.exe" (file type: application).

This will open the application on your default browser, such as Google Chrome, Firefox, or IE.

If the browser does not launch by itself, you can also open a browser (preferably Google Chrome) and go to the following URL: http://localhost:5001. This will load CloudQI on your browser.

1.3.2. Multiuser Support

This installation process is similar to the desktop installation described in [Section 1.3.1](#) above. However, when multiuser support is selected, the installation is done on a server as a hosted application. It is recommended that you reach out to your server administrators for assistance. This setup allows you to access the application on your desktop (MS Windows or Apple macOS) through a browser by using a specific URL. You will need to log in with the credentials provided by your administrator. In this mode, the software operates in a distributed environment, requiring you to log in so it can identify you and keep your work separate from other users. This setup ensures that your work, such as file imports and reports, will not be overwritten by another user, enabling you to work independently. This is a significant step towards making this application a fully distributed system.

When installing in Multiuser mode, the installer will prompt the administrator to provide their email address. Users in your organization will use this email address to contact the administrator for future support, such as password resets. This email address will be displayed on the screen for users requiring support. Administrators installing the application should note the default username ("systemadmin") and password ("admin") for the initial login. Upon logging in, the system will require the administrator to reset the "systemadmin" password. For security reasons, it is highly recommended to change the password immediately.

To ensure successful access, it is crucial that your server administrators open port 5001 to enable you to reach the URL from your desktop. Collaborate with your administrators to have

the application installed on a Windows server. Your administrator can choose a different port after installing the software, such as port 80 or 443 (standard ports). This is done by opening the appsettings.js from this location: C:\Program Files (x86)\CloudQI with a notepad in an admin mode. Once open, change the following parameter (replace the URL text in bold with your URL and port number) and save the file.

"CloudQIUrls": "**http://*:5001**", //separate by semicolon

These are the URLs that the CloudQI app listens to for requests. "**http://*:5001** indicates that the app will listen to all available addresses (*) at port 5001. You can also use http://*:5001;http://*:5002. This implies that the app will listen to all addresses at port 5001 and 5002.

You must restart the CloudQI application for the new URL and port number to take effect.

Before making the changes, it is important to verify that the new port number is not already in use.

After Installation, accessing the application remotely:

Once installed, your administrator will provide you the URL of this application, which will look something like this – http://[IP or Domain]:5001/. You will need to use a browser, preferably Google Chrome, to access the CloudQI application.

2. Background

Each module of the AHRQ QIs includes quality of care measures that highlight potential quality concerns, identify areas that need further study and investigation, and/or track changes over time. 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 AHRQ QI software is intended to be used with data that cover an entire patient population (e.g., all discharges from a hospital in a year and/or emergency department treat-and-release data) or that were sampled from a patient population using a simple random sample. The software does not support weighted QI estimates or standard errors for weighted estimates. Thus, analyses using data obtained from a complex sampling design will not produce accurate estimates for the population from which the data were sampled. The residential population data for the area-level utilization indicators are from the U.S. Census Bureau (see *2023 Population File for Use with AHRQ Quality Indicators*).

The CloudQI software generates observed, expected, risk-adjusted, and smoothed rates across the PSI and PQE modules for most indicators. Observed rates are the raw rates, which are the count of discharge records including the health outcome of interest divided by the count of discharge records in the patient population at risk. Expected and risk-adjusted rates both acknowledge that individual hospitals (or areas of the country) are unique and differ in two important ways from the representative profile observed in the reference population. First, most individual hospitals serve patients with a distribution of covariates (demographics and comorbidities) that differ from the reference population. Some hospitals serve populations that are at higher risk for adverse events, and some serve populations that are at lower risk. Thus, this is a dimension that makes it difficult to make meaningful comparisons of observed rates. Second, heterogeneity exists in the quality of care that is provided. Some hospitals and areas provide exemplary care. Others provide a lower standard of care. This is also an important dimension of differences. The expected and risk-adjusted rates each peg one of these two dimensions (quality of care or patient mix) to that observed in the reference population and then comment on the second dimension, as observed in the local data.

The expected rate answers the question, "What rate of adverse events would we expect to see if this hospital (or area) provided the average level of care observed in the reference population, but provided it to patients with the locally observed distribution of characteristics?" (i.e., average performance from the reference population of the universe of patients applied to a locally observed mix of patients with their local risk profiles). When the observed rate is smaller than the expected rate (or the observed/expected ratio is <1), then there is reason to think that the hospital (or area) is performing better than average on this indicator.

The risk-adjusted rate answers the converse question, "What rate of adverse events would we see in this hospital (or area) if they provided the locally observed quality of care to patients whose distribution of characteristics matched those in the reference population?" (i.e., locally observed performance on a representative mix of patients from the reference population). Risk-adjusted rates

are useful in comparisons between hospitals or areas. They are evaluated on an identical mix of patients, so they attempt to remove the confounding influence of patient mix (different profiles of risk that are not related to care) from the comparison.

The smoothed rate is a weighted average of the reference population rate and the locally observed (hospital or area) rate. If the data from the individual hospital or area include many observations and provide a numerically stable estimate of the rate, then the smoothed rate will be very close to the risk-adjusted rate, and it will not be heavily influenced by the reference population rate. Conversely, the smoothed rate will be closer to the reference population rate if the hospital or area rate is based on a small number of observations, and it may not be numerically stable, especially from year to year.

The software also calculates 95 percent intervals for some of the rates (confidence intervals in the case of risk-adjusted rates, probability intervals for composite and smoothed rates). These intervals can be used to test whether the computed rate is statistically different from a reference value. If the reference value is greater than the upper bound of the interval, then the computed rate is statistically lower than the reference value. If the reference value is less than the lower bound of the interval, then the computed value is statistically higher than the reference value. If the reference value falls between the lower and upper bounds, then there is no statistical difference between the computed rate and the reference value. For a more thorough explanation of risk-adjusted and smoothed rates, please see the technical documentation on the [AHRQ QI website](#).

2.1. Patient Safety Indicators (PSI) Background

The Patient Safety Indicators (PSI) module contains indicators that reflect the quality of care inside hospitals.

The Patient Safety Indicators (PSIs) provide information on potentially avoidable safety events that represent opportunities for improvement in the delivery of care. More specifically, they focus on potential in-hospital complications and adverse events following surgeries, procedures, and childbirth. The PSIs can be used to help hospitals assess the incidence of adverse events and in-hospital complications and identify issues that might need further study.

The module includes 17 hospital-level PSIs (plus one composite) 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 shortcomings in the quality of care. These indicators are measured as rates: the number of complications/adverse events divided by the number of admissions for the procedure or condition. The hospital-level indicators include only those cases in which a secondary diagnosis code flags a potentially preventable complication.

Eight of these indicators are for surgical discharges, eight are for either medical or surgical discharges, and three are for obstetric discharges. Six of the hospital-level PSIs (PSI 03 Pressure

Ulcer Rate, PSI 09 Perioperative Hemorrhage or Hematoma Rate, PSI 10 Postoperative Acute Kidney Injury Requiring Dialysis Rate, PSI 11 Postoperative Respiratory Failure Rate, PSI 12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate, and PSI 14 Postoperative Wound Dehiscence Rate) 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 were available. Admission type is used by four of the PSIs (PSI 10, PSI 11, PSI 13 Postoperative Sepsis Rate, and PSI 17 Birth Trauma Rate – Injury to Neonate) to identify elective surgeries and newborn admissions. PSI 17 is calculated by the PDI module in SAS QI because it is based on pediatric discharges. In WinQI, it is calculated with the PSI module. CloudQI does not calculate PSI 17.

Note that PSI 02 Death Rate in Low-Mortality Diagnosis-Related Groups is reported as a single hospital-level measure (observed and risk-adjusted). A single measure is necessary to ensure adequate reliability of the hospital-level rates by pooling an infrequent event over a large group of patients. However, the denominator for the indicator is very heterogeneous, and the mortality rate among the low mortality MS-DRGs varies by MS-DRG type. Users should compare the observed rate to the risk-adjusted rate, which accounts for differences among hospitals in patient case-mix (i.e., age, sex, MS-DRG, and comorbidities). For example, a hospital may have a high PSI 02 observed rate only because the hospital has a higher-than-average share of adult medical MS-DRGs.

The software does not report expected rates, risk-adjusted rates, and smoothed rates for the following indicators: PSI 17; PSI 18 Obstetric Trauma Rate–Vaginal Delivery With Instrument; and PSI 19 Obstetric Trauma Rate–Vaginal Delivery Without Instrument. These measures are not risk-adjusted, so only the numerators, denominators, and observed rates are reported. CloudQI v2024 stratifies PSI 04 Death Rate among Surgical Inpatients with Serious Treatable Complications by the five treatable complications contained in the overall indicator: deep vein thrombosis/pulmonary embolism, pneumonia, sepsis, shock/cardiac arrest, and gastrointestinal hemorrhage/acute ulcer. CloudQI v2024 does not report smoothed rates for the strata; all other results reported for the overall indicator are also reported for the strata. The strata results may not equal the sum of the overall results because the strata are not mutually exclusive.

2.2. Prevention Quality Indicators in Emergency Department (PQE) Background

The Prevention Quality Indicators in Emergency Department Settings (PQE) module, a newly added module of the AHRQ QIs, are measures of visits to the emergency department (ED) (treat and release ED visits and inpatient admissions through the ED) that may be associated with a lack of access to quality care in other settings. They may reflect availability of community health resources (e.g., medical care, dental care), disease burden or both. It should be noted that the PQEs do NOT reflect the quality of care provided in the ED.

The PQE module consists of five indicators:

- PQE 01 Visits for Non-Traumatic Dental Conditions in ED
- PQE 02 Visits for Chronic Ambulatory Care Sensitive Conditions in ED
- PQE 03 Visits for Acute Ambulatory Care Sensitive Conditions in ED
- PQE 04 Visits for Asthma in ED
- PQE 05 Visits for Back Pain in ED.

The numerators for four out of five PQEs (PQE 01, PQE 02, PQE 04, and PQE 05) consist of both ED visits resulting in inpatient admission and those resulting in discharge from the emergency room. Both are included because both are measures of ED use that could be avoided by access to quality health care. The numerator for PQE 03 excludes inpatient stays even when they begin in the ED. This exclusion means that the measure excludes the most severely acute cases, for which delay in seeking care to avoid the ED may harm the patient.

Unlike other PQEs, which are defined based on a single ED visit, PQE 05, Visits for Back Pain, includes only patients with two or more back pain visits in a year. A single back encounter, which may involve severe pain or immobilization may require treatment in the ED, but subsequent visits may be avoided by correct initial diagnosis or high-quality ambulatory care. The numerator of the back pain measure requires two visits for back pain within a twelve-month period. Therefore, the measure can only be calculated when multiple visits and the time between visits for a single person can be identified. The reference population for this measure includes only states that provide data that permits linkage between visits.

PQE 01, PQE 03, and PQE 04 include pediatric visits. PQE 01 and PQE 04 both include visits for patients ages five years and older. PQE 03 includes visits for patients ages three months and older. All PQEs also include visits for adult patients.

Like other area-level indicators, the PQE indicators are adjusted for age and sex. An additional, optional adjustment for the local poverty rate may also be selected. Rates smoothed by reliability adjustment are also available.

The data required for measuring these indicators come from hospital inpatient and outpatient ED records (administrative data), which are readily available within hospitals or from many state data organizations. The AHRQ QI software is intended to be used with data that cover an entire patient population (e.g., all inpatient and outpatient ED records from a hospital in a year) or that were sampled from a patient population using a simple random sample. The residential population data used to construct denominators for the area-level utilization indicators are from the U.S. Census Bureau (see *2023 Population File for Use with AHRQ Quality Indicators*).

3. Overview of the CloudQI Software

This section describes the AHRQ QI Windows® CloudQI Software Version v2024, a free tool that allows users to run AHRQ QI analyses with data that they provide. Anyone who has access to administrative inpatient and outpatient data can run this software to compute rates for PSI and PQE indicators.

3.1. Reference populations

When applicable, the software calculates risk-adjusted and expected rates using a reference population that is an aggregation of inpatient and outpatient data from all states participating in the HCUP SID for 2019-2021 and SEDD for 2021. For additional information on HCUP SID and SEDD, see AHRQ's HCUP website (https://www.ahrq.gov/research/data/hcup/index.html). For states included in the reference population, see the Empirical Methods document.

Regression coefficients from the reference population are applied to the individual cases in the risk adjustment process. These reference population file regression coefficients are provided as part of the CloudQI v2024 software. The risk-adjusted rates for the hospital-level indicators will then reflect the age, sex, condition/severity, and comorbidity distribution in the reference population rather than the distribution for the hospitals in the user's data. Similarly, the risk-adjusted rates for the area-level indicators will reflect the age and sex distribution in the reference population rather than the distribution for the areas in the user's data. This approach will allow risk-adjusted rates produced by various users to be compared directly to the reference population. The regression coefficients were derived from the HCUP SEDD and, for area-level indicators, U.S. Census data. The code to generate these reference population coefficients is not part of the CloudQI software.

3.2. Data included

The CloudQI software does not include data for any individual hospitals or groups of hospitals.

The only QI rates included in the software are for the reference population (see Section 3.1). You cannot use this software unless you provide your own administrative discharge data to analyze. The data requirements and specifications (for both inpatient and emergency department settings) are outlined in Appendix A.

In addition to the reference population rates, the software includes risk adjustment coefficients and model parameters (e.g., signal variance estimates) based on a statistical analysis of the reference population. These data are populated in the application during installation and generally cannot be modified (an exception to this is the composite weights that you can modify before generating a composite report, as described in Section 12.4.2.3).

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3.3. Benchmarks

Having calculated an observed rate for an indicator, the obvious next question is, "How do these rates compare to others?" Users typically want comparisons with other hospitals or a national rate. However, neither of these is generally appropriate given that hospitals vary in the patients they treat. For example, it would not be fair to compare mortality rates from a hospital that specializes in high-risk cases to an "average" hospital, nor would it be reasonable to compare a hospital that serves a largely elderly population with one that serves a more balanced area. An appropriate benchmark for a hospital is necessarily specific to the demographics and the types of cases it receives.

For most purposes, the most useful check is to compare the observed rate with the expected rate calculated from the same group of cases calculated by the CloudQI software (see Section 14.3).

For hospital-level indicators included in PSI, the expected rate takes into account the age, sex, comorbidities, severity of illness, and other characteristics of the actual patients at risk for each outcome. For area-level indicators included in PQE, the expected rate takes into account the mix of age and sex in each area. The CloudQI software provides an option to risk adjust based on poverty demographics in a given area along with age and sex for the Prevention Quality Indicators in Emergency Department (PQEs). The risk-adjusted rate calculated by the software is the observed rate divided by the expected rate times the reference population rate.[1] The risk-adjusted rate is the rate that would be expected if the specific group of "at-risk" patients in a service area or hospital received the "average" expected treatment.[2]

3.4. Using the CloudQI Software for Analysis

The CloudQI software provides built-in tools to assist users in analyzing the rates that are produced.

3.4.1. Reviewing individual cases

The CloudQI software includes tools to review the individual cases that are selected for each indicator. Once you have loaded your data and generated indicators for specific modules, select the module you would like to analyze and click <**Create Patient Report**> (see Section 10.2.5) on the **Home** screen under the **Create Reports** section of the screen. Then select the desired indicator on the **Patient-Level Report** screen. This tool can be useful for selecting cases for chart review and further study.

Click on the row number of an individual case or the "View Case Details" link to get more information about that case. The **Case Details** screen traces an indicator for a single case, showing why each case was or was not included, excluded, or flagged (including which Medicare Severity

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[1] The reference population rate is used in the calculation of the risk-adjusted rate only when creating a report   stratified by county or hospital or when no stratification is used. Otherwise, the risk-adjusted rate is equal to the   observed-expected ratio.
[2] See the Empirical Methods report (https://qualityindicators.ahrq.gov/measures/qi_resources).

Diagnosis-Related Group or *International Classification of Diseases, 10th Revision, Clinical Modification* codes contributed to this assignment).

You may also drill down on the **Observed Numerator** or **Observed Denominator** values from the **Hospital-Level** or **Area-Level Report summary** screen to review corresponding individual cases for the specific indicator and selected stratifiers.

3.4.2. Stratification

You may examine QI rates by subgroup using the **Report Wizard** to generate reports that are stratified according to a particular data element. Stratification allows you to divide the discharges into groups by attributes, such as age or sex, and view the observed, expected, and risk-adjusted rates for each group. This tool helps to identify whether there are differences in quality of care for different groups and can be used to identify areas and opportunities for quality improvement.

3.5. Other documentation

The QIs are separated into five modules: Patient Safety Indicators (PSIs), Inpatient Quality Indicators (IQIs), Prevention Quality Indicators (PQIs), Pediatric Quality Indicators (PDIs), and Prevention Quality Indicators in Emergency Department (PQEs). Each module is documented separately in technical specifications documents that provide detailed definitions of specific QI inclusion and exclusion criteria. The technical specifications provide specific diagnoses, other criteria that are used to construct the denominator and numerator from discharge records, and the logical conditions under which records would be excluded.

Other documents to help users of the AHRQ QI software are available on AHRQ's website. These documents include the SAS® syntax and SAS QI software instructions, as well as a list of the coding changes made for each fiscal year by module (see the Change Logs and Release Notes for details on CloudQI and SAS QI v2024). For additional details on SAS QI please see the SAS QI Software Instructions Document.

3.6. CloudQI Flowchart

The following flowchart provides a high-level overview of the possible processing steps the CloudQI software supports.

Figure 1. CloudQI Flowchart
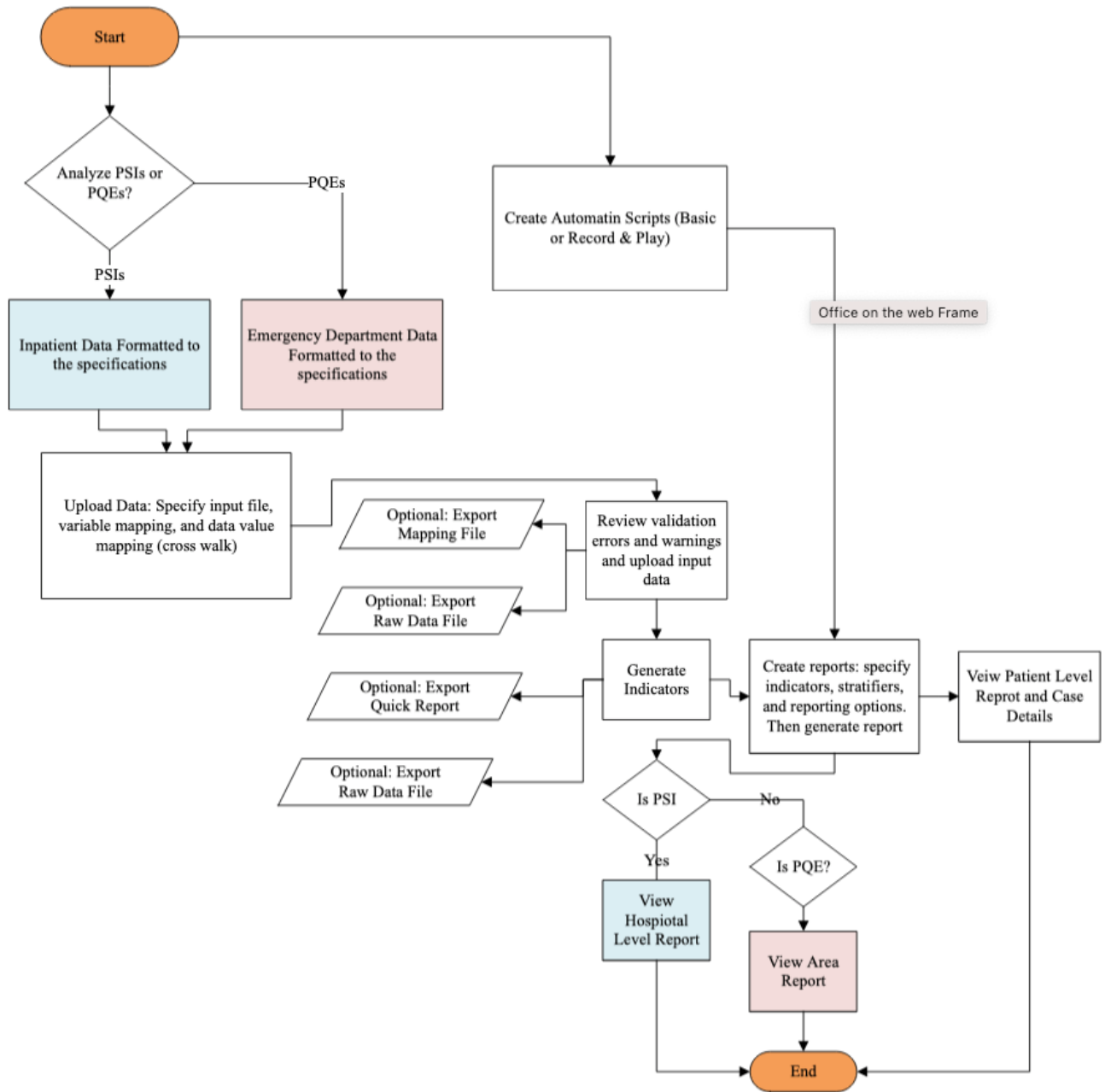
4. Getting Started

4.1. Using CloudQI

4.1.1. How do I start the CloudQI software?

For Windows 8 and above, click on your computer's <**Start**> button and type "CloudQI" to find the installed software on your computer. Once you see the "CloudQI" App icon, click on it to launch the application. The software will open in a browser.

4.1.2. How do I use this instruction manual?

The main part of this manual is organized into the sections shown in Figure 2.

Figure 2. Data Flow Diagram for How to Use This Manual

Most of these sections provide screenshots of each processing step for each software function. The discussion of the capabilities for each screen includes answers to the following questions: (1) What is this screen for? (2) How is this screen organized? and (3) What should I do here? Time-saving tips and other questions may also be included in the discussion.

5. CloudQI Intelligent Installer
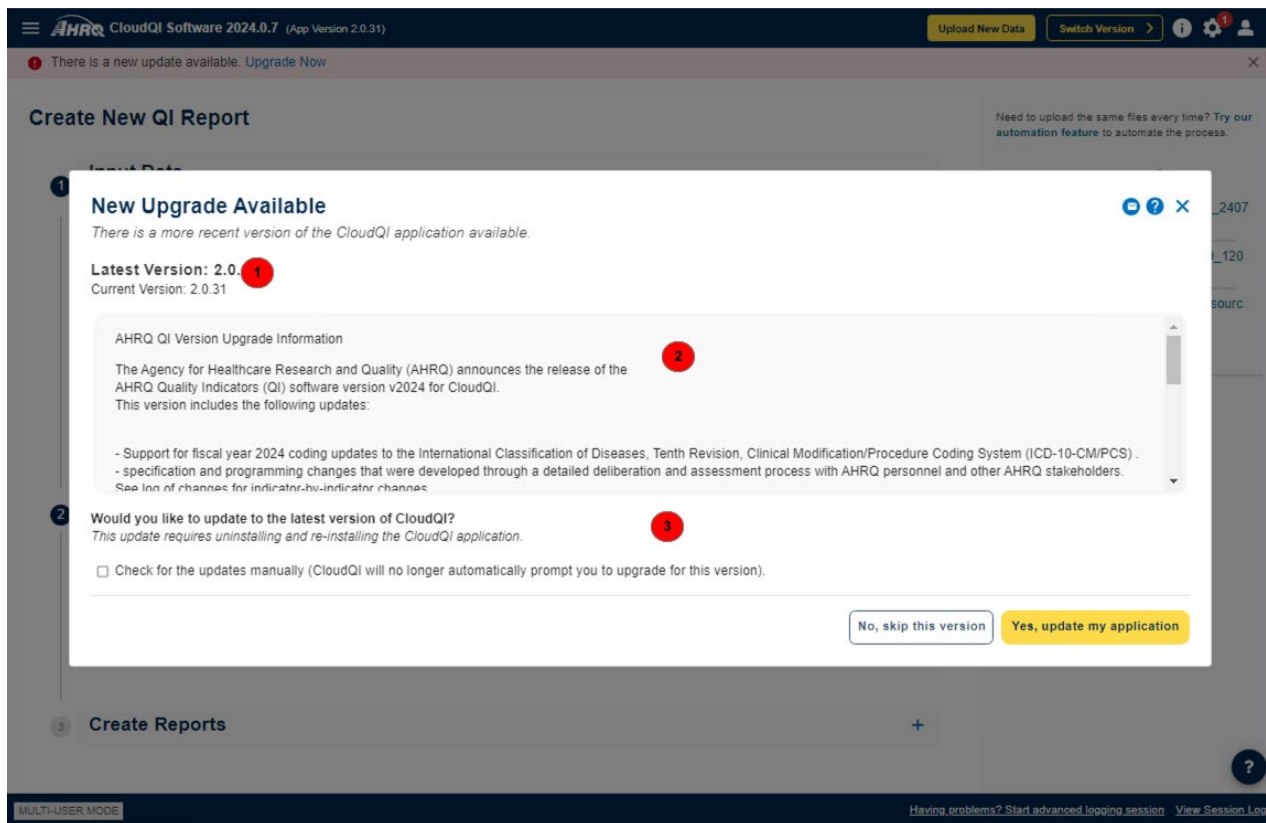
5.1. What is this screen for?

This particular feature is for users who have a CloudQI version of the application already installed. It is essential to have an internet connection for this feature to function properly. If a higher version of CloudQI than the one you are currently using is available, the software will notify you about the existence of the newer version. It will display the features offered in the latest version and inquire whether you would like to upgrade your software at that point. Should you choose to proceed with the upgrade, the software will handle the update process for you. However, if you already have the most recent version installed and no further updates are available, the software will direct you to the home screen. Note, the setup of this screen (pictured below) closely resembles that of WinQI.

CloudQI automatically searches for updates and notifies you when a new version becomes available. There are two distinct types of updates offered in CloudQI:

1. **Application version update:** This process entails updating the software instance installed on your computer. These updates may include the addition of new features, bug fixes, and other enhancements to the software. You will receive notifications regarding the availability of these updates, and it is recommended that you opt in for them. Upon choosing to update, the application will close and reinstall the software on your computer, ensuring that you have the latest version with all the improvements. This update process will retain all your previously uploaded data and exported reports making the upgrade process seamless for you.

2. **Data version updates:** These updates specifically pertain to fiscal year updates for the AHRQ QI software. An example of a data version update is transitioning from v2023 to a more recent version. To incorporate these updates, you will simply download and switch to the desired fiscal year's version from within the application. Once you have downloaded a version, the software will allow you to switch to that newly downloaded version.

Screenshot 2: New Version Notification Screen

5.2. How is this screen organized?

5.2.1. Latest version

This section shows what version of the software you have and what is the latest version on the website.

5.2.2. Release notes

This section informs you of the high-level features included in the latest release so you can make an informed decision about whether you should upgrade sooner rather than later.

5.2.3. Would you like to upgrade to the latest version?

In this section, the software first informs you that when upgrading from your current version to the latest version. Your data and reports from the prior version will be retained for future use. It then asks you if you would like to upgrade now. If you answer in the affirmative, the software will start the upgrade process. You may continue or cancel the upgrade. If you decide not to upgrade, the software goes to the **Welcome** screen. Once upgraded, the software will re-launch the latest version.

5.2.4. Check for upgrades manually

By checking this checkbox, you turn off the software feature that automatically checks for upgrades each time you launch the software. Even if you turn off the automatic check, you may still subsequently check for upgrades by selecting the **Check for Upgrades** option under the **Menu** or in the left-hand side.

5.3. What should I do here?

If a newer version of the software is available, read the features of the newest release and determine whether or not it will be helpful to upgrade now. In general, we recommend that you install the latest version of the software because certain technical issues may also have been resolved in the newer version. This will install the latest CloudQI that incorporates the two modules, PSI and PQE.

6. CloudQI Login Screen

6.1. What is this screen for?

Starting with v2024, the CloudQI application adds capabilities to be installed as a multi-user application on your servers, while still allowing desktop installations as an option.

Multi-User Mode

When the application is installed on a server in multi-user mode, this screen will appear. In this mode, multiple users can access CloudQI via a browser running on the server. Here's what you need to do:

1. Login: Enter your credentials to log in. This identifies you as a unique user.

2. Independent User Experience: Your configuration and data in CloudQI are independent and will not be affected by changes made by other users concurrently accessing the application.

Refer to Screenshot 3 to view the login screen in multi-user mode.

Desktop Mode

If the application is installed in desktop mode, you will not see the login screen and will be taken directly to the home screen.

Screenshot 3: Login Screen (Multi-User Mode Only)
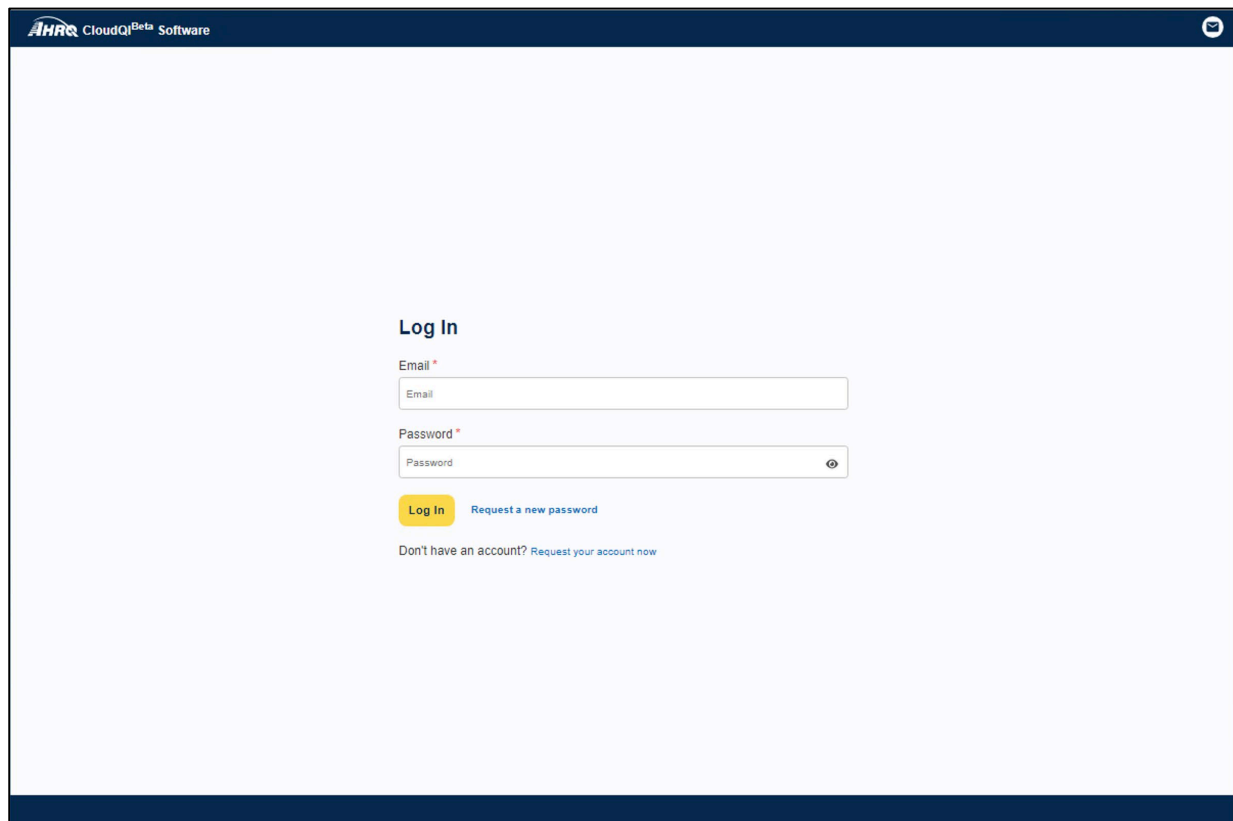
After the software has been launched and in a multi-user mode, you will be presented with this screen to enter your email address and the password that you have obtained from your administrator. After you log in, you will see the home screen for the application.

On this screen, you also have the option to reset your password, or request a new account. These requests will be received by your AHRQ QI software administrator. Please note that your administrator is not automatically notified. From this screen you can click on the email hyperlink displayed to notify your software administrator.

7. CloudQI Home Screen

7.1. What is this screen for?

This screen (Screenshot 4) shows the initial **Home** screen that you will see the first time you launch the application. You will also see this screen if you have launched it before but have not yet imported a data file. You must import a data file in order to perform any Quality Indicator (QI) analysis.

In version 2024, the PSI and PQE modules are integrated into a single CloudQI platform. The home screen has been updated to support both modules, with clear distinctions between them: PSI indicators utilize inpatient data types, while PQE indicators use emergency department data (this includes inpatient admissions from the ED and treat-and-release visits to the ED). These data types require different constructs and are separated on the home screen for clarity. If you are generating PSIs, you will use the inpatient data type; for PQEs, you will start by importing emergency department related data. Detailed data dictionaries for each data type are available in the Software Instructions Document (Appendix A).

Screenshot 4: Home Screen (Create New QI Report)
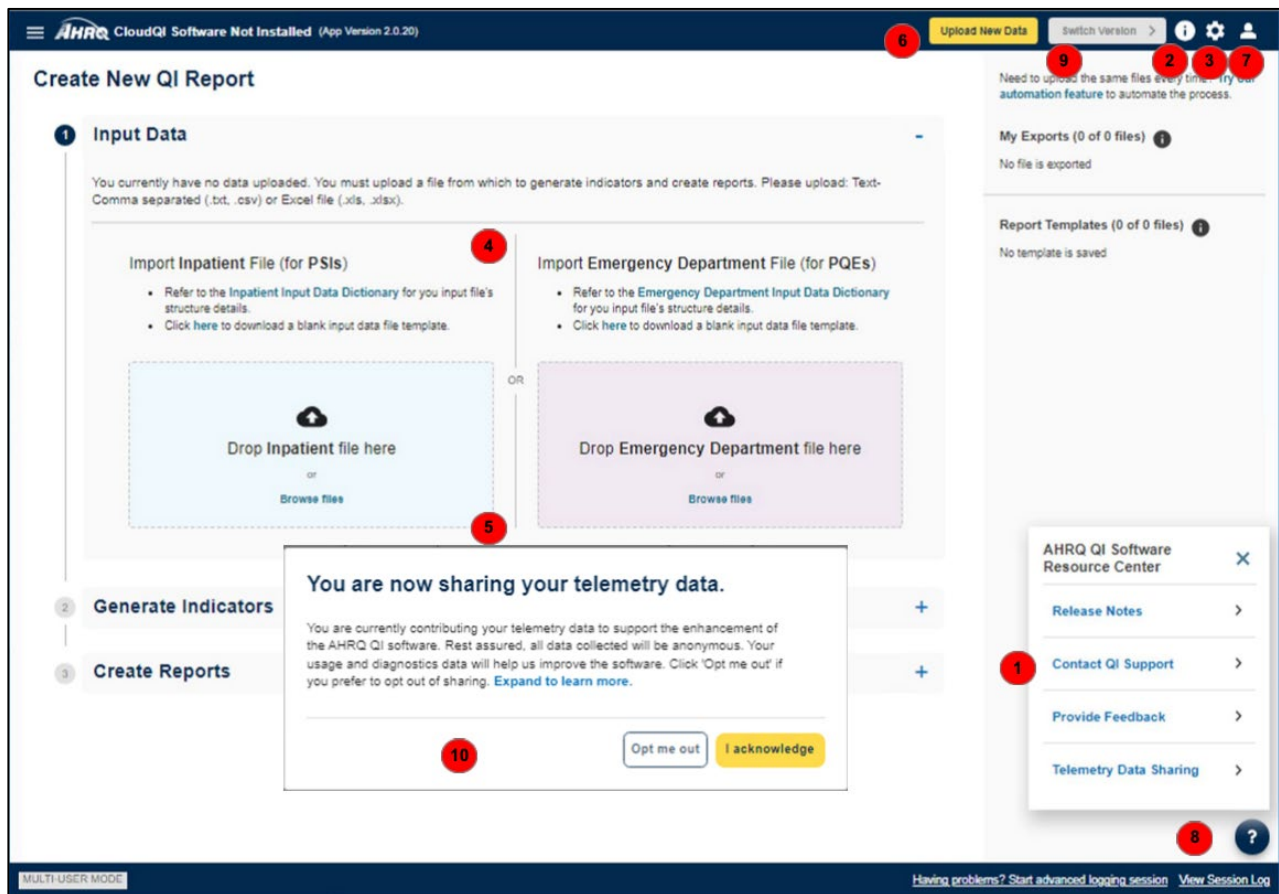
On this screen you will see that in version 2024 the CloudQI platform supports two data types. One type is inpatient data (for PSIs) and the second is emergency department related data (for PQEs). Users can use either data platform to analyze rates and results.

7.2. How is this screen organized?

7.2.1. Contact QI support

Clicking the mail icon will inform you how you can reach the AHRQ QIs support team for any questions or issues and what information you will need to send them. This icon is available on all of the screens of the CloudQI application.

7.2.2. Help

When you click the **Help** button, a window pops up and brings you to the **Help Guide**. This icon is available on all of the screens of the application and will bring up help specific to the screen or function you are on.

7.2.3. Settings

This icon will bring up a menu containing several helpful tools that are available to you throughout the application. Please see Section 13 for a description of the available tools.

7.2.4. Input Data

Since v2024 CloudQI integrates PSI and PQE modules, you can choose to upload your input data by Inpatient or Emergency Department data file types. Input inpatient data files to calculate PSI rates or Emergency Department related data files to calculate PQE rates. Clicking the link "Click here to download a blank input data file template" will allow you to download a blank input data file (.csv) to setup your data for PSI or PQE, depending on which data type you started with. Please refer to input data format in Appendix A.

7.2.5. Browse to Files

You have two options in the section to upload your file. Either drag and drop your file in the <**Drop file here**> section or click on the <**Browse files**> link to navigate to your file on your hard drive. Please upload only the following: comma-separated text (.txt, .csv).

7.2.6. Upload New Data

Clicking the <**Upload New Data**> button is another way to upload your data file. It will allow you to navigate to your file on your hard drive and upload.

7

7.2.7. My Account (only available in multi-user mode and not in the desktop mode)

In multi-user mode, this feature enables users to edit and view their profiles, access and switch between previously uploaded files, and, for system administrators, manage organizational users accessing CloudQI via a web browser. The details of these functions are outlined below.

7.2.7.1. Uploaded Files

This link will show once you have uploaded at least one input file in CloudQI. In version 2024, CloudQI retains a copy of your uploaded files and offers the option to switch to a previously uploaded file instead of requiring files to be re-uploaded. This feature will save you time when you need to use a file you've already uploaded.

Screenshot 5: View Uploaded Files

7.2.7.1.1.   What is this screen for?

The following information about your uploaded file is available for you on this screen:
- File Name
- Folder Name (Where the File is Saved)
- Date Uploaded
- Data Type (Inpatient or Emergency Department)

7.2.7.1.2.   What can I do on this screen?

Under the Action column, click the "Switch to This File" link to use it for analysis.

These files are saved in a folder –
C:\Users\[username]\AppData\Roaming\AHRQ\CloudQI\UploadFiles.

If you need to free up space on your machine, consider deleting some previously uploaded files from this folder.

In this section, you will see a list of the current uploaded files that you have in the system. There are three tabs available under 'My Account': Uploaded Files, User Management, and Your Profile.

Under the tab "Uploaded Files', you will see the file and folder names and the date the file was uploaded. You will see what type of data files have been uploaded (emergency department or inpatient related data), the data size, the current action, and user. Under 'Action', you can see which files are currently active, or you can switch to any uploaded file for processing and analyzing. By going back to the Home Page, you will see your newly selected data file.

7.2.7.2.   User Management

This allows administrator to manage users' access in their organization in the CloudQI software. This function will be enabled if the following conditions are both true:

1. The application is installed on a webserver as a hosted application in your environment with multi-user mode.
2. The logged in user has admin privileges in the CloudQI application

Screenshot 6: User Management
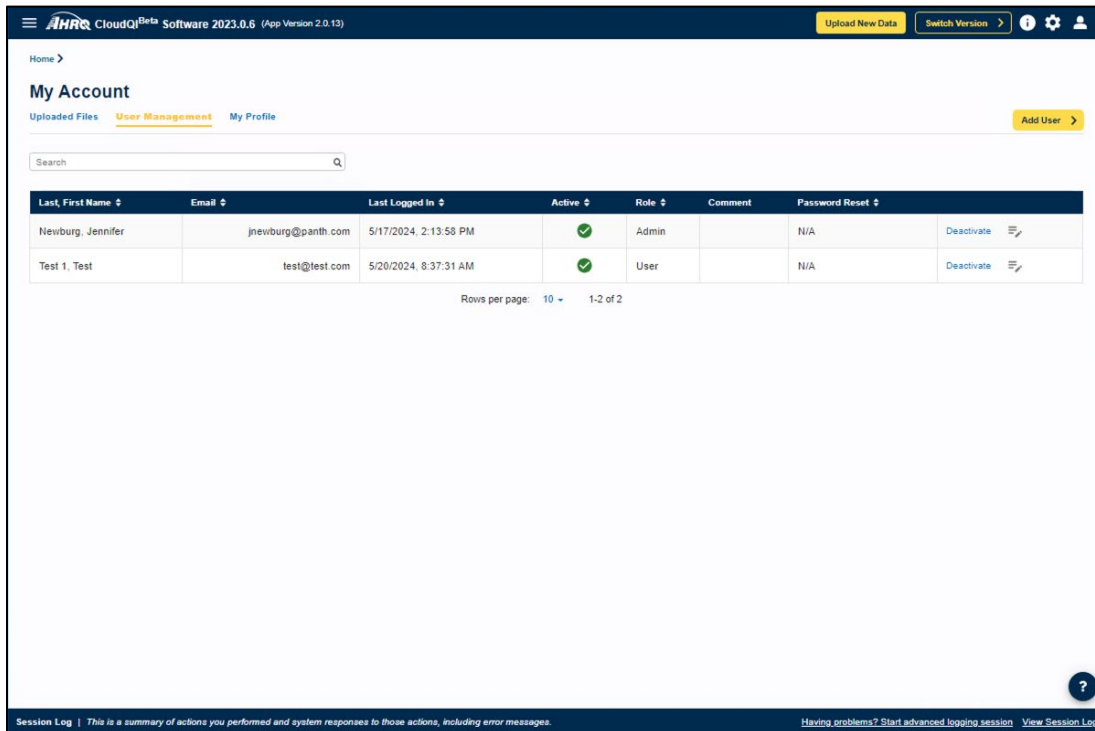
Under the tab "User Management", you will see a list of users that are in your organization who have access to the software. It will list their email address, role, last logged in date, and any comments. All headers can be sorted in ascending or descending order. Only an administrator may activate or deactivate a user, see if a password reset has been requested, and make any user profile edits that may be required.

7.2.7.3. My Profile

In multi-user mode, as a logged-in user you can update your profile information, including your password.

Screenshot 7: My Profile

On this screen, you can change your first and last name if necessary. From here, you can also reset your password by selecting "Reset Password."

8   **7.2.8. Information Center**

Starting in version 2024, a new feature called the "Information Center" has been added to CloudQI. This feature gives users access to several newly introduced functions. You can activate the "Information Center" by clicking the question icon at the bottom right corner of the screen. The popup box that appears will contain links to the following:

1. **Release Notes**: Access the latest release notes and the software instructions document.
2. **Contact QI Support**: View the QI support email address.
3. **Provide Feedback**: Submit your feedback directly within the application. You can choose from topics such as suggesting an improvement, leaving a comment, asking a question, reporting a bug, or others. Depending on your selection, a box will appear for you to enter and send your feedback. If you would like AHRQ QI support to contact you, you can provide your email address. If you prefer not to be contacted, your feedback will remain anonymous.
4. **Telemetry Information Sharing**: The application collects telemetry information (anonymous information on usage and diagnostics) to help AHRQ improve the AHRQ QI

software. You have the option to opt out of sharing your telemetry data. For more details, see Section 7.2.10.

To act on any of these features, click the carrot icon ">" next to each feature to expand the accordion and proceed.

7.2.9. Switch Version

Located at the top of the screen, you will find the <**Switch Version**> button. When clicked, a pop-up window will appear, displaying all available versions of the software you are currently using, ready for download. For instance, if you are currently using version 2023.0.1 but wish to obtain Version 2024, you can leverage this feature to acquire the desired version.

The data versions displayed on this screen depend on the input file type (Inpatient or Emergency Department) currently imported. For an Inpatient file, you will see PSI data versions, while for an Emergency Department related file, you will see PQE data versions. If a new version of the CloudQI software is available, switching to the new version is simple. Click on the <**Download**> link in the action column and watch that space for a status update as the file downloads. Once the process is complete, the original <**Download**> link will be replaced by a <**Switch to this Version**> button. By clicking on this button, your current version will be updated to the new version you have just downloaded. After clicking <**Finish**> in the bottom right corner of the window, the application process will be successfully completed, and your new software will be updated and ready for immediate use.

Screenshot 8: Switch Version
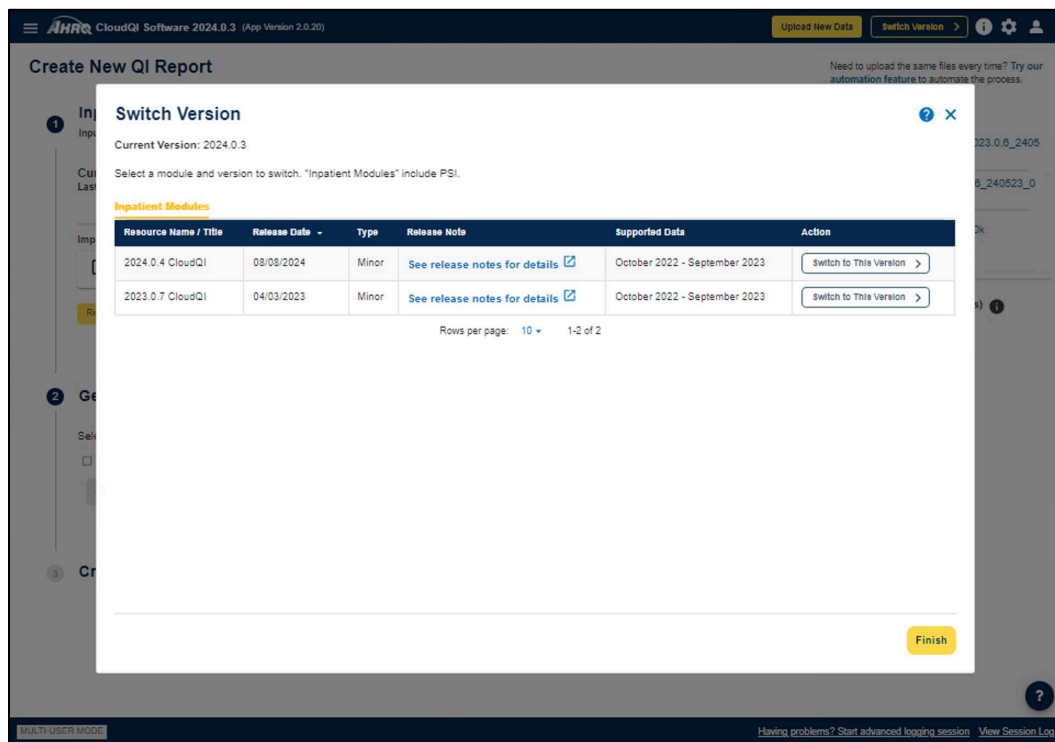
7.2.10.　　Telemetry Collection Notifications

Beginning v2024, CloudQI collects anonymous telemetry information on usage and diagnostics. When launching the application for the first time, you will be notified about the collection of telemetry data. Your action is required to continue using the application. By sharing your telemetry information, you will help AHRQ enhance the AHRQ QI software. All information collected will be anonymous. Usage and diagnostics data will assist AHRQ in improving the software. You may opt in and contribute to improving the user experience or you may toggle to opt out. By default, you are opted into sharing your usage and diagnostic data.

By opting in to share telemetry information with AHRQ, you agree to allow the collection of anonymous diagnostic and research information from the application. This information is used solely for improving the quality, performance, and security of our software and services. Information collected may include:

- Error Events: Information about any error events encountered while using our software, which helps us diagnose and address issues promptly.
- Usage Frequency: Data on the frequency of use of specific functions and reports within our software, aiding us in understanding user behavior and preferences.
- Data Volume and Processing Time: Details regarding the volume and size of data utilized, as well as the time taken to process it. This information assists us in assessing the performance of our software and optimizing its efficiency.

It is important to note that the telemetry information collected does not include any personally identifiable information (PII) or protected health information (PHI). Additionally, we do not collect any of the following data:

- Indicator Rates Generated from Input Data: We do not collect any indicator rates generated from your input data. Your proprietary data and analyses remain strictly confidential and are not transmitted to AHRQ.
- Case Level Information: We do not collect any case-level information, such as diagnoses, procedures, or other sensitive healthcare-related data.

Your participation in sharing telemetry data is voluntary, and you may opt out at any time through the software settings.

When accessing the application for the first time, it will prompt you to opt in or out of sharing your telemetry information. Click the <**Opt me out**> button to opt out. The <**I acknowledge**> button will keep the default settings and will share your telemetry information with AHRQ.

If you later decide to update your choice of whether to share telemetry information, you may access this feature by clicking on the <!> icon at the bottom right. This will open a popup allowing you to toggle between <**sharing**> and <**not sharing**> options. Once you select your option, click the <**Save**> button to save your changes. If you select not to share your data, the system will stop sharing telemetry information with AHRQ.

8. About Input Data

See Appendix A for a detailed description of the input data elements and coding conventions used by the Quality Indicators Windows® CloudQI software. This includes both inpatient data for PSIs and emergency department related data for PQEs.

8.1. Questions on input data

8.1.1. Where do I begin?

The first thing you need to do is obtain a file that contains the inpatient (hospital) and outpatient (ED) records you want to analyze. While Inpatient data files are used to analyze PSIs, PQEs use Outpatient treat-and-release data along with ED visits resulting in admissions. Once you have these files, run the CloudQI application. Start by entering the file path to locate the file on your computer and begin the **Import File** process. The graphical user interface will guide you through the steps to load data, generate indicators, create reports, and review cases.

8.1.2. What kind of input data can be used by the software?

The software uses readily available hospital inpatient and/or outpatient (ED) administrative data that provide demographics on the patient; diagnosis codes; and information about the admission or treat-and-release.

8.1.3. What format should the data be in?

Two formatting issues to keep in mind are that

> **The software accepts a common data format:**
>
> ◆ **Text (comma-separated)**
> ◆ **Excel**

- Each row of data should represent a separate inpatient or outpatient record, and
- Each column of data should represent a single variable for all discharges. There is a limit of 200 columns.

If the data file meets these requirements, the **Data Import Wizard** will assist users in transforming their data into the QI data format. See Appendix A for a definition of each field.

8.1.4. What is the easiest format to work with?

Use a comma-separated value format (.csv or CSV) or Excel (.xls, .xlsx) and use the variable names in the **Data Elements** table as column headers. For each *mapped* variable in the **Data Elements** table, use the numeric values listed. None of these suggestions are mandatory, but they will simplify data import.

Note that the CSV format can be problematic for international users who might use commas to denote the decimal place in numeric fields. The CloudQI software is not able to properly interpret commas used as decimal separators. Users are required to reformat their data so that decimal points (i.e., ".") are used as decimal separators.

8.1.5. What data must be included?

The CloudQI Input Data Dictionary (see Appendix A) contains tables for Inpatient and Emergency Department data types. These tables list the data that should be included for each record.

8.1.6. What if I don't have all the data?

It is not necessary to create "dummy data" to fill the columns or create missing data elements. See the comments in the **Data Elements** table in the software and on the **Data Mapping** screen in the **Data Import Wizard** to determine the consequences of leaving out any variable.

The CloudQI software, unlike WinQI, doesn't allow you to import additional data at this point.

8.1.7. My file does not have column headers. Do I need to put them in?

Column headers are not required for CSV files. The software **Data Import Wizard** allows you to map variables by name or by position. However, *including column headers is generally easier and less likely to result in error*. Though not required, we recommend that you include column headers in CSV files.

8.1.8. What are the different data types?

Numeric and string values must match the format specified.

Mapped variables have specific meanings according to the coding conventions in your organization, and they have specific meanings in the CloudQI application. For example, when using inpatient data types, disposition value "20" (DISP = 20) is used to indicate in-hospital deaths, while emergency department data types rely on the indicator DIED = 1 to identify patients who have died in the hospital.

> There are four types of data elements:
> ◆ **Numbers,**
> ◆ **Dates,**
> ◆ **Strings, and**
> ◆ **Mapped variables.**

Your data do not need to use the value "20" to mean "died," but in order for the CloudQI application to calculate mortality indicators, you will need to provide the translation in the **Crosswalk** screen.

8.1.9. What if I have commas in some of my data values?

Comma-separated value format files use commas to separate the data values. If you have commas within any data values, then you will need to put double quotes around each data element. When selecting your file, check the appropriate box to have the quotes recognized. And, as noted in Section 8.1.4, the CSV format can be problematic for international users who might use commas to denote the decimal place in numeric fields. The CloudQI software is not able to properly interpret commas used as decimal separators. Users are required to reformat their data so that decimal points (i.e., ".") are used as decimal separators.

8.1.10. Can I use tabs instead of commas as a delimiter?

Yes. You can switch the delimiter to **Tabs** on the **Program Options->Other** screen from the Settings menu.

9. Import Data File

This section walks you through the process for importing your data file into the Quality Indicators Windows® (CloudQI) software. As mentioned previously, a data file (containing administrative discharge data) must be imported into the database prior to performing any QI analysis. Regardless of whether you are importing Inpatient or Emergency Department data, the import steps are the same. An overview of the steps in the data import process is outlined below.

- **Specify input file**—Choose the appropriate file that you would like to import.
- **Input File Option**—Provide additional information about your data input file.
- **Check File Readability**—The application will check your data input file to ensure each row can be read.
- **Data Mapping**—Map the variables from your data input file to the corresponding Agency for Healthcare Research and Quality (AHRQ) Quality Indicator™ (QI) variables.
- **Mapping Quick Check**—Review the variables that have and have not been mapped to your data file.
- **Preparing for Crosswalk**—The application will process the values specified for crosswalk variables.
- **Crosswalks**—Review and confirm the crosswalk of the values in your input file to QI values for specific variables.
- **Data Errors**—The application will report data errors or warnings that need to be addressed.
- **Load Data**—Your data file will be loaded into the application, and a summary of the load process will be displayed. This is the last step in the process.

At any step in the import process, you may exit the process and return to the **Home** screen. This will result in all changes being discarded, and you will need to resume the import process from Step 1.

For additional information on the definition of input columns, compatible formats for your data, etc., refer to the Input Data Dictionary (see Appendix A).

9.1. Specify input file

9.1.1. What is this screen for?

The first step in importing an input file is to specify the file you want to upload and import.

9.1.2. How is this screen organized?

This screen (Screenshot 4) shows the **Home** screen if this is your first time using the software with the current version. Because you have not uploaded any data, the screen will display a message saying, "You currently have no data uploaded."

However, if a file has been uploaded in a previous session, you will see that file on this screen. Uploading a new file will override the previously uploaded file.

If at any time during the import process, you decide to edit and replace your data input file, you may press the <**Exit Wizard**> button in the upper right of your screen to return to the **Home** screen and begin the import process again. Any changes you have made before completing the process will not be saved.

9.1.3. What should I do here?

To upload your file, browse to and select the appropriate file to upload (Screenshot 5). Only one file can be uploaded at a time. Your file has to be in the CSV format. A blank input data file template can be downloaded from this screen by clicking the "Click here to download a blank input data file template" link.

- Text–Comma separated (.txt, .csv)
- Excel (.xls, .xlsx)

9.1.4. View All Uploaded Files

You can access previously uploaded files from the home screen by clicking on the "View All Uploaded Files" link.

Screenshot 9: View Uploaded Files
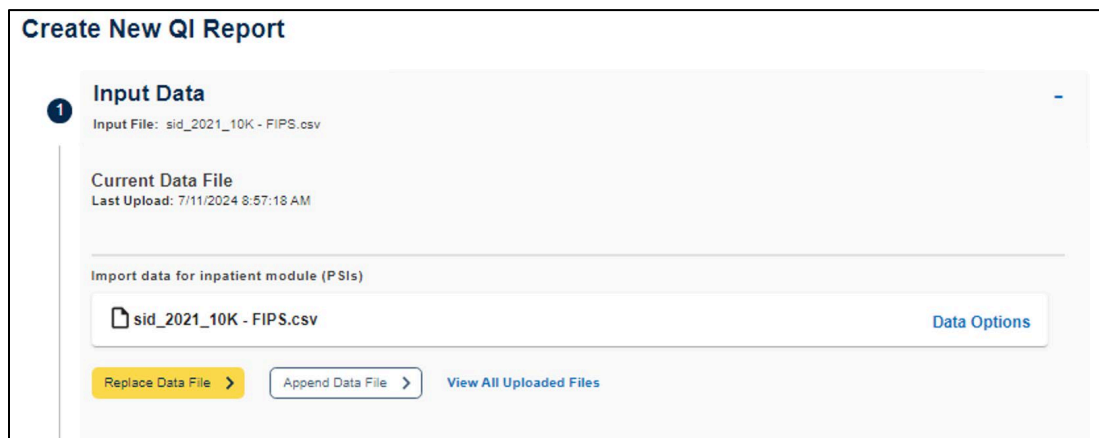
9.2. Input File Options

9.2.1. What is this screen for?

Use this screen (Screenshot 10) to provide information about your data format. You may also specify a mapping file on this screen. A mapping file describes the contents of your file to the application. See Section 9.2.2.2 for more information on mapping files.

Screenshot 10: Input File Options
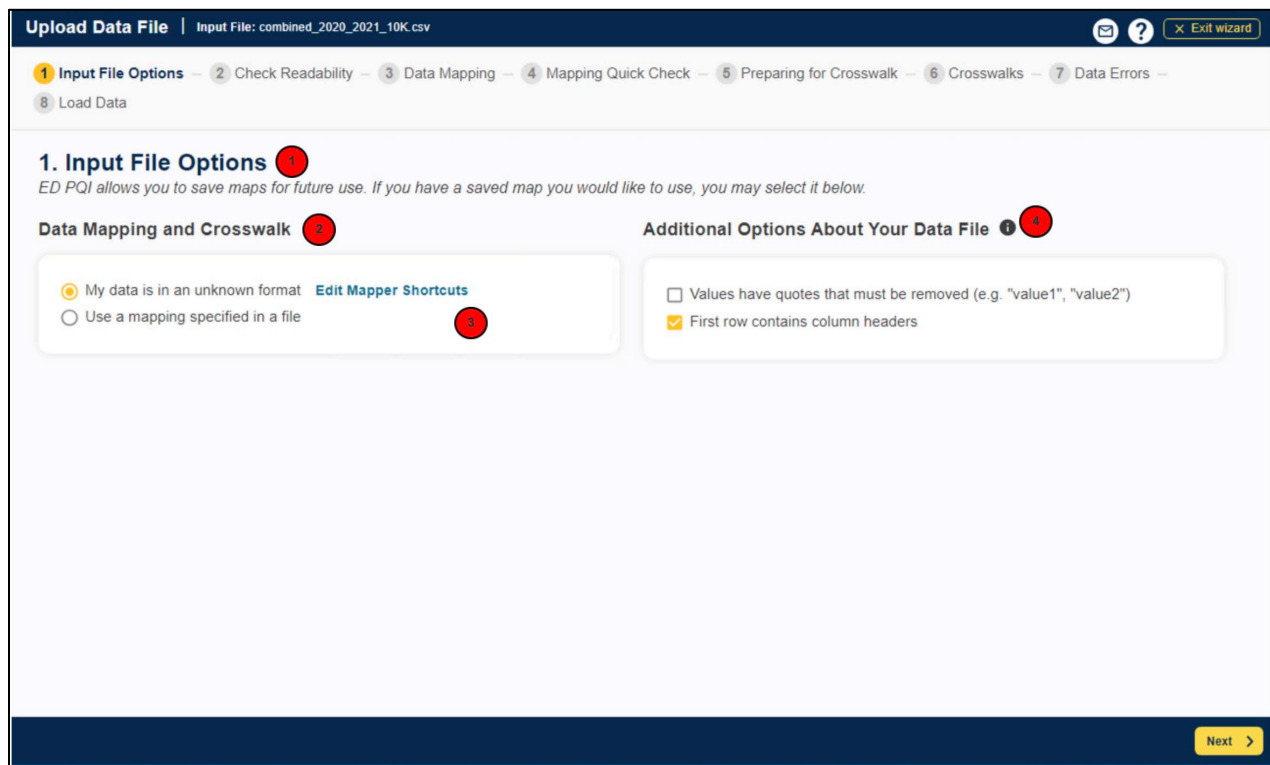
9.2.2. How is this screen organized?

9.2.2.1. Navigation

1 *Along the top of the screen from this step on, you will notice the sequence of steps in the import process. The step that is highlighted in purple will let you know where you are in the process at any given time.*

The screen is separated into three sections: "Data Mapping and Crosswalk," "Additional Options about Your Data File," each of which are described below.

9.2.2.2. Data Mapping and Crosswalk

2 In this section, you will specify whether you are using a mapping file (if so, which one) or whether you will be manually mapping via the wizard. The mapping file specifies the mapping of variables in your input file to QI variables. It also specifies mapping of the crosswalk variables and other attributes of your file. This is important for the CloudQI software to know how to process your data. The program will preselect the <**My data is an unknown format**> option by default. Once you have completed the import process and saved a mapping of your variables, you can reuse those specifications with other data files in future sessions. Using a saved mapping file enables you to save time on the import process.

There are two types of mapping files:

1. **By Position:** mapping files define columns based on the exact order of columns. The column headings of text files imported with positional mappings are ignored and may be excluded. An error message will be displayed if you attempt to use a **By Position** mapping file with an MDB data file or ACCDB file.

2. **By Name:** mapping files define columns based on name. Note: this option may only be used with files that have column names. These columns may be in any order. The program will not allow you to use a mapping file that is inappropriate for the type of file you have selected.

A saved mapping file may be used in two ways:

   a. You may bypass the **Check Readability**, **Data Mapping**, and **Crosswalks** screens. If you have saved a mapping file in a previous session and would like to use it for this import, select the indicator to the left of <**Use a mapping specified in a file**> to access that file. A <**Browse Files**> button will appear, which will then allow you to find and select the appropriate mapping file. Only Quality Indicators Mapping (.qim) files can be used here. If you are sure that you are uploading a valid mapping file that matches the data structure of your input file, you can check the <**Skip validation and mapping screens (Jump to Data Load)**> checkbox and then click the <**Next**> button to jump to the **Load Data** section of the process. It is recommended that you do not check the skip validation and mapping screen checkbox if you are importing for the first time.

   b. You may use a mapping file in which the specifications in the file (such as the variable mapping, crosswalk mapping, and other input specifications) do not perfectly match your input data specification. Make sure that the <**Skip validation and mapping screens (Jump to Data Load)**> checkbox is not checked. This option will allow you to make desired changes on subsequent screens.

If you are not using a saved mapping file, the software may still determine a default mapping if your column headers match the default column names specified in the Input Data Dictionary (see Appendix A). You can edit the default mapping by clicking the <**Edit Mapper Shortcuts>** button.

9.2.2.3. Data Mapper Shortcuts

9.2.2.3.1.   What is this screen for?

This screen (Screenshot 11), accessed by clicking the <**Edit Mapper Shortcuts**> button on the Input File Options: Data Mapping and Crosswalk screen, allows you to map variables in the Data Mapper Shortcuts screen. If you load similar files but do not use a mapping file, this can save effort in the Data Import Wizard.

Screenshot 11: Data Mapper Shortcuts
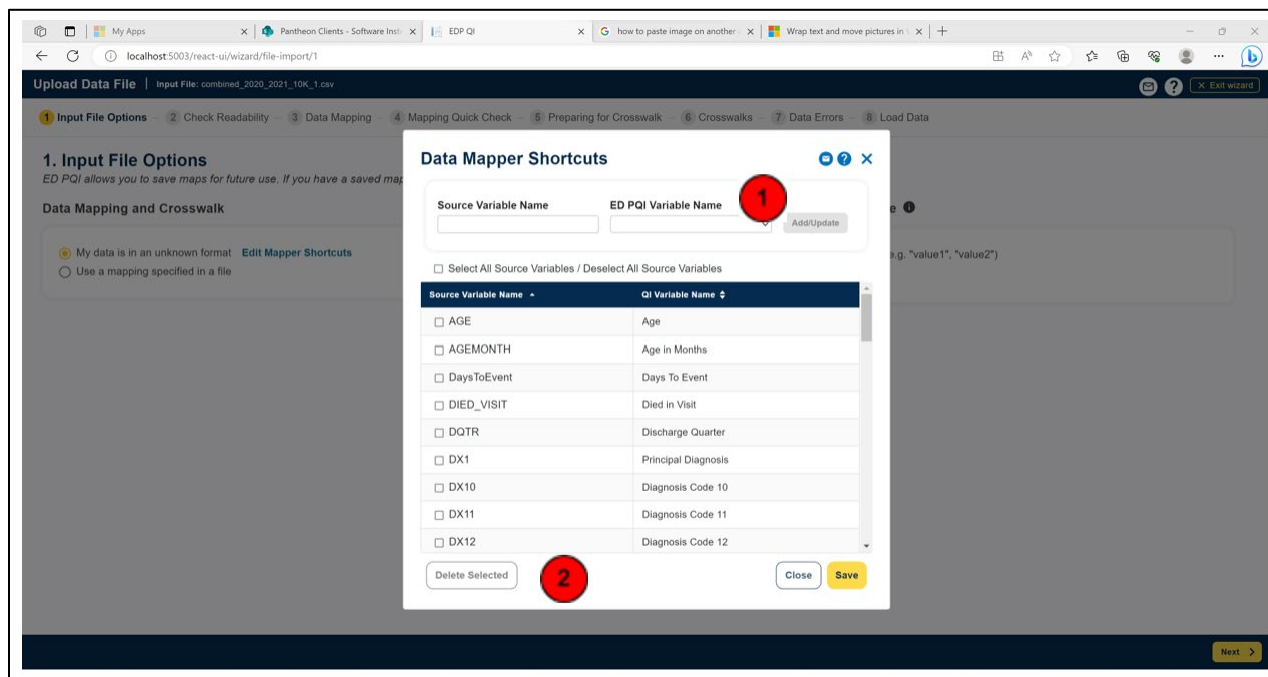
9.2.2.3.2.   How is this screen organized?

9.2.2.3.2.1.   Mapping controls

The controls used to create new matches include the Source Variable Name, the AHRQ QI Variable Name, and the <**Add/Update**> button.

9.2.2.3.2.2.   Mapped variables

The mapped variables are listed, along with checkboxes and a <**Delete Selected**> button to delete selected variables.

9.2.2.3.2.3.   What should I do here?

To delete the association between a source variable and a QI variable, click the checkbox next to the source variable and then click the <**Delete Selected**> button.

To create an association, type the variable name as it appears in the **Input Data** file into the **Source Variable Name** field, select an Indicator variable name from the drop-down menu, and then click the <**Add/Update**> button.

After all desired changes have been made, click the <**Save**> button at the bottom of the screen.

9.2.2.4.   Additional Options About Your Data File

This section, in Screenshot 10, allows you to provide additional details about your data file (such as the use of quotes or column headers). Click on the corresponding filters to indicate whether any

values in your input file have quotes that need to be removed or whether the first row in your file contains the column headers. We recommend that you include column headers in your first row. Doing so will simplify the processing of your file and will help reduce errors. If you have specified a mapping file, then the information in this section will be prepopulated from the mapping file.

9.2.3. What should I do here?

Select the information you would like to provide about your data file. If you have provided all the necessary information, click the <**Next**> button to continue to the **Check Readability** step.

9.3. Checking Readability

9.3.1. What is this screen for?

This screen (Screenshot 12) displays the application's progress as it scans your input data file to ensure that each row can be read. It is important to ensure that the file is in a readable format prior to performing any further processing.

Screenshot 12: Checking Readability
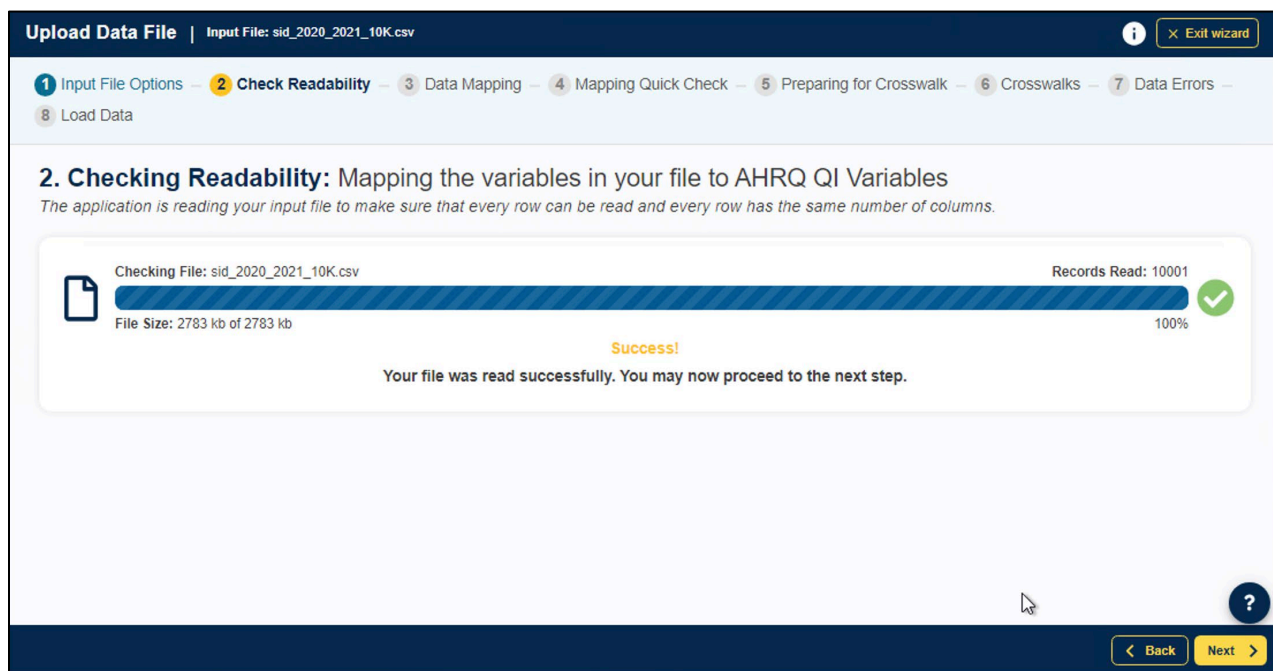
9.3.2. How Is This Screen Organized?

The screen displays a progress bar indicating the percentage of your input file that has been read by the application. You can also use the number of records read or the status to gauge completeness of the readability check. When the scan is complete, a message will appear stating that "Your file was read successfully. You may now proceed to the next step." and a green check mark will appear to the right of the progress bar.

9.3.3. What Should I Do Here?

Check to make sure that the correct data file has been specified and that the file has not become corrupted. Please note that an error in this step indicates a serious issue that is preventing the file from being read. If an error is found, click <**Exit Wizard**> to exit the process, review your file for issues, and then start the import process again.

Starting with version 2024, the readability check now verifies that the correct data type has been selected for the input file. If there is a mismatch, such as uploading a file with the Emergency Department file layout when analyzing PSIs, a warning message will appear, allowing you to choose the appropriate data file. Once the scan is complete and you have confirmed that no readability errors were found, click the <**Next**> button to continue to the **Data Mapping** step.

9.4. Data Mapping

9.4.1. What Is This Screen for?

This screen (Screenshot 13) allows you to map variables from your data input file to the CloudQI variables. This is important for the CloudQI software to know how to process your data. If you have uploaded a mapping file in the **Select File Options** portion of the process, the variables on this screen will be mapped accordingly. If the column names in your input file match the names of the input variables as specified in the Input Data Dictionary (see Appendix A), the auto-mapper will map the variables according to the column headers.

The mapping screen presented at this step will depend on the data type selected at the beginning of the import wizard. For example, Screenshot 13 below shows mapping for Emergency Department data to analyze PQEs. If you select the Inpatient Data Type for PSIs, the fields will adjust to align with the data dictionary in Appendix A. Regardless of the data type, the screen functions in the same way.

Screenshot 13: Data Mapping

9.4.2. How Is This Screen Organized?

The screen is divided into four sections: Your Data File, Missing Required AHRQ QI variables, Missing Recommended & Optional AHRQ QI Variables, and Live Sample of Your Input Data, each of which are described below.

9.4.2.1. Your Data File

This section lists the names of all variables found in your data file, along with the position of each variable (the column number) within each row. The view will default to show all variables (mapped and unmapped); however, you can change the view by clicking the filters to the right of the **Show** field Be sure to find all unmapped variables and map them to the appropriate QI variable. The **Search AHRQ QI Variables** field option allows you to search for a specific field by typing the first few letters of the variable into the text box. You can also sort the fields by column number, input variable name, or QI variable name. Note that your input data may contain variables that do not correspond to variables used by the CloudQI software.

9.4.2.2.   Missing Required AHRQ QI variables

② This section lists the names of any required QI variables that have not been mapped to one of your data input file variables. Required variables (see Appendix A for a listing of the names of all QI variables) must be mapped in order for you to continue through the import process. The required variables include the following:

Inpatient Data File

- Age
- Sex
- Discharge Year
- Discharge Quarter
- Principal Diagnosis

Emergency Department Data File

- Age
- Sex
- Discharge/Visit Year
- Patient State/County Code
- Resident (used in v2023, not required for v2024)
- In-hospital death (DIED_VISIT in v2023, DIED in v2024)
- First-listed diagnosis
- Evidence of ED services (HCUP_ED, v2024 only)

9.4.2.3.   Missing Recommended & Optional AHRQ QI Variables

This section shows the names of any missing recommended or optional QI variables that have not been mapped to one of your data input file variables.

Recommended variables (see Appendix A for a listing of the names of all QI variables) are not required to be mapped in order for you to move forward with the import process, but all of them are used in QI data analysis. Therefore, we highly recommend that you include these variables in your input file and map them to QI variables in order to get the most accurate results from the QI calculations.

To map QI variables, drag the desired QI variable from the table on the right and drop it into the field next to the intended input variable in the **Input Variable** table on the left. You can remove a mapping by dragging the QI variable back to the **QI Variable** table. If you are not sure how one of your variables matches up to a QI variable, look at the **Live Sample of Your Input Data** of your data to see what values are stored in the variable.

Recommended variables include the following:

Inpatient Data File

- Discharge Disposition
- Admission Type
- Admission Source
- Length of Stay
- Point of Origin
- Age in days
- Procedure Code 1
- Patient State/County Code
- Present on Admission flag variables (corresponding to Diagnosis code variables that have been mapped)
- Days to Procedure code variables (corresponding to Procedure codes that have been mapped)

Emergency Department Data File

- Length of Stay
- Age in Months
- Discharge/Visit Quarter
- Secondary Diagnosis Codes
- ED admission (ED Admit)
- Individual Identifier (Visit Link)
- Date of ED encounter (Days to Event)
- Hospital ID
- Hospital State

③   9.4.2.4.   **Live Sample of Your Input Data**

This section displays a snapshot of the first 50 rows of your input file to give you an idea of the data that appear in each column. This data view is provided to aid you in mapping the QI variables to the appropriate variable in the input file. You can locate specific columns from your input file by typing part of the column name into the **Search AHRQ QI Variables** field. As you change which QI variables are mapped and unmapped, the corresponding header will update in this section. You have the ability to hide these data by clicking on the <**View/Hide Data**> button.

9.4.3. What should I do here?

To map a QI variable to the variable in your data file, drag it from either **Missing Required AHRQ QI Variables, Missing Recommended**, or **Optional AHRQ QI Variables** to the **Your Data File** list on the left, and drop it next to the corresponding variable name in your input data

file. Remove a mapping by dragging the QI variable back to either of the variable trays on the right.

If you are not sure how one of your variables matches up to a QI variable, look at the **Sample Data View** of your data to see what values are stored in the variable.

If you would like to go back and make changes to any of the selections you have made so far, click the <**Back**> button to return to earlier steps in the process.

When you are finished mapping your data, click the <**Next**> button to continue to the **Mapping Quick Check** step in the import process.

EXAMPLE: The required variable "Sex" is listed under **Variables Used by QI Software**. You are not sure which of your variables corresponds to this. You look at the **Sample Data View**, and you notice that a column labeled "GG" contains the values "m" and "f." Therefore, you conclude that you need to drag the "Sex" variable to the empty spot next to "GG" in the **Input File Variables** area.

9.4.4. Time-saving tips

9.4.4.1. Select variable names

If possible, use the QI variable names for the columns when you create your data file. If they are found (with exactly the same spelling), they will automatically match up.

9.4.4.2. Data mapper shortcuts

Other column names can be matched up automatically to QI variables. These include the SAS®-equivalent variable names and other common mappings, such as "DX31" to "Diagnosis Code 31." You may edit the shortcut table on the **Data Mapper Shortcuts** screen.

For fields that are indexed, such as Diagnosis Codes (DX1, DX2, DX3), it can take a long time for users to finish mapping one at a time. CloudQI software contains a feature in which the system intelligently senses the indexed fields. After the user completes the first drag-and-drop of one of the indexed fields, it does the following:

1. Asks whether the user wants all other field names (i.e., all secondary diagnosis) to be mapped automatically.

If the user chooses <**Yes**>, the system tries to guess the rest of the unmapped, indexed fields in the input file by matching the name.

Once identified, the system auto-maps all of these indexed, unmapped fields.

The user can choose <**No**> and manually map each field if necessary.

9.4.5. Other questions

9.4.5.1. What is the difference between "Required," "Recommended," and "All" variables?

Required variables are critical to the proper flagging of cases for the majority of the QIs. You will not be allowed to load a file that does not have all of these variables. While recommended variables are not required to be mapped in order for you to move forward with the import process, we highly recommend that you include them in your input file and map them to QI variables given that all of them are used in QI analysis. Depending on what type of analysis you are interested in, your calculated QI rates may not be accurate unless these variables are included. If you leave these variables unmapped, they will be treated as blanks in every record.

9.4.5.2. What if I have extra variables in my file?

The application only imports and processes variables that have been mapped. Any variables in your file that are not mapped will not be imported and will not affect the QI calculations.

9.4.5.3. What if I don't have inputs for all variables?

The QI calculations are based on the data inputs for mapped variables in your file. For best results, correct any issues identified during the import process and populate any blank fields with the proper inputs, if available. Normally, you should correct your input file to get the best results possible.

9.4.5.4. What if I have fewer than 35 diagnoses or 30 procedures?

You can map the number of diagnoses variables that are coded according to the conventions in your institution. Unmapped QI variables will be treated as blank.

9.4.5.5. What if I have more than 35 diagnoses or 30 procedures?

The default is 35 diagnosis codes and 30 procedures, however, starting in v2024, you can configure the application to add additional diagnosis and procedure codes You can access these configurations by going to <**Program Options**> and clicking the <**Other**> tab. The numbers entered will be added to the default values of 35 and 30 for diagnosis and procedure codes respectively to match the total number or diagnosis and procedure codes in your data file.

Screenshot 14: Configure # of Diagnosis and Procedure Codes

9.4.5.6. What is the proper format for diagnosis codes?

For the ICD-10-CM format, diagnosis codes are between three and seven alphanumeric characters. Please see the Centers for Medicare & Medicaid (CMS) website for additional information.

In all cases, you must remove the decimal point before loading the data.

The CloudQI software runs an exact textual comparison of all codes. Therefore, it is important not to pad any additional characters (such as trailing zeros) to the right of ICD-10-CM codes. Similarly, if the rightmost and/or leftmost character is a zero, you should not remove this zero because it will change the meaning of the code.

9.4.5.7. What is the proper format for procedure codes?

 For ICD-10 format, procedure codes consist of seven alphanumeric characters with no decimal point. As with diagnosis codes, you should remove any decimal points, and you should not add or

remove characters or zeros on the left side of the code. Please see the [CMS website](#) for additional information on ICD-10 coding.

9.4.5.8. Why does my data view display quotation marks?

This indicates that your input data are separated by quotation marks. To remove the quotes, access the **Input File Options** screen and enable the checkbox labeled <**Values have quotes that must be removed (e.g., "value1", "value2")**>. Selecting this checkbox will remove the quotation marks in your data upon import.

9.4.5.9. How should I map my data element for the patient's location?

If you intend to use the PQE module to calculate area-level rates, the recommended approach is to map the Federal Information Processing Standards (FIPS) State/county code for the patient's residence to the data element labeled "Patient State/County Code." If the FIPS State/county code of the patient's residence is not available, then you may map the hospital FIPS State/county code to the data element labeled "Patient State/County Code." However, we recommend that you then analyze the area rates at the State or metropolitan area level.

If the hospital FIPS code is used in Patient State/County Code, users should be aware that rates may be biased for hospitals that serve as regional referral centers. These hospitals are likely to treat patients from outside the metropolitan area, county, or even the State in which the facility is located.

Using the patient FIPS State/county code for analysis may more accurately reflect the population truly at risk. If you choose to use the hospital FIPS State/county code for analysis, you should exercise caution with larger geographic areas to minimize bias from patients who come from a county that is different from that in which the hospital is located.

The software provides you with the option of producing output by metropolitan area or by county. When metropolitan areas are selected, urban areas are always defined by metropolitan areas. When county is selected, urban areas will be defined by county. Rural areas are always defined by county.

The metropolitan area definitions are from three different sources:

1. The "modified FIPS" definition is from the [Area Health 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 Office of Management and Budget (OMB) circular 99-04 (last revised May 6, 2002). Mapping is done from county to Metropolitan Statistical Area (MSA) except in New England, where counties are assigned to the New England County Metropolitan Area (NECMA). OMB defines NECMA as a county-based alternative to the city- and town-based New England MSA and Consolidated MSA (CMSA). For example, Hampden and Hampshire Counties in western Massachusetts are assigned to the Springfield, MA, NECMA, even though the town of Holland in Hampden County is part of the Boston MSA.

3. The "2003 OMB" definition is from OMB circular 03-04 (last revised December 4, 2005). The mapping is from county to either MSA or Micropolitan Statistical Area.

9.4.5.10. What's the difference between "Key" and "Patient ID"?

The **Key** field is intended to distinguish discharge records, whereas the **Patient ID** field is intended to help link patients across discharges. However, any data may be stored in either field. The **Key** field is displayed in several places in the application, but the **Patient ID** field is included only in the **Export Data** screen. Additionally, patient ID data are stored in a separate table and require additional disk space. The **Key** field and the **Patient ID** field can be used for tracking or printing results, but the software does not link records belonging to the same patient.

9.4.5.11. Can I use information from a complex survey design to obtain nationally representative results?

No. The software is intended to be used with data that cover an entire patient population (e.g., all inpatient and outpatient population in a year) or that were sampled from a patient population using simple random sampling. The software does not support weighted QI estimates or standard errors for weighted estimates. Thus, analyses using data obtained from a complex sampling design will not produce accurate estimates for the population from which the data were sampled.

9.5. Mapping Quick Check

9.5.1. What is this screen for?

This screen (Screenshot 15) summarizes the information from your data input file so that you have a clear understanding of which QI variables have been mapped to your input variables and which have not been mapped. Unmapped recommended variables are called out because the QI analysis may not be accurate unless these variables are included and mapped. This screen will help you see what impact unmapped variables in your file will have, and whether you wish to continue without mapping those variables or whether you wish to go back and map these variables before continuing.

Screenshot 15: Mapping Quick Check

9.5.2. How is this screen organized?

9.5.2.1. Unmapped recommended variables

In the **Unmapped Recommended Variables** tab, you can see which QI modules and indicators are impacted by each unmapped recommended variable and learn more about whether or not each variable affects indicator logic or risk adjustment. Click on the text in any field under the **Modules Impacted** or **Indicator Logic** columns for more information about the impacts of each QI variable in calculating observed and/or risk-adjusted rates. To know more about what a "recommended variable" is, see Section 9.4.5.1. Although the software will not stop you from moving forward without including and mapping all the recommended variables, it is highly recommended that you do so to allow for the most accurate reporting.

Click the **Export Unmapped Variables Report** link at the bottom of this screen to export a report to your computer that contains all of your unmapped variables.

②

9.5.2.2. All variables

By clicking the **All Variables** tab, you will see the full set of mapped and unmapped variables. Click the <**Export All Variables Mapping Status Report>** link at the bottom of this screen to export a report to your computer that contains all variables' mapping status.

9.5.2.2.1. What should I do here?

Scan the list of warning messages to see if anything needs to be corrected. If you would like to go back and map the recommended QI variables to your data input file or otherwise edit your variable mapping, click <**Back**> to return to the **Data Mapping** step.

When you are satisfied with your mapped variables, click the <**Next**> button to continue to the **Preparing for Crosswalk** step in the import process.

③

9.5.2.3. Export unmapped variables report

This option lets you export a report that contains unmapped recommended variables to your computer.

9.6. Preparing for crosswalk

9.6.1. What is this screen for?

During this step in the import process, the application is reading your input file per the data mapping specified in the previous step. It is processing the values specified for the crosswalk variables and also determining errors in the data values specified in the file. Data errors will be displayed on the subsequent **Data Errors** screen.

9.6.2. How is this screen organized?

As Screenshot 16 shows, the progress bar indicates the percentage of your input file that has been read by the application. You can also use the number of records read or the status to gauge completeness of the readability check. When the scan is complete, a green check mark will appear to the right of the progress bar, and a "100%" will appear just below it.

Screenshot 16: Preparing for Crosswalk
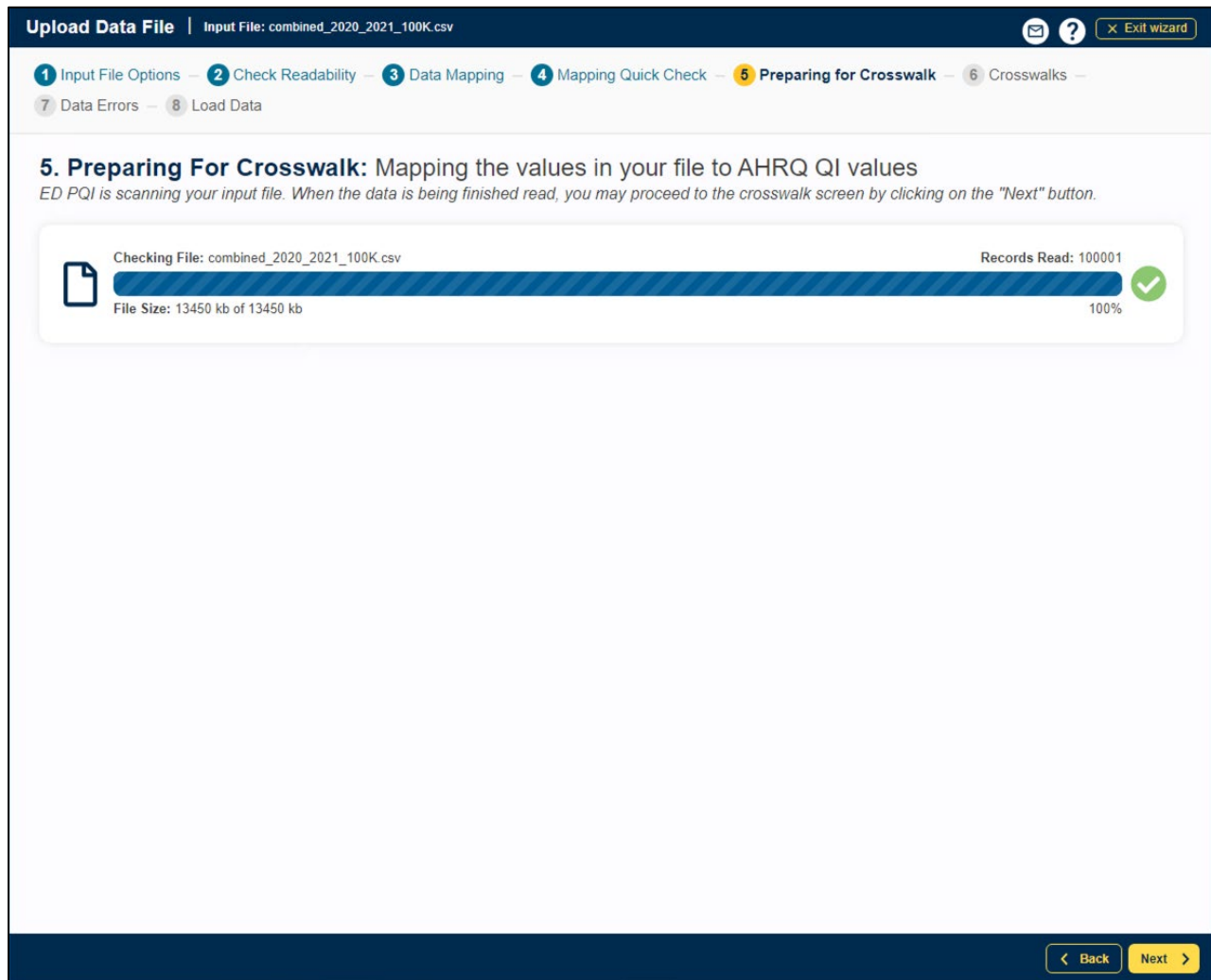
9.6.3. What should I do here?

Once the application has finished processing, click the <**Next**> button to proceed to the **Crosswalks** step.

9.7. Crosswalks

9.7.1. What is this screen for?

The purpose of this screen (Screenshot 17) is to allow you to review and confirm the crosswalk of the values in your input file to the values used by the CloudQI software for the following variables:

Inpatient Data Type (for PSI)

- Admission Source
- Admission Type

- Discharge Disposition
- Point of Origin
- Primary Payer
- Race
- Sex

Emergency Department Data Type (for PQE)

- Sex
- EDADMIT
- Resident (v2023 only. In v2024, this is a calculated field and is not required on the input file)
- Died in Visit (v2023 only. In v2024, this is a calculated field and not required on the input file)

For more information about the values used by CloudQI software, please refer to the PQE Input Data Dictionary in Appendix A.

Screenshot 17: Crosswalks

9.7.2. How is this screen organized?

9.7.2.1. Input variables, occurrences, and QI value

For each variable, the table will display the input value, the number of occurrences of each input value, the corresponding QI value, and an optional message indicating status of the mapping.

9.7.2.2. Filters to jump to a specific value or variable

Just above the table are three sections that have variable links allowing the user to jump to the selected variable in the "Excluded QI Variables," "Missing QI Variables," or "Matched QI Variables" tabs. In addition, this screen also displays the total number of variables in the crosswalk and the total number of distinct values in those variables.

③

9.7.2.3.   Export data mapping

This option lets you export your data mapping and crosswalk information. You can recognize columns by name or position.

9.7.3. What should I do here?

The CloudQI software assigns specific meaning to these values and processes them a certain way, so it is important that the values accurately reflect their intended meaning (refer to the Input Data Dictionary in Appendix A for more information about each variable and corresponding values). Compare the input value to the proposed QI value. Where an input value is not a valid QI value (or may be blank), the software may assign it by default to either "Missing" or "Excluded," based on the severity of having an invalid value for that variable. Please review each mapped variable and make changes if necessary. To specify a different QI value, click the arrow next to the QI value, and select one from the drop-down menu.

Before moving on to the next step in the import process, you may export your map settings by clicking the <**Export Data Mapping**> button; choose to either "Recognize Columns By Position" or "Recognize Columns By Column Name" by selecting the appropriate radio button. Mapping selections from **Input File Options**, **Data Mapping**, and **Crosswalk** screens will be included in the export. The mapping file can be used to specify the data structure of a future input file and save time in the import process.

If you would like to go back and review the summary of your mapped and unmapped variables, click the <**Back**> button to go back to the **Mapping Quick Check** section.

Once you have reviewed the values for each input value and are ready to move on, click <**Next**> to go to the **Data Errors** section.

9.7.4. Other questions

9.7.4.1.   What effect does <Map to Missing> have?

Missing values affect different variables in different ways. Records with missing values for sex will not be loaded. You may map values to missing for other fields, but this will affect the assignment for some indicators.

9.8. Data errors

9.8.1. What is this screen for?

Prior to loading the data, this screen (Screenshot 18) identifies any data errors your input file contains. You may want to review the number and severity of errors to determine whether you want to continue with the data load process or exit the process at this time and fix the data issues before loading the data.

Screenshot 18: Data Error

9.8.2. How is this screen organized?

9.8.2.1. Error/Warnings

Errors will be displayed in order of severity of the error. In some cases, it may be a warning only. You can determine the action that will be taken by the software as a result of each error by reviewing the field to the right of the error description field. Some potential actions are that the record will not be loaded, or the value of the variable will be set to blank (missing).

9.8.2.2. Export all data error/warning messages

You can export all error messages and warnings by clicking the <**Export all error/warning messages**> button at the bottom of the chart. You will want to export the error messages if you wish to review the data errors with someone other than the person running the software to determine next steps.

9.8.3. What should I do here?

Review the error messages (and the corresponding action that will be taken by the system) to see the impact of each error and decide whether you would like to continue through the import process or go back and fix the issues. Know your data. The warnings provided are intended to catch common errors. However, depending on the typical case mix and coding conventions in your institution, these warnings may or may not be significant. If you decide to move forward without addressing the errors or warnings, the system may change the value set to "missing" or exclude the record from analysis based on the severity of the issue. We recommend that you fix all necessary issues and reimport the updated file to ensure greater accuracy of the QI results.

Once you have addressed any critical errors and/or warnings, you may proceed to the **Load Data** section by clicking the <**Next**> button.

9.8.4. Other questions

9.8.4.1. How can I find out which rows had problems?

Formatting errors due to individual values on records are written to the QI Session Log (see Section 10.2.9). You can view the error messages along with the line number if you view the **QI Session Log**. Figure 3 shows a screenshot of lines printed to the session log. The **QI Session Log** may be accessed from the **Home** screen in the **Tools** section.

Figure 3. How to Identify Rows with Problems.

```
Check For Data Errors
Reading column names from the first row in the file
Read 106 values from first row.
KEY column number = 1
Hospital ID column number = 34
Reading Text File (CSV)
      File is 1046475 characters.
Row 4, COLUMN Age, KEY 94615. Not an integer: "abcdefg"
Row 6, COLUMN Age, KEY 94617.  Missing or invalid required value  Row
7, COLUMN Age, KEY 94618.  Missing or invalid required value   Read
1046475 characters from file, total of 3637 rows
```

9.8.4.2. Does the program check for invalid ICD-10-CM codes?

No. The program only performs basic format checks; it does not check the reasonableness of the data. A three- to seven-character string will be accepted as an ICD-10-CM diagnosis code. Users should verify the quality of their discharge data by some other means before loading the file with this program.

9.8.4.3. Why does it check for leading zeros in ICD-10-CM codes?

QI users often use a spreadsheet program such as Excel to calculate some fields before loading data into the CloudQI software. Frequently, the spreadsheet will reformat text that it considers numbers into the simplest format. For example, it may remove a leading zero that it considers

unnecessary from "04567," thus changing the code to "4567." This is a completely different diagnosis code and will result in errors in your QI results.

The diagnosis codes in the range of 001 to 100 are related to infectious diseases. Removing all leading zeros can result in a subtle error in which some of the QIs are unaffected and some are incorrect.

Because most diagnosis codes do not have leading zeros, it is certainly possible that a data file will not have any leading zeros in a column. If you see the message "Column of ICD-10-CM codes does not have any leading zeros (warning)," consider the number of diagnosis codes involved. The more codes found in a column, the more improbable it is that they all will happen to not have leading zeros. If all or most of the diagnosis and procedure code columns have this warning, it may signal that the zeros were stripped out of the entire file at some point before the file was imported into the **Data Import Wizard**.

9.9. Load data

9.9.1. What is this screen for?

This screen (Screenshot 19) displays a progress bar as your data are loaded into the application. A progress bar will appear, and when it is complete, the Load Data screen will appear, and it will show some statistics of the loaded data plus any data errors that were encountered during the loading process.

Screenshot 19: Load Data

9.9.2. How is this screen organized?

9.9.2.1. Progress

This area lets you know how far along the data read has progressed within your file. The number of records read increases incrementally as the check progresses. When the scan is complete, a "Your data is finished loading" message and a check mark will appear to the right of the progress bar.

9.9.3. What should I do here?

Upon completion of the data load, check the values displayed next to **Total Rows Loaded** and **Total Rows Excluded** to confirm that they match your expectations.

9.9.4. Other questions

9.9.4.1. Why are rows "excluded"?

There are several reasons this might occur. Records may be excluded because you specified <**Exclude From Dataset**> in the **Crosswalk** screen. They also may be excluded due to data value errors, such as invalid numbers in the **Age** or **Resident** field. You will have an opportunity to review the reasons for excluded rows on the screen that follows.

9.9.4.2. What should I do if no rows were loaded?

If no rows were loaded, click <**Previous**> to return to the **Crosswalk** screen, and correct the value settings for rows excluded from analysis. If you have errors in your data file, then you may need to exit the import process, edit the file, and restart the import process.

9.10. Load data report

9.10.1. What are these screens for?

These screens (Screenshot 20) provide statistics of the data load process and summarize any errors or warnings encountered during the data load.

Screenshot 20: Data Load Statistics

9.10.2. How are these screens organized?

9.10.2.1.1. Data Load Statistics

This screen (Screenshot 23) will give you an idea of what the information in your imported data file looks like and a snapshot view of the data loaded in the QI database. When viewing the information under **Data Load Statistics**, you will see a list of QI variables as well as the number and percentage of records missing that value and the minimum and maximum values for each variable. This information should be checked for reasonableness based on your own knowledge of your data. For example, a file that has only adult patients should show 100 percent missing for "Age in Days," but a file containing a mix of adults and children should reflect this mix by having "Age in Days" for every child under 1 year old. You can also export a summary of the Load Data process by clicking the <**Export Data Load Summary Report**> link at the top of the table. Additionally, you can also view the advanced data load report by clicking on the link <**View**

Advanced Data Load Report> at the top of the table. The advanced data load report is a summary of data issues that could impact your reports. See Section 9.10.4 for details.

② ### 9.10.2.2. Errors and Warnings

Errors/Warnings (Screenshots 21 and 22) shows the data errors in the input file and what (if any) action was taken by the application when loading the corresponding records. Based on the severity of the error, certain records may get excluded from the dataset entirely, or the values of certain variables may be set to missing.

Screenshot 21: Errors and Warnings

Screenshot 22: Errors and Warnings

9.10.2.3. What should I do here?

Scan this report to verify that your data were loaded correctly. You can export a summary of the data error report by clicking the <**Export Data Error Report**> link at the top of the table. You may also export the data that were loaded into the database by clicking the <**Export your cleaned data**> link at the bottom of the table. For a description of the exported data, please see the Export Data Dictionary in Appendix C.

At this time, you will have an opportunity to save your mapping file for use at a later time. If you would like to save your mapping file, click <**Export Data Mapping**>.

Notice that once the load is complete, the application does not immediately start generating indicators. You have the opportunity to decide whether or not you would like to move on to this step at this time or save your data and generate indicators at a later time.

Clicking the <**Finish**> button will complete the import process and take you to the **Home** screen, where you will now see your imported file. If you decide to move on to **Generate Indicators**, click the <**Finish and generate indicators**> button to complete the import process and move on to begin the indicator generation process.

9.10.3. Other questions

9.10.3.1. Doesn't this tell me the same information as the Data Errors screen?

The **Data Errors** screen tells you what will be loaded before the settings are finalized; this screen tells you what was actually loaded. The counts may be different when more than one error occurs on the same record.

9.10.4. Advanced Data Load Report

9.10.4.1. What is this screen for?

Once the data is loaded, you can run this report to get a better sense of data issues in your dataset and what (if any) impact they may have on your reports and the indicator numbers included in the reports. Data issues may be due to problems mapping certain fields, missing or erroneous data values, or explicit user instructions during crosswalk. Impacts may result on indicator logic, risk adjustment, and/or grouping (stratification) of reports. You should review this report to determine whether you want to continue with indicator generation or whether you want to fix your data issues and re-upload your data file prior to indicator generation.

This report may be retrieved from the following places:

1. **Load Data** screen—after loading the data into the database.

Report Summary (Area Report) and **Patient-Level Report**—In this case, the report shows the possible impact of the data issues only for the modules shown on the report.

9.10.4.2. How is this screen organized?

Screenshot 23: Advanced Data Load Report

9.10.4.2.1. Find Indicators

If you are interested only in specific indicator(s), you can check whether issues in your data could impact this indicator(s). You can search by one indicator at a time. Please type the name of the indicator without spaces (e.g., "PQE01").

9.10.4.2.2. Columns and related impact

In this section, you will see all the fields in your dataset that have issues. Corresponding to each of the columns, you will see how many records were affected, which modules are impacted, whether the column impacts indicator logic or risk adjustment or stratification, and what action was taken to address the issue (for example, the record was not loaded, or the column was set to missing)

9.10.4.2.2.1. What should I do here?

Review the nature of the issues and the corresponding action taken for all modules/indicators in which you are interested. You can export the advanced data validation report by clicking on the **Export Report** link in the lower right of the "Advanced Data Load Report" screen. Depending on the nature of the issues, you can determine whether you want to continue with generating indicators or whether you want to exit the application, fix your data issues, and reload your data file prior to continuing. Close this report window to return to the **Load Data** screen.

10. Home Screen (After Data Import)

10.1. What is this screen for?

This screen (Screenshot 24) is what you will see after you have imported and saved a data file. Once you upload a specific type of data, such as Inpatient data, the application will reorient the home screen to focus on that single data type. This allows users to concentrate on one data type at a time. You can switch to a different data type, such as Emergency Department data, by importing the new data type at any time.

Screenshot 24: Home Screen (After Data Import)
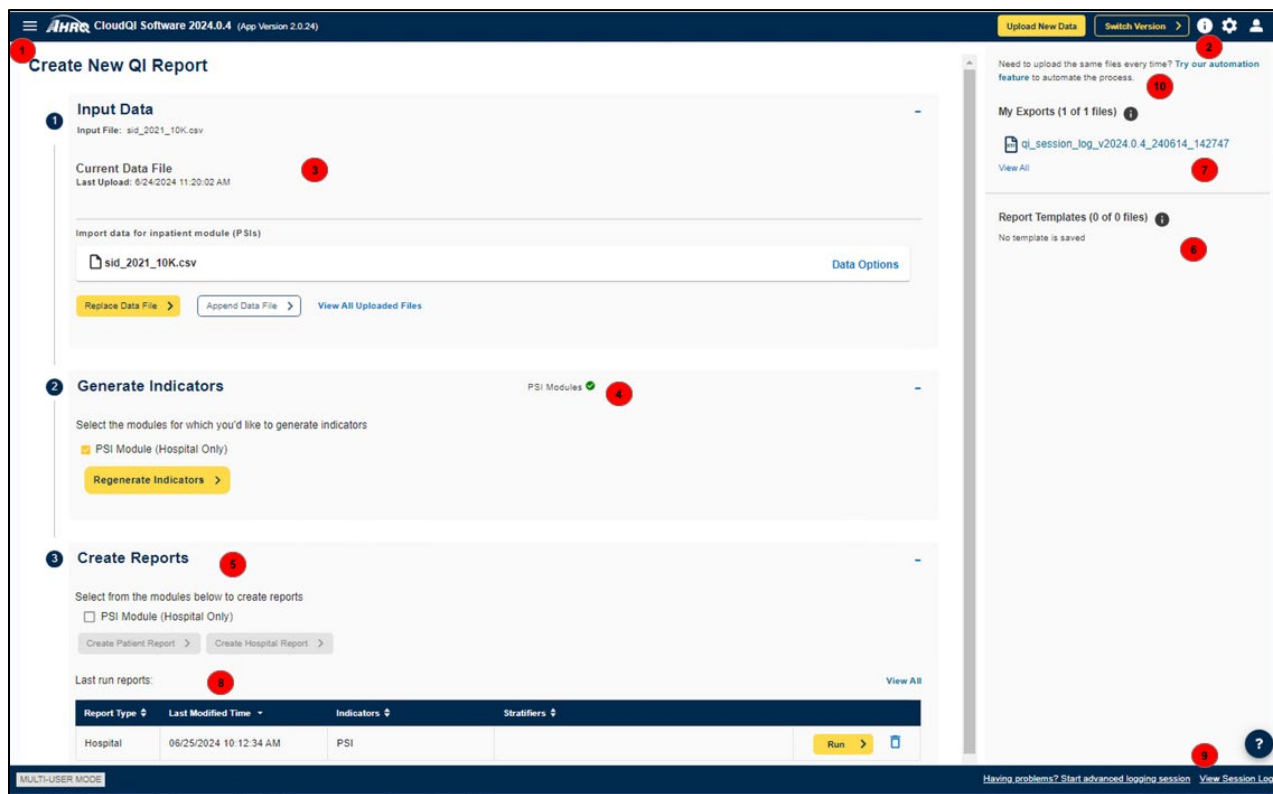
10.2. How is this screen organized?

10.2.1. Home Screen Options

When you open the application after you have already imported and saved a data file, home screen options will expand to the following:

- **Input Data**—This will allow you to do the following:

    - **Upload New Data:** Launches the import file process so that you can upload another input data file that you would like to analyze.

> » **Append Data File**: Allows you to append your newly imported file instead of replacing your currently saved data. This allows you to do rolling updates to your input data. The system will use the combined file to regenerate the rates. It is recommended that you limit your combined input data file to less than 10 million cases to avoid adversely impacting the performance of the software. Note that only CSV files are supported for appending files.
>
> » **Replace Data File**: Allows you to replace your currently saved data with the newly imported file. The rates must be regenerated after replacing the input file.
>
> » **View All Uploaded Files**: Allows you to view all your previously uploaded file across both Inpatient and Emergency Department data types and switch your input file to one of the uploaded files.

- **Export Data:** Allows you to export the processed data currently saved in the database and in the QI format that was generated during the import process. You will be asked to select what types of fields to include in your export file.

- **View Data Load Summary:** Displays the Data Load Report that appears at the end of the import file process for the data currently loaded in the database.

- **View Advanced Data Load Report:** Allows you to view a summary of data issues in your data file, corresponding action taken by the system (if any), and potential impact on indicator rates or grouping.

- **Export Data Mapping File:** Allows you to export the data mapping file if you have not done so during the data import process. The Data Mapping file can be re-used where you don't need to manually map your variables to CloudQI variables.

- **Generate Indicators**——This will allow you to do one of the following:

  - **Generate Indicators**: Allows you to generate indicators for a module if indicators have not yet been generated.

  - **Regenerate Indicators**: Allows you to regenerate indicators if they have been previously generated.

- **Create Reports**—This section will be enabled once the indicators have been generated. This section allows you to create one of the following reports as long as you have generated indicators for one or more modules. You may also view the Hospital or Area Report that was last run:

  - Create Area Report (PQEs)

  - Create Hospital Report (PSIs)

  - Create Patient-Level Report (PSIs and PQEs)

2

10.2.2. Help

When you click the <!> icon, you will be able to access the Help Guide for the screen or feature you are on.

3

10.2.3.   Current Data File

This section displays information about your most recent imported data file, such as the name of the file and when it was last uploaded. If you would like to replace the data file with another, click the <**Replace Data File**> button, select the data type (Inpatient or Emergency Department data), and browse for the appropriate file. Remember that replacing your current data and importing a new file will cause the application to overwrite your existing data and all related indicator calculations.

Use the <**Append Data File**> button and browse for the appropriate file to combine your new input data file with the existing data in CloudQI when importing files. This requires you to use the .csv or excel file format for importing in your data and the same datatype (Inpatient or Emergency Department data) that is currently loaded . Clicking the "Append Data File" when importing your input data file will combine your data. You can continue to append files. Once combined, you will be required to re-generate your QI rates.

Therefore, by selecting this option, you will see a decrease in your hard drive space.

It is recommended that you keep an eye on the size of the combined data in CloudQI, as the larger the input data becomes, the more resources are required to run CloudQI. CloudQI is tested with a maximum of 8 million rows input data file and depending upon the resources (memory and disk space) in your machine/database server, a larger file can cause CloudQI to slow down and may eventually stop processing.

The <**Data Options**> link to the right of the filename will provide you with the following options:

- View Data Load Summary
- View Advanced Data Load Report
- Export Data
- Export Data Mapping File

4

10.2.4.   Generate Indicators

This section allows you to generate indicators for the module(s) that have not yet been generated. Click the <+> sign to the right of the **Generate Indicators** header to expand the section. Choose the module(s) for which you would like to generate indicators or click <**Select All**>, then click the <**Generate Indicators**> button to begin the Generate Indicators process. Please see Section 11 for a detailed description of the Generate Indicators process. Note: in v2024, only PSI and PQE modules are supported. Other modules are planned for future versions. The module available for generating rates will depend on the data type used in importing your input file (Inpatient for PSI; Emergency Department for PQE).

(5) ### 10.2.5.   Create Reports

This section allows you to create reports for any module for which indicators have already been generated. Click the <+> sign to the right of the **Create Reports** header to expand the section. From here, you can create an Area Report, Hospital Report, or Patient Report. You can also view any previously run reports by clicking on an individual report's name in the "Last run reports" table. Note that you will not be able to continue with the Create Reports process until you have generated indicators.

(6) ### 10.2.6.   Report Templates

This section shows report templates that you can use to create new reports rather than going through the **Reports Wizard**. Report templates may be either "AHRQ QI Templates" (that is, predefined by the software) or "My Templates" (that is, defined by you when previously creating a report). Report templates save you time because you don't have to navigate through the whole Reports Wizard each time you want to run a report. Report templates are also carried from one version of the software to the next. When you generate a particular report the first time, you can save those parameters as a template (on the **Additional Options** screen) and run the template in the future to create the report with the same parameters. You can save as many report templates as you like (do so if you are generating reports with different selection criteria, groupings, etc.). Make sure to name the template appropriately and provide a description that will help you recollect the parameters of that report.

The Report Templates section will provide the following information:

The name and description of the report. Hover over any filename to see the following information on that report:

- Report Type (Area)
- Last Modified (My Templates only)
- Input File (My Templates only)
- CloudQI Version

10.2.6.1. What can I do here?

- Click the Report Template Title to run a report based on it.

- Click the "**View All**" link to open the "My Templates" window.

- Run link—Clicking on this link will start the process of generating the report by loading the parameters in the corresponding report template. You will be taken to the Create Report screen. When the report is finished generating, you may proceed to view the report summary by clicking <**Next**>. Please note that the <**Run**> link will be available only if the basic, underlying criteria for the report have been met. For example, if the report template is based on the PSI module and you have not yet generated indicators for the PSI module

with your current input file, then the <**Run**> link will not be available for the corresponding template.

- Edit link—Clicking on this link will load all the parameters for the corresponding report template and will position you on the first screen of the Report Wizard. Navigate through the wizard screens and change any parameters you wish to change. Remember to save the new template (you may overwrite the current template or save it as a new template) before creating the report with the revised template. You cannot overwrite an AHRQ QI template. If you make any changes to an AHRQ QI template, you can only save it as a new template (which will then appear in your My Templates tab). Please note that the <**Edit**> link will be available only if the basic, underlying criteria for the report have been met. For example, if the report template is based on the PSI module and you have not yet generated indicators for the PSI module with your current input file, then the <**Edit**> link will not be available for the corresponding template.

- You can sort report templates in alphabetical order (A–Z or Z–A), by Selected Module, or by date (most recent or least recent) by clicking the column header.

- You can search for a particular template by typing a partial name or description in the Find Template box.

10.2.7.   My Exports

The **My Exports** section provides one central place in which you can see all the reports or other data files you have exported through the CloudQI software. Files are listed in order of most recently exported.

Hover over any filename to see the following information on that export:

- File Type
- Export Date
- Input File
- CloudQI Version

10.2.7.1. What can I do here?

- Click on any filename in the list to open it.

- Click on the <**View All**> link to bring up the "**My Exports**" screen. From there, you can sort, download, or delete any export reports you may have.

- You can also search for a particular exported file by typing a partial name or description in the **Find Export** search box.

10.2.8.   Last Run Reports Table

This section allows you to run previously run reports or any saved report templates.

- Run link—Clicking on this link (in the **Last run reports** table) will start the process of generating the report by loading the parameters in the corresponding report template. You will be taken to the **Create Report** screen. When the report is finished generating, you may proceed to view the report summary by clicking <**Next**>. Please note that the <**Run**> link will be available only if the basic, underlying criteria for the report have been met. For example, if the report template is based on the PSI module and you have not yet generated indicators for the PSI module with your current input file, then the <**Run**> link will not be available for the corresponding template.

- Click the **"Trash"** icon to delete that report.

(9) ### 10.2.9.   Session Log

In this section, you can view your **Session Log** or start an advanced logging session to help troubleshoot any issues you are encountering. The Session Log provides a record of all activities during the session. It also records any errors that might be generated during the session. There is other important information captured in the session log to identify the user's environment, such as version of CloudQI, OS version, number of processors and total processor time, total system memory, available memory and memory allocated, CPU usage, available disk space, and database information. This information can be useful for problem solving.

There are several ways to save your Session Log:

1. A cumulative Session Log is automatically stored in a text file that has the ".log" extension.

There is a <**Save QI Session Log**> button on the **Home** screen, located under the **Settings** menu. Selecting this control allows you to specify a different location (such as your desktop) to save the log file. This information is saved in rich text format.

You can also select the <**View Session Log**> option in the bottom right of the **Home** screen.

(10) ### 10.2.10.   Quick Link to Access Automation Features

A new quick link is added on the home screen for you to access the automation features directly from the home page.

10.3.   Left Menu

10.3.1.   What should I do here?

Click one of the options in the left menu bar on the main screen. You can upload new data, view and export data, generate indicators and create reports based on the current data import file. You can select "Check for Application Upgrades" to verify if there are any current updates for the application. If so, you will be prompted to upgrade or keep the existing CloudQI version. The Switch version option will let you select the QI version used to run CloudQI. In CloudQI, you can switch between current and prior versions of the software to run your data.

10.4.   Other questions

10.4.1.   What happens to the data after the application is closed?

The most recent set of imported data and indicator calculations are saved between sessions. Once a new data file is loaded, the previous data file is replaced.

10.4.2.   What if I forget to save a report?

The last run reports will stay in the system. If your report has been generated at least once, you can use the <**My Exports**> section on the Home screen to find the report, and then click on its title to download it.

10.4.3.   What if I have a problem?

You may contact qisupport@ahrq.hhs.gov if you have problems running the CloudQI application. To provide context for your questions, please include a copy of the **QI Session Log** (saved after starting **Advanced Session Log**) and a copy of your column mapping—either the .qim mapping file or the contents of the **Mapping Quick Check** screen.

11. Generate Indicators

Once you have completed the import process, the next step is to begin generating indicators. The **Generate Indicators** process goes through your loaded data and performs all the Quality Indicator (QI) analysis and indicator calculations necessary for creating reports. You do not need to generate indicators at the same time you import the file. You may safely exit the application and return at a later time. As long as you have finished loading the data, your data will be saved in the database and will be available for you to generate indicators at a later time.

The process of generating indicators includes the following steps:

- **Generate Indicators**—Generates the indicators for the PQE or PSI module you have chosen to analyze.
- **Regenerate Indicators**—Regenerates the indicators if they have been previously generated.
- **Display Quick Report**—Shows the total numerator and, where applicable, the denominator and observed rate for each indicator.

Screenshot 25: Select Modules to Generate Indicators

11.1. How is this screen organized?

Option for PSI or PQE will appear with a checkbox depending on the data type you have used to import the input file.

11.1.1. What should I do here?

You have the option to generate indicators for the PSI or PQE module.

The application does not allow you to generate individual indicators within a module. If you are interested in a specific indicator (for example PQE 01), you must generate all PQE indicators. However, when you begin creating reports, you will have the option to select specific indicators.

Once you have selected the PQE or PSI module, click the <**Generate Indicators**> button to begin the Generate Indicators process.

11.2.   Generate Options

Depending on the data type (Inpatient or Emergency Department), the generate options screen will be different.

11.2.1.   Inpatient Data Type (PSIs)

11.2.1.1. Indicate if data is available for number of days

You have two options when analyzing the rates due to available PRDAY in your data. If you have the PRDAY data included in your input data file and mapped it while importing your data, the default section will be "PRDAY is included." However, you are allowed to change your selection. Your selection will be used in generating rates for all modules. You will not be allowed to change your selection once you have generated the rates for at least one of the modules. You may, however, change it once a new file is uploaded.

• Default option – PRDAY is included—No suppression will be applied.

• Option 2 - PRDAY is not included—This will suppress expected rates, risk-adjusted rates, smooth rates, and composite rates for measures PSI 04, 09, 10, 11, 12, 14, 15 and PDI 08 and PDI 09.

Throughout the Generate Indicators process, clicking the <**Exit Wizard**> button will exit the screen and take you back to the **Generate Indicators** selection screen. If you have not completed the indicator generation process, any selections you have made will not be saved.

11.2.1.2. MDC Options

Starting with v2023, before you generate your rates, you can now indicate whether you have MDC values included in your discharge data.

- Data has MDC from MS-DRG grouper (default option): rates are not suppressed in the hospital report. Any records with the missing MDC values will be excluded from all QI analysis.

- Data does not have MDC: selecting this option will suppress the risk-adjusted and composite rates in the hospital report.

If users choose the "Data has MDC from MS-DRG Grouper" option but the software encounters missing MDC values in the input data, the software will exclude discharges with missing MDCs from the rate calculations for a handful of indicators that use MDC values as an exclusion. Starting with v2023, the software includes Setnames for MDC 14 and MDC 15, which are commonly used exclusion criteria for many QIs. Therefore, users without data for MDC can now generate results for many QIs.

11.2.2.   Emergency Department Data Type (PQEs)

 No options are needed for processing PQEs. Click the <**Next**> button to start the generation process.

11.3.   Generate Indicators

11.3.1.   What is this screen for?

This screen (Screenshot 26) shows progress as the application works to generate indicators for the CloudQI modules you selected in the **Select the modules for which you'd like to generate indicators** step. Generating indicators is a multistep process, and it can take a few minutes to several hours based on the size of your input file.

Screenshot 26: Generate Indicators
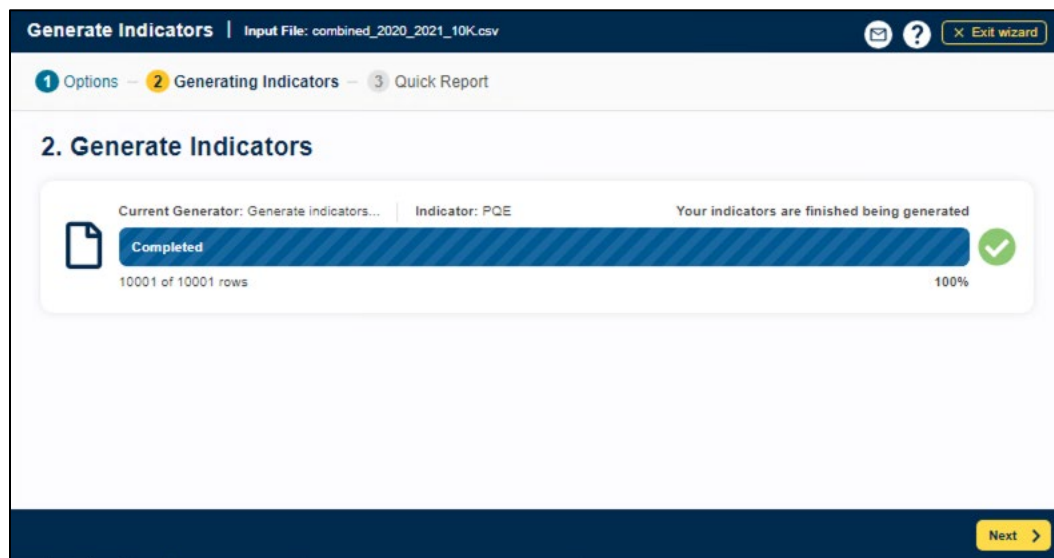
11.3.2.   How is this screen organized?

11.3.2.1. Progress

The progress bar tracks the application's progress in generating the indicators for the module you selected. When the generation has completed, the progress bar will display "100% Complete" as well as a message saying, "Your indicators are finished being generated." When the generation is 100 percent complete, you may proceed to the next screen.

11.3.3.   What should I do here?

Be patient during this process. Some indicators are complex, and the analysis may take several minutes or hours. When the queries are completed, a "completed" message will appear. If no errors were found, you will also see a message indicating that no errors were encountered. If the application encountered any errors, an "Errors were encountered" message will appear, along with a link that will allow you to view the errors.

The <**Next**> button will be unavailable until all the queries have been run, but when the Generate Indicators process is complete, you can view a quick report of your data.

If you click the <**Exit Wizard**> button at this stage, all the indicator calculations will be discarded, and you will be taken back to the **Home** screen.

11.4. Other questions

11.4.1. What should I do if I get an error?

If you receive an error on this screen, your entire results should be considered invalid.

Check the QI Session Log to see what the error was. Errors may be sent to the AHRQ QI support team for assistance.

11.4.2. Why does it run all indicators when I am only interested in a few?

You need to generate indicator flags only once. The results are then summarized for quick reporting. Once this screen has completed, you may go through the **Create Reports** process multiple times to prepare reports that display as many or as few indicators as you wish. The entire indicator-flagging analysis must run for a module before you can generate any reports for that module.

11.5. Display Quick Report

11.5.1. What are these screens for?

The purpose of the **Quick Report** screen (Screenshot 27 and 28) is to give you an understanding of how your data translates into a report and allows you to check to see whether your data appear to have loaded properly.

11.5.2. What are these screens for?

11.5.2.1. Hospital-level indicators

Screenshot 27: Hospital-Level Indicators

This displays the numerator and denominator, observed rate, and population rate for all hospital-level indicators.

- **Numerator (Num.)**—This term is the numerator for the observed rate. It is defined as the total number of cases that meet the inclusion criteria and the flag criteria but do not meet the exclusion criteria.
- **Denominator (Den.)**—This term is the denominator for the observed rate. It is defined as the total number of cases that meet the inclusion criteria but do not meet the exclusion criteria. Volume indicators are not reported as a rate and do not have a denominator. Area-level indicators do not show this column as the denominator is based on area population.
- **Observed Rate (Rate)**—This term is the observed rate for the indicator. This term is equal to the numerator divided by the denominator (Num/Den). This is not shown for Area-level indicators.
- **Population Rate (Pop. Rate)**—This term is the overall rate for this indicator in the reference population. The reference population is pooled discharges from the HCUP SID or SEDD. This rate is used in the calculation of the risk-adjusted rate (observed rate divided

by the expected rate, multiplied by the population rate), and it is not affected by the currently loaded data.

11.5.2.2. Area-level indicators

Screenshot 28: Area-Level Indicators

11.5.3. What should I do here?

Pay close attention to the data in this report! This is your opportunity to perform a quality check of the report to make sure the values are what you expected, or to determine whether you need to go back and make changes to your data before you begin to create detailed reports. If you would like to save this report, click the <**Export Quick Report**> or the **<Export Raw Data>** button.

When you are satisfied with the information the quick report is showing, you can click the **<Generate Reports>** button to begin creating your reports. A window will appear that allows you to select the module(s) for which you would like to generate reports. Select the appropriate module(s); then select whether you would like to create an Area-, Hospital-, or Patient-Level Report. Only one module may be selected when creating a Patient-Level Report.

Click the **<Finish and go back to home screen>** button if you would like to create your reports at a later time. You will be returned to the **Home** screen, which will display the module(s) for which you can create reports when you are ready to do so. The Home screen will also display the modules for which indicators have not yet been generated and therefore are not yet available for creating reports. You can also click the **<Finish>** button if you decide that you need to go back and

make changes to your data. This will take you back to the Home screen. Once there, you can click the <**Upload New Data**> button to upload a new input file with your edited data.

11.6. Other Questions

11.6.1. Why is the population rate inappropriate for comparison?

The population rate for v2024 PSI is based on the reference population, which itself is based on the universe of hospital cases in the SID for 45 states in 2019, 46 states in 2020, and 45 states in 2021. Likewise, 40 states participating in both the SID and SEDD are used to develop v2024 PQE population rates.

It would be fair to compare your observed rate with the population rate only if your hospital(s) perfectly matched the average demographics and severity of cases in this sample. A more appropriate rate with which to compare is the expected rate, which can be calculated during the Create Reports process. If you are using data from a state, the state rate is included when you run a hospital report as a total for all hospitals with the indicator. The state rate can be compared with the population rate or individual hospital rates.

11.6.2. Why is the population rate displayed?

It can be useful to see if your observed rates are "in the same ballpark" as the population rate to determine whether the data load was correct. You can use the population rate to verify the calculation of the risk-adjusted rates that are calculated during the Create Reports process.

11.6.3. Why are no denominators or rates displayed for area-level indicators?

It is necessary to go through the Report Wizard to select the correct census population to get a denominator for area-level indicators. Also, many input files will contain a few out-of-State cases that can inflate the total population counts if the proper stratifiers are not selected.

12. Create Reports

12.1. Report basics

This section describes the type of reports the Quality Indicators Windows® CloudQI software provides and walks you through the process of generating each report. The reports you can create include the **Hospital Report, Area Report**, **Patient-Level Report**, **Case-Level Details Report**, and **Quick Report**.

The **Create Reports** screen (Screenshot 29) allows you to choose the type of report you would like to create and select the module(s) for which you would like to create the report. You can reach this screen in two ways: by continuing to Create Reports immediately after you have finished generating indicators or by choosing your reports and module(s) on the Home page after indicators have been generated during follow-on sessions.

The CloudQI software provides reporting that takes you through the following steps:

- **Quality indicators**—Select QIs to include in a report.
- **Filter criteria**—Select the hospitals, quarters, and/or years for which you wish to select records.
- **Stratifiers**—Select stratifiers for your report.
- **Additional options**—Select additional options for data analysis.
- **Create reports**—Generate and view area-level reports.
- **Additional reports**—Drill down to corresponding patient-level and case-level details.

Screenshot 29: Create Reports
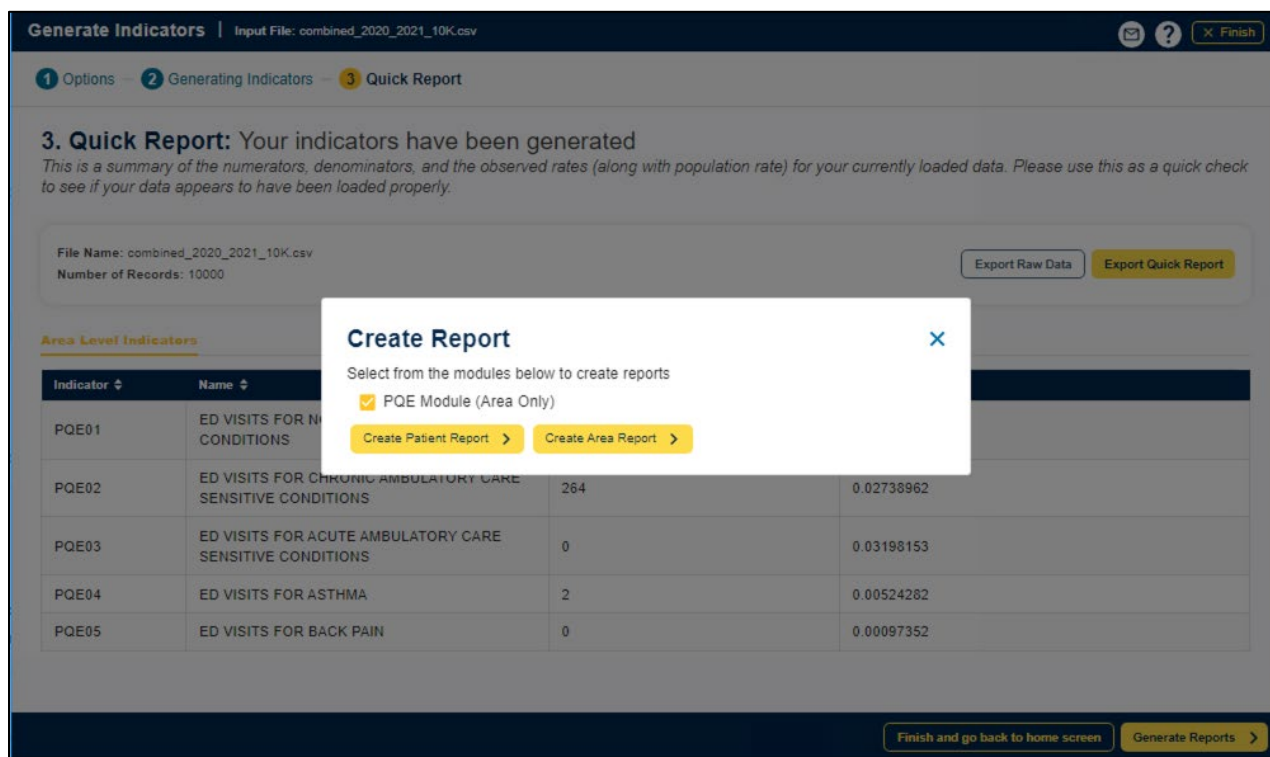
12.2. What kinds of reports can I generate?

The CloudQI software provides several types of reports. Table 3 lists the kinds of reports that can be generated and the sections in the instruction manual that discuss them.

Table 3. Types of Reports Provided by CloudQI Software

SECTION NUMBER	SOFTWARE COMMAND/DESCRIPTION
AREA-LEVEL RATES REPORT - PQEs	
Section 12.3.1	Select indicators (Area-Level Report)
Section 12.3.2	Select Date Range (Area Reports)
Section 12.3.3	Select Stratifiers for Use With Area Indicators
Section 12.3.4	Select Additional Options for Data Analysis
Section 12.3.5	Create Report
Section 12.3.6	View Report
HOSPITAL-LEVEL RATES REPORT - PSIs	
Section 12.4.1	Select Indicators (Hospital Reports)
Section 12.4.2	Select Filter Criteria (Hospital Reports Only)
Section 12.4.3	Select Stratifiers for Use With Hospital Indicators
Section 12.4.4	Additional Options for Data Analysis
Section 12.4.5	Create Report
Section 12.4.6	View Report

Section 12.5	Composite Report
PATIENT-LEVEL REPORT – PQEs and PSIs	
Section 12.6	Patient-Level Report
Section 12.7	Case Details
QUICK REPORT ON INPUT DATA – PQEs and PSIs	
Section 11.5	Quick Report

12.3. Area-Level Report (PQEs)

This section explains the process for creating an area-level report from your data. The Area-Level Report shows calculated QI rates for area-level indicators. Area-level indicators identify hospital admissions that evidence suggests might have been avoided through access to high-quality outpatient or preventive care. Population estimates from a U.S. Census Bureau dataset are usually used to calculate area-level rates. Please refer to the Empirical Methods document for more details on calculating area-level rates.

When calculating the Area-Level Report, you may select specific indicators and filter or group them by specific criteria. Details are presented in the sections that follow. The steps for running this report include the following:

- Select indicators
- Select date range
- Select stratifiers
- Select additional options for data analysis
- Create report
- Display report

12.3.1. Select indicators (Area-Level Report)

Use this screen (Screenshot 30) to specify the indicators to include in the report. The software reports observed, expected, and risk-adjusted rates for the overall indicator. Indicators on this screen are listed by module and then by number. Table 4 lists the indicators and the number convention used on the selection screen.

Table 4. List of Indicators in Version 2024

MODULE AND NUMBER ON SELECTION SCREEN	INDICATOR TITLE
PQE 01	PQE 01 ED Visits for Non-Traumatic Dental Conditions
PQE 02	PQE 02 ED Visits for Chronic Ambulatory Care Sensitive Conditions
PQE 03	PQE 03 ED Visits for Acute Ambulatory Care Sensitive Conditions
PQE 04	PQE 04 ED Visits for Asthma

MODULE AND NUMBER ON SELECTION SCREEN	INDICATOR TITLE
PQE 05	PQE 05 ED Visits for Back Pain

Screenshot 30: Select Indicators (Area-Level Report)

Area Report | **Input File:** combined_2020_2021_10K.csv ✉ ❓ ✕ Exit wizard

① **Indicators** — ② Population Year and States Selections — ③ Stratifiers — ④ Additional Options — ⑤ Create Report — ⑥ View Report

1. Indicators: Select desired indicators to create area report
These are the modules you have presently selected:

Some modules are not included as they contain Provider Indicators only:

☑ PQE Module (Area Only)

If you wish to change the selected module(s), please return to the hompage to do so. Please find indicators by categories in the tabs below.

By Module

PQE	**Deselect All**
	☑ PQE 01: ED VISITS FOR NON-TRAUMATIC DENTAL CONDITIONS
	☑ PQE 02: ED VISITS FOR CHRONIC AMBULATORY CARE SENSITIVE CONDITIONS
	☑ PQE 03: ED VISITS FOR ACUTE AMBULATORY CARE SENSITIVE CONDITIONS
	☑ PQE 04: ED VISITS FOR ASTHMA
	☑ PQE 05: ED VISITS FOR BACK PAIN

Next ▶

12.3.1.1. How is this screen organized?

All indicators for the PQE module are listed.

The Select All or Deselect All button can be used to select or deselect all indicators.

> NOTE: If you have created reports previously, <u>all</u> your selections have been saved. To specify a new group of indicators, deselect and select the indicators as desired.

12.3.1.2. What should I do here?

Select the indicators for which you would like to run a report.

Click <**Next**> when the desired indicators have been selected.

12.3.1.3. Time-saving tips

12.3.1.3.1.   Selecting/deselecting everything

You have the option to **Select All** or **Deselect All** indicators within modules. The first time you run the application, all the indicators for selected modules will be preselected by default. If you are interested in running a report on only a small number of indicators, you should deselect all indicators and then select the few that you would like to analyze.

12.3.1.3.2.   Clearing a Screen

Click the <**Select All**> link to select the entire screen. It will then change to a <**Deselect All**> link – click that link to deselect the entire screen.

12.3.1.4. Other questions

12.3.1.4.1.   What if I just want to see the cases for each indicator?

You don't need to go through the full reports process to see the individual cases for each indicator. After you have imported your data file, you can view the cases using the **Patient-Level Report** option (see Section 12.6).

12.3.2.   Select Date Range (Area Reports)

12.3.2.1. What is this screen for?

This screen (Screenshot 31) allows you to limit the records you wish to include in your report to only those records that occurred during the selected quarters. Additionally, in this screen, you may select a different denominator for your report.

Screenshot 31: Select Date Range (Area Reports)
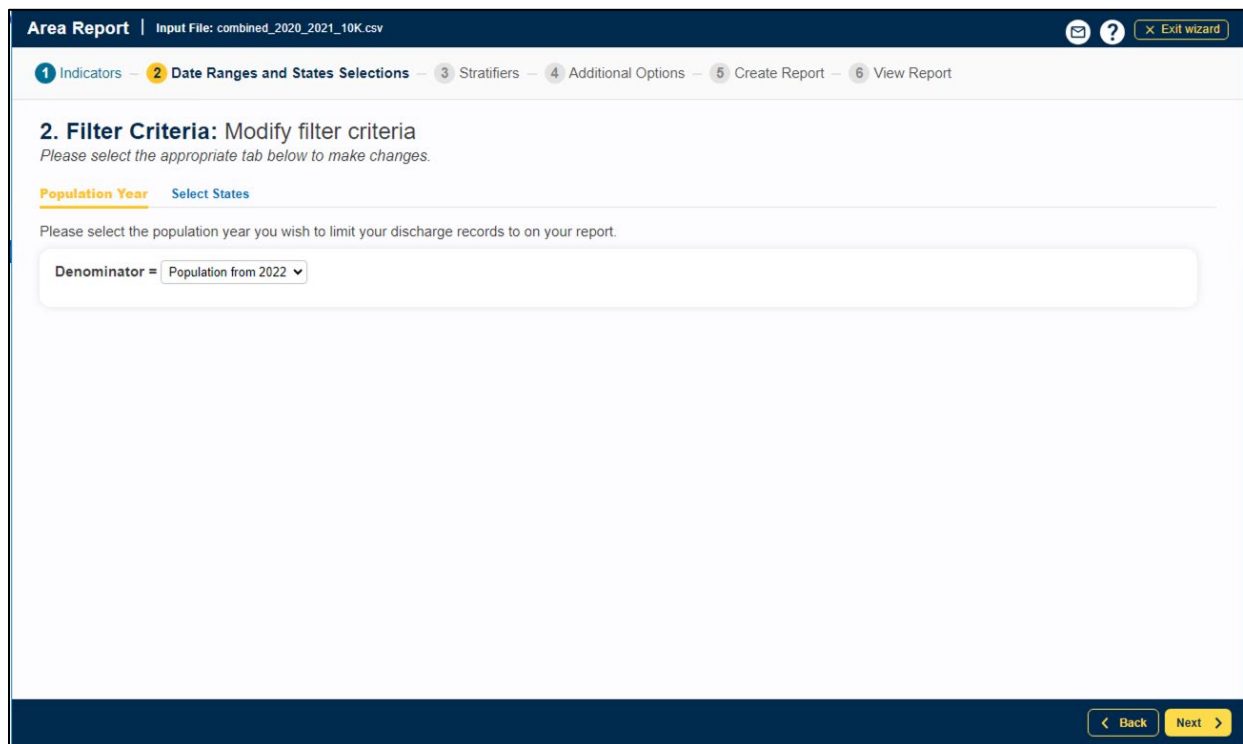
12.3.2.2. How is this screen organized?

12.3.2.2.1. Discharge year

The year represented in the input data is listed.

12.3.2.3. What should I do here?

Select the year for which you have data in your input file.

12.3.2.4. State

The states with the VisitLink field's data included in your input file are selected by default. This is needed for calculating PQE 05 - ED Visits for Back Pain. You can update the selection by adding and removing states per your needs.

12.3.2.5. What should I do here?

Select the States for which you have the VisitLink data in your input file.

12.3.2.6. Other questions

12.3.2.6.1. How does the program determine the numerator and denominator for each rate?

The program first gets a list of all the year values that you have selected. This selection includes the records with a missing year or quarter value if you have checked the appropriate box.

The program then totals the numerators for the selected indicators for each year grouped by the selected stratifiers.

For the denominator, the program totals the Census population that you have selected for each year. The Census population figures are also grouped by the selected stratifiers. The indicator numerators and denominators are joined together to obtain the observed rate grouped by the selected stratifiers.

12.3.3.   Select Stratifiers For Use With Area Indicators

12.3.3.1.1.   What is this screen for?

This screen (Screenshot 32) is used to build a hierarchy of stratification for area-level indicators. On this screen, you will indicate to the CloudQI software what variables you want your report output grouped by. You will also indicate the order of the "group by" variables.

Screenshot 32: Select Stratifiers (Area Reports)
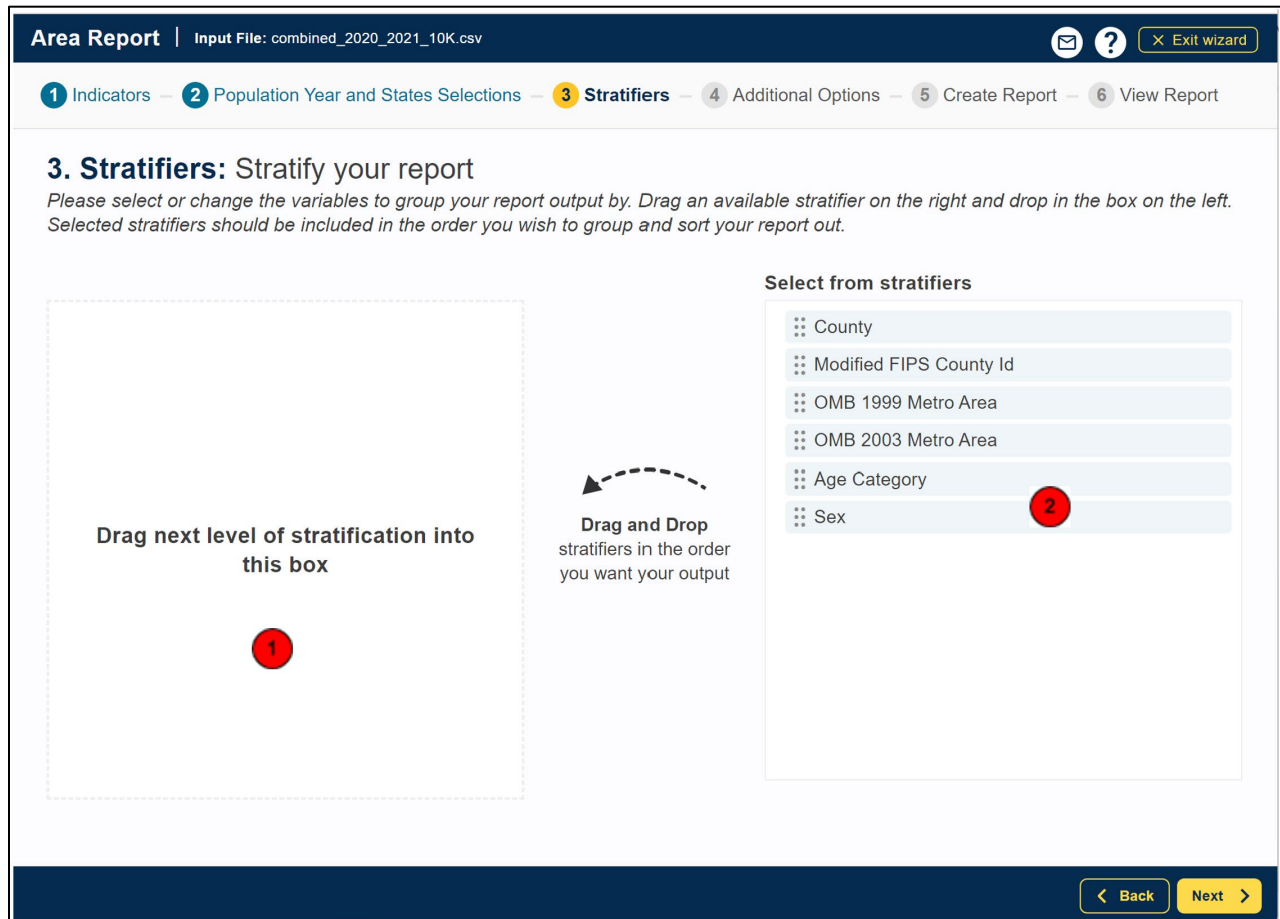
12.3.3.2. How is this screen organized?

(1)

12.3.3.2.1. Selected stratifiers

This area displays the area-level stratifiers (variables by which to group the report) currently selected in the hierarchical order in which they will be sorted.

(2)

12.3.3.2.2. Select from stratifiers

This area displays a list of available stratifiers (variables by which to group the report) that can be used for reports on area-level indicators. Hover over each stratifier to see the number of distinct values in your data that relate to that stratifier.

12.3.3.3. What should I do here?

Click on a desired stratifier in the **Select from Stratifiers** box, drag it to the selected stratifiers area, and drop it in the desired position. Area stratifiers are as follows: Age Category, Sex, County, Modified FIPS County ID, OMB 1999 Metro area, and OMB 2003 Metro area. Only those variables that are in your input file and that have been mapped to QI variables will be available for stratification.

To remove a selected stratifier, click and drag it back to the **Select From Stratifiers** list.

To reposition a stratifier, click and drag it up or down in the list of selected stratifiers. You will see a line that shows you where the stratifier will be placed.

The risk-adjustment stratification report will be calculated and displayed differently with different stratification selected by the user.

- Overall and/or County for Area Report — If no stratifier (i.e., Overall), or just County, is selected by you, then the risk-adjustment calculation will compute risk-adjusted rates, smoothed rates, and corresponding variance estimates.
- Any other stratification combination — Only risk-adjusted rates and variances are calculated. Note that the risk-adjusted rates are calculated as the O/E ratio. In the View Report screen, you will see warning message "For more granular stratification only risk-adjusted rates and variance are calculated."

12.3.3.4. Other questions

12.3.3.4.1. What is a "stratifier"?

A stratifier is a variable used to break your data down into subgroups. In database parlance, this is equivalent to an item in a "group by" clause.

12.3.3.4.2. What if I just want the totals for each indicator?

If you only need the overall rates for each indicator, do not select any stratifiers.

12.3.3.4.3.   Does the order matter?

Yes. The order stratifiers are selected determines the order in which the stratifiers are listed on the reports and the order in which the rows are sorted.

12.3.3.4.4.   How do I know which stratifiers to select?

Select stratifiers that will provide you with useful information. For example, if you are processing data from a single hospital, selecting a single stratifier for "County" will not provide you with any useful information.

12.3.3.4.5.   Can I display the names of each county?

Yes. Select the "State/County" stratifier, then choose the option **"Show the names of each county, State, or metro area"** under <**Graphic Stratifiers**> on the **Additional Options for Data Analysis** screen. The county will be the patient county of residence.

12.3.3.4.6.   What are the definitions of the metro areas?

The Office of Management and Budget defines metropolitan and micropolitan statistical areas. Visit the United States Census Bureau for more information.

12.3.3.4.7.   What is the Modified Federal Information Processing Standards stratifier?

Federal Information Processing Standards (FIPS) codes are a standardized set of numeric or alphabetic codes issued by the National Institute of Standards and Technology to ensure uniform identification of geographic entities through all Federal Government agencies. The entities covered include States and statistically equivalent entities, counties and statistically equivalent entities, named populated and related location entities (such as places and county subdivisions), and American Indian and Alaska Native areas.

The modified FIPS stratifier aggregates the independent cities with the counties that surround them. This table can be viewed at http://www.nist.gov/itl/fips.cfm.

You no longer need to use the modified FIPS codes assignment for area denominators. However, that option is still available. In the modified FIPS codes, certain independent cities (e.g., 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.

12.3.4.   Select Additional Options For Data Analysis

12.3.4.1. What Is This Screen For?

This screen (Screenshots 33 and 34) lets you choose additional calculations and display options before generating reports.

Screenshot 33: Select Additional Options for Data Analysis

Screenshot 34: Select Additional Options for Data Analysis

12.3.4.2. How is this screen organized?

12.3.4.2.1. Rates

This area provides checkboxes to select which rate values you want to include in your report. You may also decide whether to include the overall totals for each indicator here. If the composite measures have been selected, be sure to select **Smoothed Rates**. Please note that if the reference population rate is not selected, then you should disable reporting of the expected rate and observed/expected ratio (see the following section). If this reporting feature is not disabled, the software will report erroneous values for the expected rate and observed/expected ratio. The observed/expected ratio is the observed rate divided by the expected rate. This ratio is the most appropriate benchmark of performance. A ratio of one indicates that performance is as expected. A

ratio over one signifies that performance is higher (usually worse) than expected, and a ratio less than one indicates that performance is lower (usually better) than expected.

Table 5 provides definitions for the raw rate, multiplier, and reported rate as used in the software.

Table 5. Definition of Rates Reported by Software

TYPE OF RATE	DEFINITION
Observed	The rates as initially calculated applying the indicator definitions (see Section 9.4) to the set of data for the numerator (outcome of interest) and denominator (population at risk).
Expected	Rates that assume an "average" performance for each patient group based on the reference population but the hospital's actual case mix. The reference population is based on all States participating in the most recently available HCUP SEDD.
Reference population	The rate for the current reference population (see Section 14.3).
Risk-adjusted	The estimated performance of hospitals or areas if those hospitals or areas had an "average" case mix. This average case mix is estimated using proportional indirect standardization: risk-adjusted rate = (observed rate/expected rate)×reference population rate.
Smoothed	Estimated using multivariate signal extraction (MSX). MSX smoothing estimates the effect of random differences in the observed rate across hospitals or areas. In essence, smoothing describes how persistent a rate would be from year to year. Smoothing is a useful tool to "level the playing field" for hospitals or areas with a small number of cases.

HCUP=Healthcare Cost and Utilization Project; MSX=multivariate signal extraction; SID=State Inpatient Databases.

The CloudQI application calculates rates as raw rates. When creating your reports, you may report rates using optional multipliers to facilitate interpretation and analysis and to compare user rates to published national rates. Recommended multipliers are based on having rates expressed in whole numbers per multiplier units rather than decimal fractions. Please select the desired multipliers in the **Report Title & Scaling** section of the **Additional Options** screen.

Table 6 provides definitions for the raw rate, multiplier, and reported rate as used in the software.

Table 6. Rate Unit Definitions

TERM	DEFINITION	EXAMPLE
Raw rate	Numerator divided by denominator	0.0255
Multiplier	A unit of "per X"	1,000
Reported rate	Raw rate × multiplier	25.5 per 1,000

The risk-adjusted rate is disabled if certain stratifiers are selected. Change your stratification to enable risk-adjusted rates.

The risk-adjusted rate is appropriate only at the county level or above. Age and sex are attributes of the patients that affect the expected outcome. Thus, it would be inappropriate to calculate a risk-adjusted rate based on the total reference population but observed rates and expected rates that are based only on a segment of the population.

(2)

12.3.4.2.2.   Report Title and Scaling

This area allows you to select the scale on which rates are reported and the number of decimal places to use.

You can also change the default report title here, which includes the date and time the report was generated.

Table 7 provides the recommended multiplier for the different categories indicators. For more information, consult the *Technical Specifications* for a specific indictor.

Table 7. Recommended Multipliers for Different Categories of Indicators

HOSPITAL OR AREA	TYPE OF INDICATOR	EXAMPLE	RECOMMENDED MULTIPLIER
Area	Prevention Quality Indicator in ED Settings	PQE 04 ED Visits for Asthma	100,000
Hospital	Patient Safety Indicators	PSI 03 Pressure Ulcer Rate	1,000

12.3.4.2.3.   Cell suppression

(3)

This area provides the option to "blank out" rates for cells that are based on a small population or a small number of cases.

In performance measurement work, it is often recommended that rates be suppressed (i.e., not reported) when there are fewer than 20 cases in the denominator. This exclusion rule helps to protect the identities of hospitals and patients.

Rates will be suppressed (set to null) in the resulting report if:

- There are fewer than N people or cases in the denominator (where N is the value you supply for "Minimum patients per cell"); and
- There are fewer than N cases of interest in the numerator; and
- There are fewer than N cases that are in the denominator less the numerator.

(4)

12.3.4.2.4.   Report Layout

This area allows you to select whether to display the indicators as rows (creating a long report format) or as columns (creating a wide report format). You may also select whether to include the title and show the names of indicators when exporting the report.

(5)

12.3.4.2.5.   Report Options

This area allows you to select the population to be included in the denominator and whether risk adjustment of area rates includes adjustment for socioeconomic status ("SES").

Additionally, you can choose the O-E ratio you want to use for risk adjusting your rates. Note that logistic regression models to build risk adjustment models for QIs that need risk adjustment. For complicated risk adjustment models, the national HCUP reference population observed rate may not be exactly same as the average of predicted event rates. In the modeling process, we assessed model calibration properties, but the O-E ratio (observed rate to expected rate ratio) may not be exactly equal to 1. In software development (not part of the publicly released software), we multiplied the predicted rate for each case by this constant (O-E ratio) to make sure the new predicted rates are perfectly calibrated to the observed rates. To be consistent, we included the national O-E ratio that was calculated based on our reference population in the AHRQ software. We also now provide to users the options of calibrating to the reference population or to users' populations.

- Reference population-based O-E ratio (recommended). Unchecking will use O-E ratios based on your own input data: Uses reference population-based O-E ratio. This is recommended in most situations, and it is also the default choice in the software.
- Risk adjust for SES poverty decile: Uses users' own population-based O-E ratio. This option is kept in the software for users who want to calibrate the predicted rates to users' population.

12.3.4.2.6.   Geographic Stratifiers

This area allows you to select whether to display FIPS codes or the name of the county, State, or metro area.

12.3.4.2.6.1.   What Should I Do Here?

Change any of the options for your report on this screen. If you would like to save all the current report selections (including selections made on previous screens) as a template, click on the "Save current selections as a report template" link and provide a name and description for the template. The template will then begin to appear on the "My Templates" section of the home page.

Click **<Next>** to proceed to creating the report with all your selected criteria.

12.3.4.2.7.   Save as a Report Template

This link allows you to save your current report selections as a template. This is saved on your home screen. This will allow you to quickly run your report without going through the selection process.

12.3.4.2.7.1.   What Should I Do Here?

Click <**Save current selections as a report template**> link to enter your report template name and description. Once entered, proceed to save (Screenshot 35).

Screenshot 35: Save a New Report Template
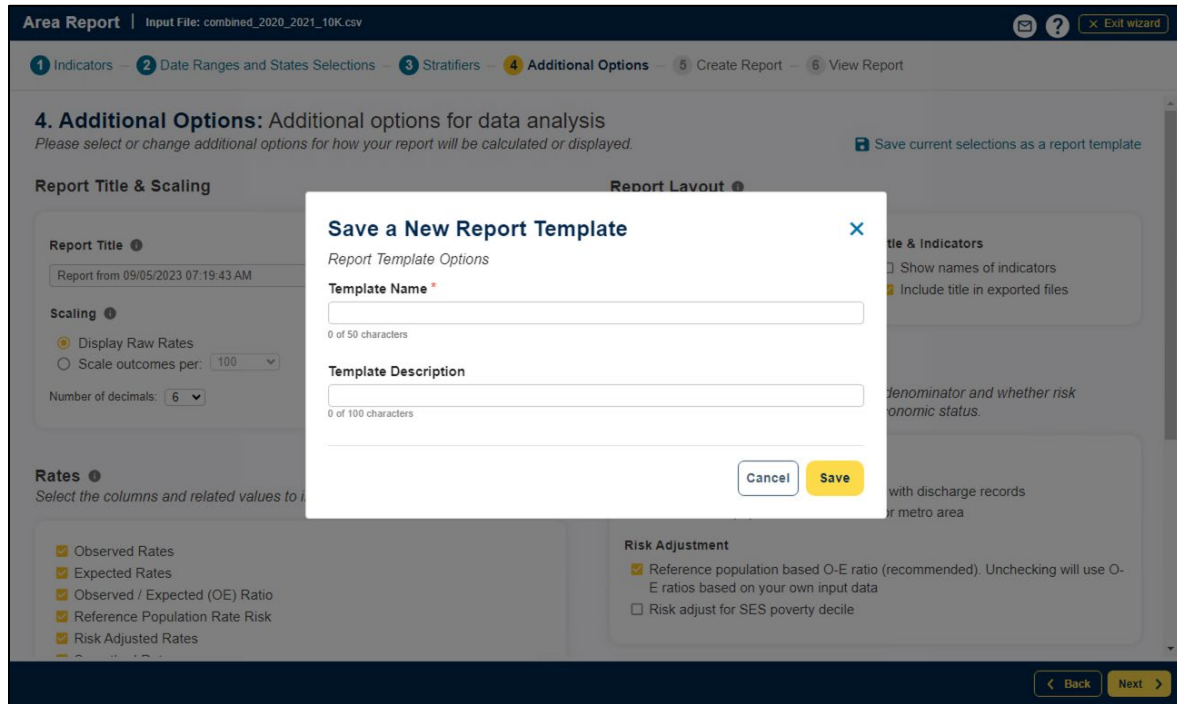
12.3.5.   Create Report

12.3.5.1. What Is This Screen For?

This screen (Screenshot 36) displays the progress of your report as it is created. When the process is complete, you may view the report.

Screenshot 36: Create Report
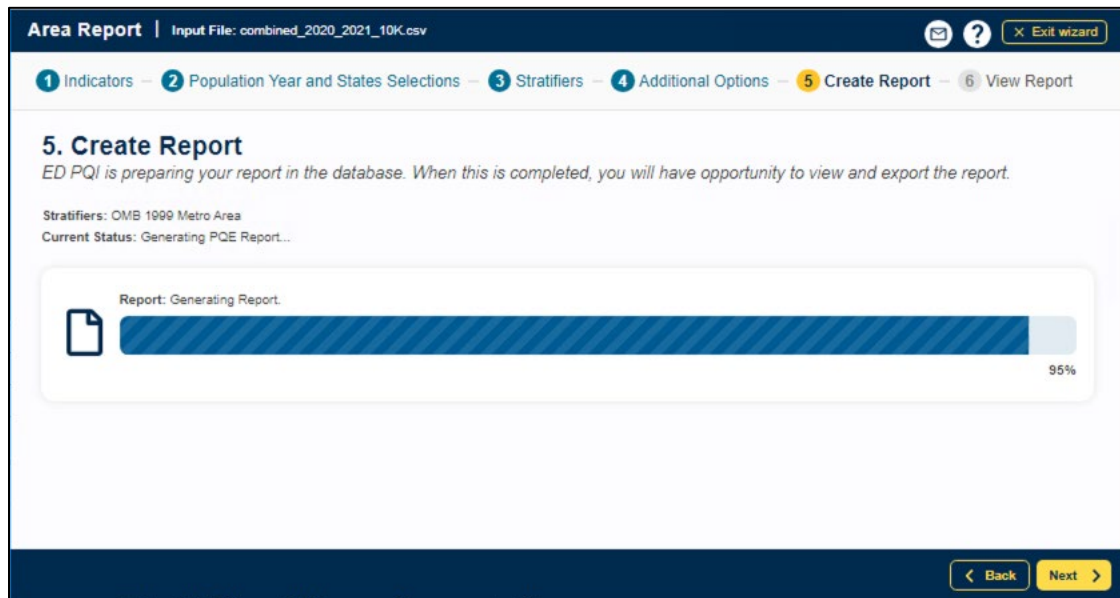
12.3.5.2. How Is This Screen Organized?

The window displays its current processing status so that you can track its progress.

12.3.5.3. What Should I Do Here?

You don't need to do anything on this screen until the processing is complete. Once the progress bar has reached 100 percent, click <**Next**> to view the report. This report can be viewed later from the main window using the <**My Exports**> section. The report will be saved until you generate another report.

12.3.6. View Report

12.3.6.1. What Is This Screen For?

This screen (Screenshot 37) displays the area- and hospital-level reports that have been generated. The last report that was generated is shown. You can access this window from the main menu, or you may access it immediately after creating a report. Once a report has been generated, it stays in the database until another report is generated. You can export the report to save the data permanently. See Appendix C for detailed information about the export format.

Screenshot 37: View Report

12.3.6.2. How Is This Screen Organized?

12.3.6.2.1.   Report Summary

① The report provides the following information about the displayed report:

- **Report Title**
- **Source Data**—The data file that was used to generate the report
- **Treatment of COVID Diagnoses**—How this report handles COVID diagnoses (v2023 hospital reports only)
- **Rates Per**—The report scale; depends on the level of report displayed. You will see different bar sizes depending on the magnitude of the rate.

    – Area-level report = "population"

- **Created**—The date and time the report was generated.
- **Rows in Report**—The total number of rows being displayed in the report.
- **Filter by Indicator**—If you are interested only in a specific indicator(s), you can check to see whether issues in your data could impact this indicator(s). You can search by one indicator at a time from the drop-down list. Only indicators for the selected modules will be shown.
- **Filter by County**— You can filter the report data by county.
- **For Area Report**—By All Counties (default) or a single county.

12.3.6.2.2.   Report window

② The large area in the center of the **Reports** screen displays the report data. Data displayed may include any of the following columns:

- Indicator
- Age Category
- Sex
- OMB 2003 Metro Area
- Observed Numerator
- Observed Denominator
- Observed Rate
- Expected Rate
- O/E Ratio
- Risk-Adjusted Rate
- Smoothed Rate[3]
- Risk Adj Conf Int Low

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[3] Smoothed rates will not be calculated for strata within stratified indicators. Only the overall indicator will have smoothed rates.

- Risk Adj Conf Int High

12.3.6.2.3. Screen controls

The <**Export this report**> link can be used to export the report in CSV format so that it can be read by Excel or other programs. The report will then begin to appear in the "My Exports" section of the home page.

The <**View Advanced Data Load Report**> link will bring up the Advanced Data load report. You may want to explore this report if you want to get a better sense of data issues in your dataset that may have had an impact on one or more indicator rates. Data issues may be due to issues with any of the following: not mapping certain fields, missing or erroneous data values, or explicit user instructions during crosswalk. Impact may be on indicator logic, risk adjustment, and/or grouping (stratification) of reports. See Section 9.10.4 for further detail on the Advanced Data Load Report.

The <**Expand Report Table**> link will expand the data section of the report to a full-screen view.

If you would like to go back and make changes to the **Additional Options for Data Analysis** screen, click the <**Back**> button. If you are satisfied with the report, click <**Done**>.

12.3.6.3. What Should I Do Here?

To see more records, use the **Page Controls**, or use the <**Rows per Page**> control under the data table. To change the data filter, you may select a different filter criterion in the **Filter by Hospital** (or **Filter by County**) drop-down box.

12.4. Hospital-Level Report (PSIs)

This section explains the process for creating a hospital report from your data. The Hospital-Level Report shows calculated QI rates for hospital-level indicators. Hospital-level indicators address questions such as the following: "Did the patient experience an adverse quality-related event while in the care of a specific healthcare hospital?" Or "did the patient have an inpatient procedure for which there are questions of overuse, underuse, or misuse?" You can refer to the *Empirical Methods* document (https://qualityindicators.ahrq.gov/Downloads/Resources/Publications/2024/Empirical_Methods_2024.pdf) for more information on calculating hospital-level rates.

When calculating the report, you may select specific indicators and filter or group them by specific criteria. Details are presented in the sections that follow. The steps for running this report include the following:

- Select Indicators
- Select Filter Criteria (Hospitals, Date Range, and Composite Measures)
- Select Stratifiers
- Additional Options for Data Analysis

- Create Report
- Display Report

12.4.1. Select Indicators

Use this screen (Screenshot 38) to specify the indicators to include in the report.

Screenshot 38: Select Indicators (Hospital Report)
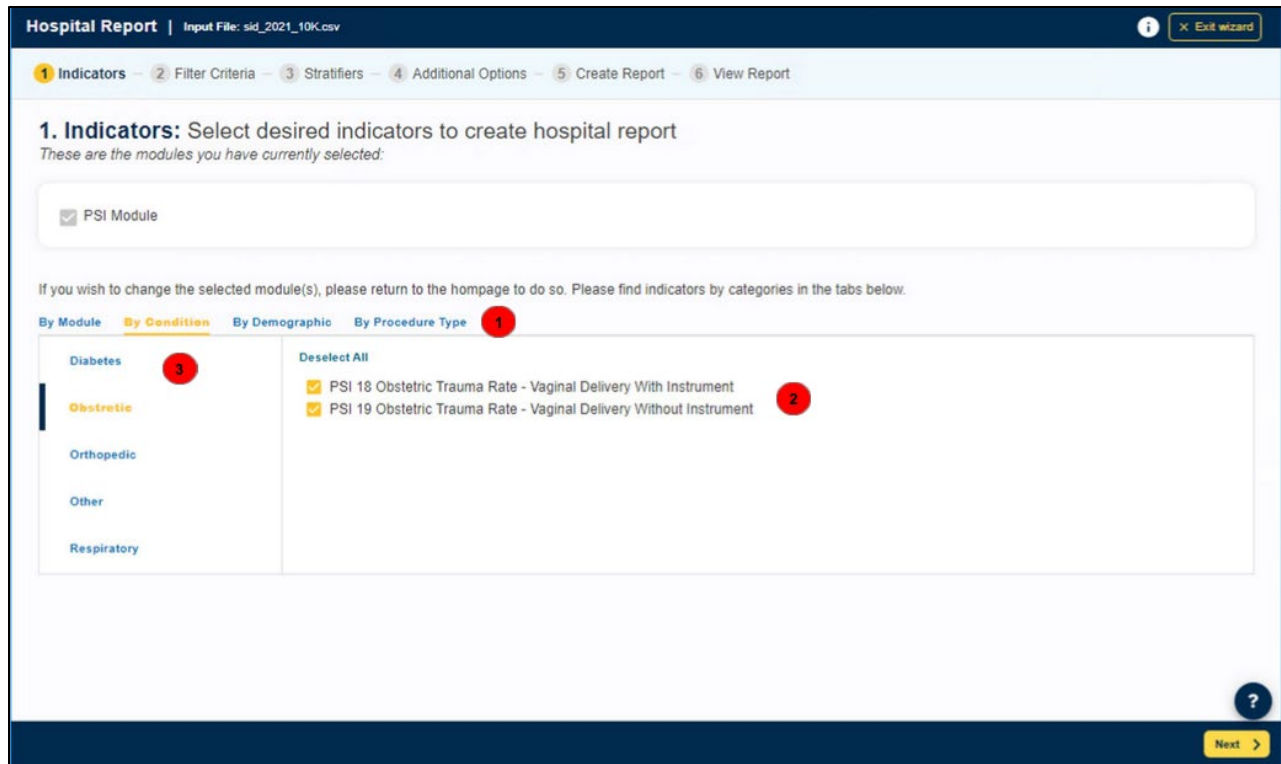
12.4.1.1. How Is This Screen Organized?

Indicators are organized according to categories that may be of interest to different types of users. Each indicator is listed in several different tabs. Stratified indicators will also appear on this screen and are labeled accordingly (e.g., Stratum A, Stratum B, etc.).

> NOTE: If you have created reports previously, <u>all</u> of your selections have been saved. To specify a new group of indicators, deselect and select the indicators as desired.

12.4.1.1.1. Top-Level Tabs

- **By Module**—The traditional way of calculating indicators; separate tabs for the PSIs, IQIs, PQIs, and PDIs. Only those modules that you selected on the earlier screen will be shown here.
- **By Condition**—Screens for indicators that are grouped by the particular condition.
- **By Demographic**—Screens for each of several interesting demographic groupings.

- **By Procedure Type**—Separate screens for indicators related to medical, surgical, and obstetric cases.

12.4.1.1.2. Subtabs

Each of the tabs contains a number of screens, as described in the preceding section, that are accessed via the subtabs.

12.4.1.1.3. Indicators

Each screen (subtab) contains a list of indicators with checkboxes. All indicators apply to that category and subcategory. For example, the **Respiratory** subtab under the **By Condition** tab lists all hospital-level indicators for the respiratory condition for the selected modules.

12.4.1.2. What Should I Do Here?

Click on one of the tabs in the top row to select a category. When a tab in the top row is clicked, subtabs are displayed below the main tabs.

Select the indicators for which you would like to run a report. You can use the tabs and subtabs to locate specific indicators. There is no need to search through all the tabs if you know exactly which indicators you are looking for. Instead, it may be more useful to search in the **By Module** tab.

Click <**Next**> when the desired indicators and composites have been selected.

12.4.1.3. Other Questions

12.4.1.3.1. Why Can't I Find An Indicator That Used To Be On This Screen?

Area and hospital-level indicators pertain to different populations and are separated into two completely different processes. You will see only area-level indicators under Area-Level Report. Additionally, only indicators for the modules you have chosen will appear on this screen. If you would like to view indicators for a different module, you will need to return to the main screen and generate indicators for additional modules.

12.4.1.3.2. What If I Just Want To See The Cases For Each Indicator?

You don't need to create a full report to see the individual cases for each indicator. After you have imported your data file, you can view the cases using the Patient-Level Report option (see Section 12.6).

12.4.2. Select Filter Criteria (Hospital Reports Only)

This screen (Screenshot 39) lets you limit the discharge records that will be included in your report. Using the tabs on the screen, you can select hospitals, date ranges, and composite measures to include in your report.

Screenshot 39: Select Filter Criteria (Hospital Reports)
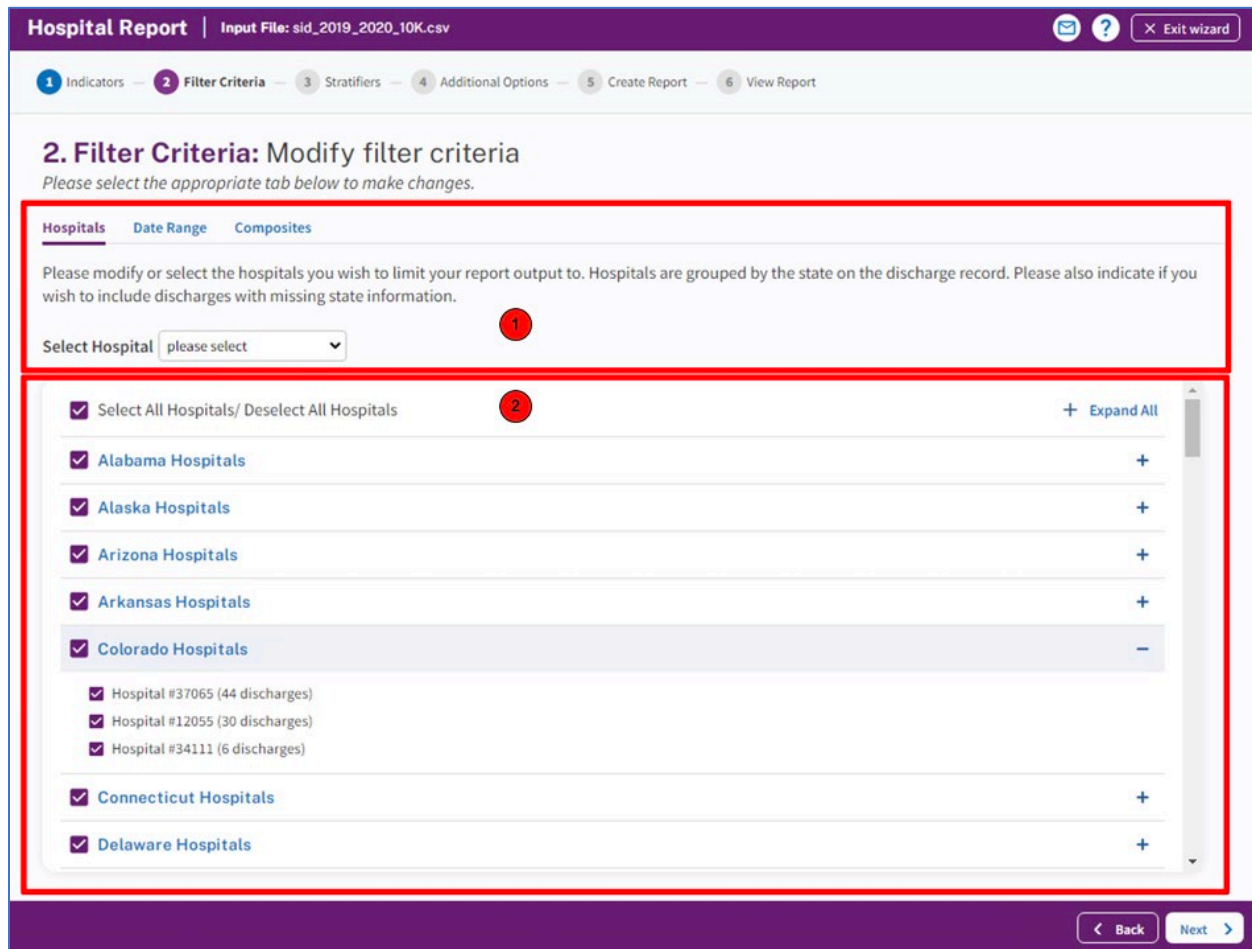
12.4.2.1. Select Hospitals

When the Hospitals tab is selected, the screen will display a list of all the states represented in the input data, and each hospital will be listed under the state. Note that if your data set contains too many hospitals, the software will disable the selection screen and automatically select all hospitals. The software will disable the selection screen after the number of hospitals reaches 900.

12.4.2.1.1.   How Is This Screen Organized?

12.4.2.1.1.1.   States In Input Data

Checkboxes allow you to select (or deselect) all the hospitals in a state at once. If you are interested in hospitals in a specific state, you should deselect all state hospitals and then use the <**Jump To**> control to choose the state in which you are interested and select all hospitals in that state.

2

12.4.2.1.1.2. Hospitals In Each State

The hospitals and number of discharges are displayed here under their state.

12.4.2.1.2. What Should I Do Here?

Check the states and hospitals you want to include in your report. By default, all hospitals in all states will be selected. For each of the tabs, there will be a **Deselect All** and a **Select All** option. These controls are a quick way to deselect all hospitals and select the few in which you are interested. The next time you log in to the application to run a hospital report, the selections you chose in the previous session will be the new default selections.

12.4.2.1.3. Other Questions

12.4.2.1.3.1. How Is The Hospital's State Determined?

During the data load, the program collects a list of hospitals from the **Hospital ID** and **Patient State/County Code** from the discharge records. The default hospital county is the first county (in the **Patient State/County** field) read for that hospital.

12.4.2.1.3.2. What Is Done With Records From Hospitals That Are Not Checked?

These discharge records will not be included in your report. This feature allows you to generate different hospital-level reports with different data without having to edit and reload your data file.

12.4.2.2. Select Date Range (Hospital Reports)

12.4.2.2.1. What Is This Screen For?

When the **Date Range** tab is selected (Screenshot 40), you can limit the discharge records you wish to include in your report to only those discharges that occurred during the selected quarters.

Screenshot 40: Select Date Range (Hospital Reports)
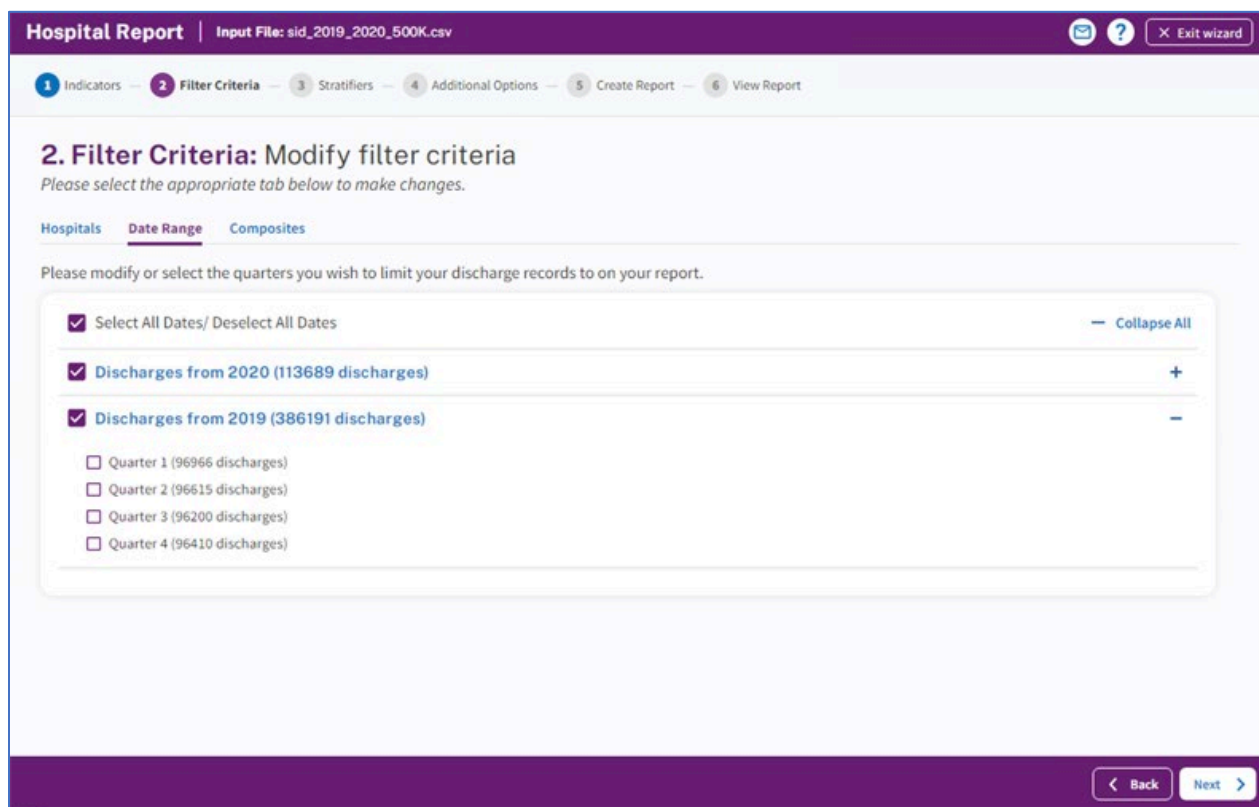
12.4.2.2.2. How Is This Screen Organized?

12.4.2.2.2.1. Discharge Year

Each year represented in the input data is listed.

12.4.2.2.2.2. Quarters

The quarters for each year in the input data are listed under the corresponding year.

12.4.2.2.3. What Should I Do Here?

Select the checkboxes next to the quarters that you wish to include in your report. The Select All Dates/ Deselect All Dates checkbox will easily allow you to choose all of or none of the available dates. The <+> and <-> buttons to the right of each discharge year will allow to expand or collapse the quarterly discharge data for each year.

12.4.2.2.4. Other Questions

12.4.2.2.4.1. How Can I Generate A "Rolling Year" Report?

A "rolling year" report is one in which the results reported for each quarter include the previous three quarters of data (e.g., 2003 Q1 includes discharges from 2003 Q1 and 2002 Q2–Q4; 2003 Q2 includes discharges from 2003 Q1–Q2 and 2002 Q3–Q4).

You cannot generate this report in a single pass because each discharge record would have to be included in the total for different quarters. However, you can run through the reports process several times and select a different rolling set of quarters for each report. (Do not select "Year" or "Quarter" as stratifiers.) You will still need to merge these reports using a spreadsheet program.

12.4.2.3. Composite Measures (Hospital Reports)

When the **Composites** tab is selected (Screenshot 41), you can choose whether to include the composite measures and, if so, what weight to assign to each indicator that makes up the composite. Composite measures are weighted averages of individual component measures.

Screenshot 41: Composite Measures (Hospital Reports)

Module	Rate
PSI 3 Pressure Ulcer Rate	0.193668468020
PSI 6 Iatrogenic Pneumothorax Rate	0.034224941630
PSI 8 In Hospital Fall with Hip Fracture Rate	0.050571996535
PSI 9 Postoperative Hemorrhage or Hematoma Rate	0.040865950913
PSI 11 Postoperative Respiratory Failure Rate	0.238448000785
PSI 12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate	0.156548387596
PSI 13 Postoperative Sepsis Rate	0.193522074455
PSI 14 Postoperative Wound Dehiscence Rate	0.016931155608
PSI 15 Abdominopelvic Accidental Puncture or Laceration Rate	0.023618303196

12.4.2.3.1. How Is This Screen Organized?

12.4.2.3.1.1. Measures And Components

A checkbox appears next to each of the composite measures. The indicators comprising the composite measure are listed below each composite measure name.

12.4.2.3.1.2. Weights For Component Indicators

A field for the relative weight appears next to each indicator. You have the ability to make changes to the composite weights. Please do so with deliberation. If you change a weight, the total (for the indicator with POA and for the indicator without POA) must still add up to 1.

12.4.2.3.1.3. Your Custom Composite Weight Changes

This area displays the default weight and the new weight for any value you have changed. If you did not make any changes to the default values, you will not see this section.

12.4.2.3.2. What Should I Do Here?

Check the composite measures that you wish to include in your report. You may increase or decrease the weight assigned to each indicator as desired, or you can set the weight to 0 to exclude the indicator from the composite altogether. However, the weights for each of the component QIs must be between 0 and 1, and the weights across the entire component QIs must sum to 1. Also, you must assign weights to every component QI, including weights of 0 for all component QIs that are to be excluded from the composite. Changing weights is generally not recommended. Please do so with deliberation.

If you would like to reset the composite measures back to the default weights, click on the <**Reset all Custom Values**> control.

12.4.2.3.3. Other Questions

12.4.2.3.3.1. How Are The Composite Measures Calculated?

The hospital-level composite measures are calculated from the following formula:

$$\frac{\sum_1^n Smoothed\ rate_i \times Weight_i}{Population\ rate_i \times \sum_1^n Weight_i}$$

where $i = 1, 2 \ldots n$, where n is the number of indicators composing the composite measure.

Additional details are provided in the *Empirical Methods* document (https://qualityindicators.ahrq.gov/Downloads/Resources/Publications/2024/Empirical_Methods_2024.pdf).

12.4.2.3.3.2. My Report Has Missing Values For The Composite Measures. Why?

Missing values for the composite measures can be attributed to any of the following issues:

1. **Calculate Smoothed Rates** was not selected on the **Additional Options for Data Analysis** screen (see Section 12.3.4). If smoothed rates are blank, then the formula shown above will result in a missing value.

2. All component measures that contribute to the composite measures were not selected. If any of the necessary component measures are left out, this will result in a missing value.

3. The necessary stratifiers were not selected. Selected Year and Quarter will produce composite measures. Any stratifiers chosen outside of these stratifiers will result in missing values.

12.4.2.3.3.3. Where Can I Find More Information About The Use Of Composite Measures?

The AHRQ QI team conducted several workgroups on composite measures, one for each of the following modules: PQIs, IQIs, PSIs, PDIs. The reports from these workgroups can be downloaded from their respective QI resource screens.

PQI Module:
https://qualityindicators.ahrq.gov/Downloads/Modules/PQI/v2024/PQI_Composite_Measures.pdf

IQI Module:
https://qualityindicators.ahrq.gov/Downloads/Modules/IQI/v2024/IQI_Composite_Measures.pdf

PSI Module:
https://qualityindicators.ahrq.gov/Downloads/Modules/PSI/v2024/PSI_Composite_Measures.pdf

PDI Module:
https://qualityindicators.ahrq.gov/Downloads/Modules/PDI/v2024/PDI_Composite_Measures.pdf

12.4.3. Select Stratifiers for Use With Hospital Indicators

This screen (Screenshot 42) is used to build a hierarchy of stratification (grouping) for hospital-level indicators. On this screen, you will indicate to the software which variables you want your output report grouped by. You will also indicate the order of the "group by" variables.

Screenshot 42: Select Stratifiers (Hospital Reports)
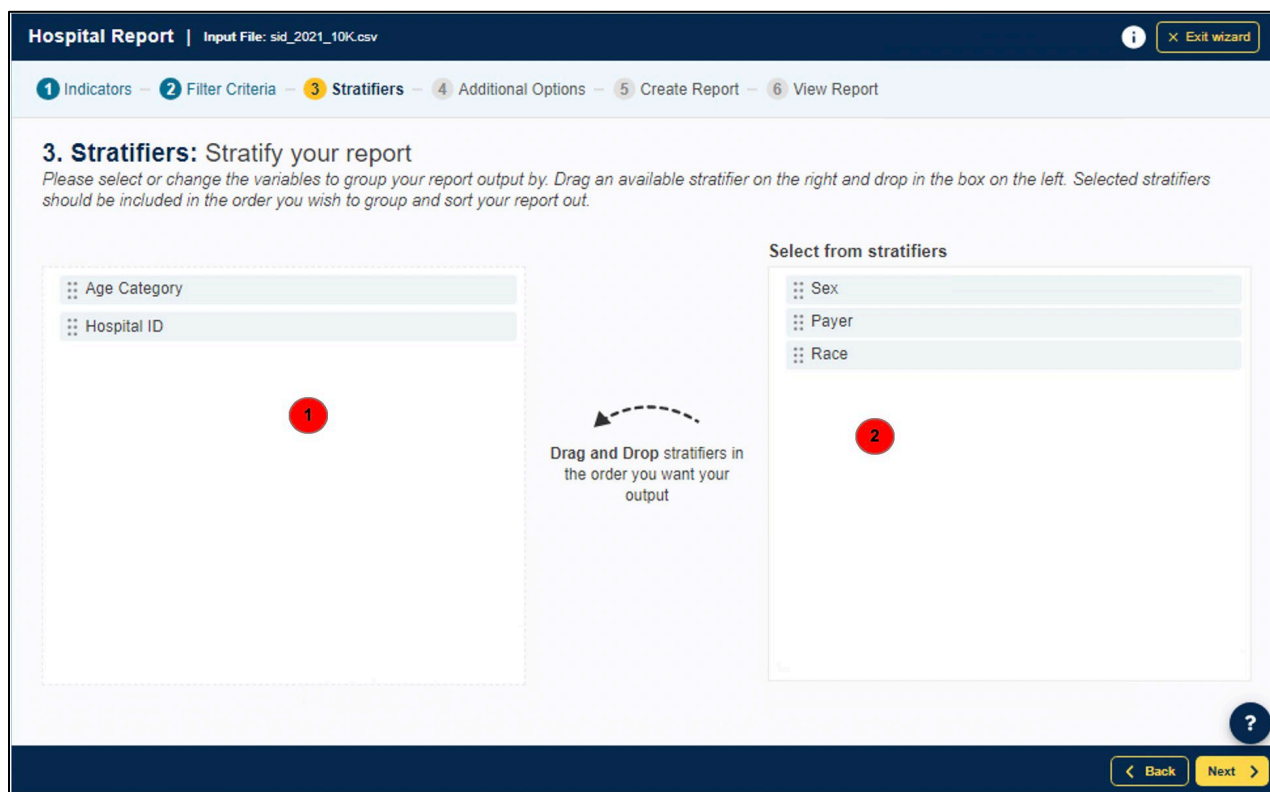
12.4.3.1. How Is This Screen Organized?

12.4.3.1.1.   Selected Stratifiers

Displays the hospital-level stratifiers (variables by which to group the report) currently selected, in the hierarchical order in which they will be sorted.

12.4.3.1.2.   Select From Stratifiers

This area displays a list of available stratifiers (variables by which to group the report) that can be used for reports on hospital-level indicators.

12.4.3.2. What Should I Do Here?

Click on a desired stratifier in the "Select from Stratifiers" box, drag it to the selected stratifiers area, and drop it in the desired position. Hospital-level stratifiers include the following: Age category, Five-year age group, Sex, Payer, and Race. Of these columns, only those that are available in the input file (and mapped to QI variables) are available for stratification.

To remove a selected stratifier, click and drag it back to the **Select from stratifiers** list.

To reposition a stratifier, click and drag it up or down in the list of selected stratifiers. You will see a line that shows you where the stratifier will be placed.

The risk adjustment stratified report will be calculated and displayed with the stratifications you select.

- Overall and/or Hospital for Hospital Report — If no stratifier (i.e., Overall) or Hospital is selected, then it computes and displays risk-adjusted rates, smoothed rates, and corresponding variance estimates

- Age and/or Sex stratification combination — Only risk adjusted rates and variance are calculated. Note that the risk-adjusted rates are calculated as observed over expected (O/E) ratio. In the "View Report" screen, you will see warning message "*For more granular stratification that includes age or sex as stratifiers, the risk-adjusted rates are suppressed from the output. Note that any stratification that includes age or sex are not supported because these factors are included as covariates in risk adjustment.*"

- Any other stratification combination — Only risk adjusted rates and variance are calculated. Note that the risk-adjusted rates are calculated as O/E ratio. In the View Report screen, you will see the warning message "*For more granular stratification that includes stratifiers other than age or sex, only risk-adjusted rates and variance are calculated.*"

12.4.3.2.1. What Is a "Stratifier"?

A stratifier is a variable or characteristic by which data will be broken down. In database parlance, this is equivalent to an item in a "group by" clause.

12.4.3.2.2. What If I Just Want the Totals For Each Indicator?

Do not select any stratifiers.

12.4.3.2.3. Does the Order Matter?

Yes. It determines the order in which the stratifiers are listed in the reports and the order in which the rows are grouped/sorted.

12.4.3.2.4. How Do I Know Which Stratifiers To Select?

Select stratifiers that will provide you with useful information. For example, if you are from a single hospital, selecting the stratifier "Hospital ID" will not provide you with any useful information. If your data do not separate patients by race, then the "Race" stratifier will be of no use.

12.4.3.2.5. How Many Stratifiers May I Select?

You may select no more than 10 stratifiers. In practice, you generally will not want more than a few stratifiers. Selecting too many will subdivide your populations and reduce the statistical significance of the calculated rates.

12.4.3.2.6. What Are "Custom 1," "Custom 2," and "Custom 3"? Why Can't I Select Them?

These are custom stratifiers that may contain any information by which you wish to group your data. Each field will be enabled only if you provided a data mapping on the **Data Mapping** screen (see Section 9.4). Common custom stratifiers are physician name and hospital type.

12.4.3.2.7. How Large Will My Report Be?

You can obtain a rough estimate of the number of rows in your file by multiplying the number of distinct values for each of your selected stratifiers. The number of values will be shown in a tool tip when you point to the stratifier name in the right panel with your mouse. If you are doing a hospital report with 120 hospitals and 14 indicators, the report will be 1,680 rows for the hospital/indicator combinations plus 14 additional rows for the indictor totals for all the hospitals. Reports can be exported to and from the report generator and loaded into other software such as Excel. Only a limited number of lines can be viewed at one time in a report.

12.4.4.   Additional Options For Data Analysis

Please see Section 12.3.4, Additional Options for Data Analysis.

12.4.5.   Create Report

Please see Section 12 for information on how to create your report.

12.4.6.   View Report

Please see Section 12.3.6 for information on how to view your report.

12.5.   Composite Report

12.5.1.   What Is This Screen For?

This screen (Screenshot 43) displays rates (or ratios) for hospital-level composite indicators. The screen can be accessed by clicking the <**Composites**> button on the Hospital-Level Report.

The composite report shows calculated rates for hospital-level composite measures. A composite measure can be defined as a weighted average of its corresponding component indicators. Composite measures are defined for each module. Please see the **Technical Specifications** screen on the AHRQ QI website for a definition of all composite measures.

The *Empirical Methods* document (https://qualityindicators.ahrq.gov/Downloads/Resources/Publications/2024/Empirical_Methods_2024.pdf) provides a detailed explanation of how composite measures are estimated. Rates shown on the composite report screen are arranged by the stratifiers you selected on previous screens.

Screenshot 43: Composite Report

12.5.2. How Is This Screen Organized?

12.5.2.1. Report

At the top of the screen, the following information is provided about the displayed report:

- Title of the report
- Date and time the report was exported and generated
- Report Types: There are two report options available:

  – All Composite Indicators
  – Advanced PSI Comp Report

If you selected "All Composite Indicators," the large area in the center of the **Reports** screen displays the report data. Data are displayed in the following columns:

- Composite indicator name;
- Composite rate or ratio;
- Variance;
- Standard error;

- Weight;
- Lower bound of the rate/ratio confidence interval; and
- Upper bound of the rate/ratio confidence interval.

If you selected any of the "Advanced" options, additional columns are displayed to show the data elements for each component indicator used in the calculation of the composite. This will provide you more information on the calculation of the composite indicators. For each component indicator included in the composite indicator, the following additional columns are displayed:

- Risk-adjusted rate
- Number of discharges in the denominator (population at risk)
- Noise variance of the composite weight
- Reliability weight of the composite
- Component weight for the composite
- Reference population weight for the composite

12.5.2.2. Screen Controls

The buttons at the bottom of the **Reports** screen can be used to export the report and to close the report window.

The "Save Report" button at the bottom of the screen can be used to save this report in .csv format.

12.6. Patient-Level Report

12.6.1. What Is This Screen For?

This screen (Screenshot 44) provides a view of the individual cases flagged for each indicator. This screen can be useful for exploring which cases actually were included in the numerator and denominator for each indicator. There are two ways to access this report: by (1) drilling down on the observed numerator or observed denominator of a record on the area-level report, or (2) creating the patient-level report on the **Home** screen.

Screenshot 44: Patient-Level Report

12.6.2. How Is This Screen Organized?

12.6.2.1. Report Controls

Controls at the top of the screen allow you to select a QI module, an indicator from that module, a grouping of records to display, and the number of rows per page to display in the report.

- **Technical Specification (PDF)** —Allows you to download the technical specification pdf for the selected Indicator. Technical Specification document explains the calculations used to formulate each indicator, including a brief description of the measure, numerator and denominator information, and details on cases that should be excluded from calculations. This document is also available directly on the AHRQ QI website:

  – PQE: https://qualityindicators.ahrq.gov/measures/PQE_TechSpec

  – PSI: https://qualityindicators.ahrq.gov/measures/PSI_TechSpec

- **Module**—Allows you to choose the module for which you would like to view information. You will be able to choose between only those modules for which you have already generated

indicators. When drilling down from the area-level report, the selected module cannot be changed.

- **Indicator**—Allows you to choose a specific indicator for which to view records. When drilling down from the area-level report, the selected indicator cannot be changed.
- **Total Records**—Displays the total number of records the report contains for a particular indicator.
- **Search Key Field**—Allows you to enter a search term to search the data in the table below.
- **Rows per Page**—This control defines the maximum number of rows displayed per page while viewing the report online. The default of 20 rows allows you to view the report without scrolling; a different value may be more appropriate for a faster computer or if you wish to sort the data.
- **All Discharges**—All records loaded in the system for the data file.
- **Outcome of Interest (Numerator)**—All records that are included in the numerator of the selected indicator.
- **All Discharges**—All records loaded in the database for the data file.
- **Expand Report Table**—Allows you to expand the table below to show more rows in one view.

2

12.6.2.2. Screen Controls

Buttons at the upper right of the screen allow you to export the records and to navigate between screens of data in the Patient-Level Report.

3

12.6.2.3. Report Area

This area displays a list of the actual cases meeting the criteria of the **Report Controls** selections. The **Key** field and several other useful identifying columns are included.

12.6.3.   What should I do here?

Find the indicator in which you are interested by selecting the **Indicator** from the drop-down lists. When drilling down from the area-level report, **the selected module or indicator cannot be changed. The drop-down list of indicators shows the** number of cases included in the numerator, as well as the number of cases in the denominator (the denominator does not apply to all indicators).

Outcome of Interest is selected for display by default, so after an <**Indicator**> is selected, all records that were included for the selected indicator are displayed. You can select a different value for display if desired.

You may quickly search for a particular case by entering its **Key** value in the **Search** box and then selecting **All Discharges**. Records are returned if your search term can be found anywhere in the **Key** value.

Click on the <**Save This Report**> button to export all records in the report.

You may drill into any one row of this report to show the reasons that any particular case was flagged for this indicator. Click on the **Row in File** or **View Case Details** field to open the **Case Details** screen (see [Section 12.7](#)).

12.6.4. Save Multiple Reports

This screen (Screenshot 45) will let you save a patient-level report for all indicators for one or more modules. You can also select which type of information you want to include in the report (numerator, denominator, etc.).

Screenshot 45: Save Multiple Patient-Level Reports

Save Multiple Patient Level Reports ✕

Available Modules
Select one or many modules, patient-level reports of all indicators belong to selected modules will be saved.
☑ PQE

Report Types & Options
Select one or many types, patient-level reports will be saved
☑ All Discharges
☑ Outcome of Interest (Numerator)

Cancel   Continue

12.6.5. Other Questions

12.6.5.1. What Data Are Displayed?

Columns displayed on all reports include "Row in File," "Key," "Age," "Sex," "MDC," "DRG," "Num," and "Den." A value of "1" under "Num" or "Den" indicates that the record was included in the rate calculation of the selected indicator, and "0" indicates the record was not included.

12.6.5.2. How Can I See Why A Case Was Flagged?

Click on the "Row in File" or "View Case Details" under the "Indicator Logic" column to open the **Case Details** screen (see [Section 12.7](#)).

NOTE: Records excluded from the Population at Risk (denominator) are, by definition, also excluded from the Outcome of Interest (numerator). In all QIs, the numerator is a subset of the denominator.

12.7.   Case Details

12.7.1.   What Is This Screen For?

This screen (Screenshot 46), accessed by clicking on the specific row number or **View Case Details** link on the Patient-Level Report, lets you see exactly why a particular case was or was not flagged for a particular indicator.

Screenshot 46: Case Details

12.7.2.   How Is This Screen Organized?

12.7.2.1. Case Details

This area displays information from the record that may be used in some indicators.

12.7.2.2. Inclusion Rules

This area displays the rules for including a case in the denominator of this indicator.

12.7.2.3. Exclusion Rules

This area displays the rules for excluding a case from both the numerator and denominator of this indicator.

12.7.2.4. Flag Rules

This area displays the rules for including this case in the numerator of this indicator.

12.7.2.5. Tabular And Classic Views

The tabular view helps you to search and find a specific code (within procedure, diagnosis code, MDC, or MS-DRG) in the case details and to filter by numerator or denominator inclusions or exclusions. The classic view shows you all information and does not have a search function.

12.7.3. What Should I Do Here?

In the tabular view, you can search for a specific code within procedure code, diagnosis code, MDC, or MS-DRG and filter by numerator or denominator inclusions or exclusions.

You can view the details of one case using the scroll bar to display the entire report. Save this report as a rich text format (.rtf) file that can be emailed or printed.

Click on any underlined set name to retrieve a list of all the *International Classification of Diseases, 10th Revision, Clinical Modification* (ICD-10-CM) procedure codes, ICD-10-CM diagnosis codes, or Medicare Severity Diagnosis-Related Groups (MS-DRGs) that apply.

12.7.4. What Data Are Displayed?

The number and complexity of rules vary per indicator. Each rule may be based on a list of procedures, a list of MS-DRGs, a list of diagnoses, or a Boolean expression. See the *Technical Specifications* applicable to this indicator to interpret each rule. If there are procedure or diagnosis codes that match any of the lists referenced, the ICD-10-CM codes and descriptions will be displayed along with the rule.

12.7.5. Other Questions

12.7.5.1. What Other Covariates Are Applicable To This Indicator?

You may view the entire table of covariates for each PQE on the AHRQ QI website. See the parameter estimates link - https://qualityindicators.ahrq.gov/Downloads/Modules/PQE/V2024/Parameter_Estimates_PQE_v2024.pdf

12.7.5.2. How Can An Individual Covariate Be Interpreted?

You can often see the relative importance of different covariates from the magnitude of the coefficient; however, individual covariates are not intended to be interpreted in isolation.

12.8. Code List

12.8.1. What Is This Screen For?

This is a popup window (Screenshot 47) that displays the ICD codes that are used in indicator definitions. You can view these lists by clicking on the blue links on the **Case Details** screen. Each set corresponds to a list of codes that can be found in the *Technical Specifications*.

Screenshot 47: Code List

Code Table ✕

Diagnosis set TraumaToFace ①

Code No	Code Description
S01401A	Unspecified open wound of right cheek and temporomandibular area, initial encounter
S01401D	Unspecified open wound of right cheek and temporomandibular area, subsequent encounter
S01402A	Unspecified open wound of left cheek and temporomandibular area, initial encounter ②
S01402D	Unspecified open wound of left cheek and temporomandibular area, subsequent encounter
S01409A	Unspecified open wound of unspecified cheek and temporomandibular area, initial encounter
S01409D	Unspecified open wound of unspecified cheek and temporomandibular area, subsequent encounter
S01411A	Laceration without foreign body of right cheek and temporomandibular area, initial encounter
S01411D	Laceration without foreign body of right cheek and temporomandibular area, subsequent encounter
S01412A	Laceration without foreign body of left cheek and temporomandibular area, initial encounter
S01412D	Laceration without foreign body of left cheek and temporomandibular area, subsequent encounter
S01419A	Laceration without foreign body of unspecified cheek and temporomandibular area, initial encounter
S01419D	Laceration without foreign body of unspecified cheek and temporomandibular area, subsequent encounter
S01421A	Laceration with foreign body of right cheek and temporomandibular area, initial encounter

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③

Close   Save

12.8.2.   How Is This Screen Organized?

① 12.8.2.1. Set Name

This area displays the name for this set of codes. This set of codes corresponds to the SAS® format name in the formats library.

② 12.8.2.2. List of Codes

This area displays the list of MS-DRG or ICD-10-CM codes. Where available, the descriptions of each code are listed.

③ 12.8.2.3. Save the List

This option allows you to save a list of codes to a separate file that can be used with other programs.

> NOTE: Indicators that indirectly make use of a set of codes are not listed. Lists that are indirectly used include the list of surgical DRGs and operating room procedures.

12.8.2.3.1.   What Should I Do Here?

You can scroll through a list of codes here. Also, if you wish to import the list into another program, you may click on the <**Save**> button to save this list.

12.8.2.4. Other Questions

12.8.2.4.1.   What Is the Significance Of the Name?

The name of each "code set" corresponds to the same set of codes in the SAS format library. This name is a succinct way of referring to a group of codes that may be used by more than one indicator.

13. Helpful Tools

The Quality Indicators Windows® CloudQI software includes several helpful tools. These are discussed in more detail in this section.

13.1. Program options

13.1.1. What is this screen for?

This screen (Screenshots 48 and 49), accessed by clicking the <**Program Options**> control under Tools on the **Home** screen, allows you to change your Logging options and to save the Session Log.

13.1.2. How is the screen organized?

13.1.2.1. Logging

Screenshot 48: Program Options (Logging)

Specify a file to save the information written to the CloudQI Session Log. The Session Log will be appended to the specified file until the file reaches 400 KB. At 400 KB, the file will be truncated and started again. When requesting assistance to the AHRQ QI Technical Support Team, please include the relevant portions of your Session Log.

During the data error check screen, messages will be written to the log if certain types of data errors are found—for example, an invalid number in a numeric column. This option may be helpful if you wish to make corrections to your input file. You may adjust the number of errors saved.

13.1.2.2. Others

Screenshot 49: Program Options (Other)

- Text File Configuration: You may change the separator between the values in a row of data to "Tab" instead of "Comma."
- Additional Number of Codes to Include
- Link to access CloudQI API documentation

13.2.   Automation script

The automation script (Screenshot 50) allows you to assemble a series of functions and then run them in an automated manner either from within CloudQI or via the command line utility. Scripts may also be scheduled to run at a predefined time. You configure certain parameters from the CloudQI user interface to generate the automation script, and following that, can run the software without having to open the user interface. This feature is useful for users who run the software frequently with the same parameters (name/location/structure of input file, name/structure of mapping file, modules, etc.) and are comfortable using the command line instead of the user interface.

The user interface to generate the automation script is accessible from the Tools menu. Once the automation script is generated, it can be run from the command prompt, or from within the CloudQI application. See Section 13.2.1.2.

13.2.1.   My automation files

13.2.1.1. What is this screen for?

This screen shows all automation scripts you have previously created. You may view their details, run them, or delete them from here. You may also import an externally created script file.

Screenshot 50: Automation Script: My Automation Files
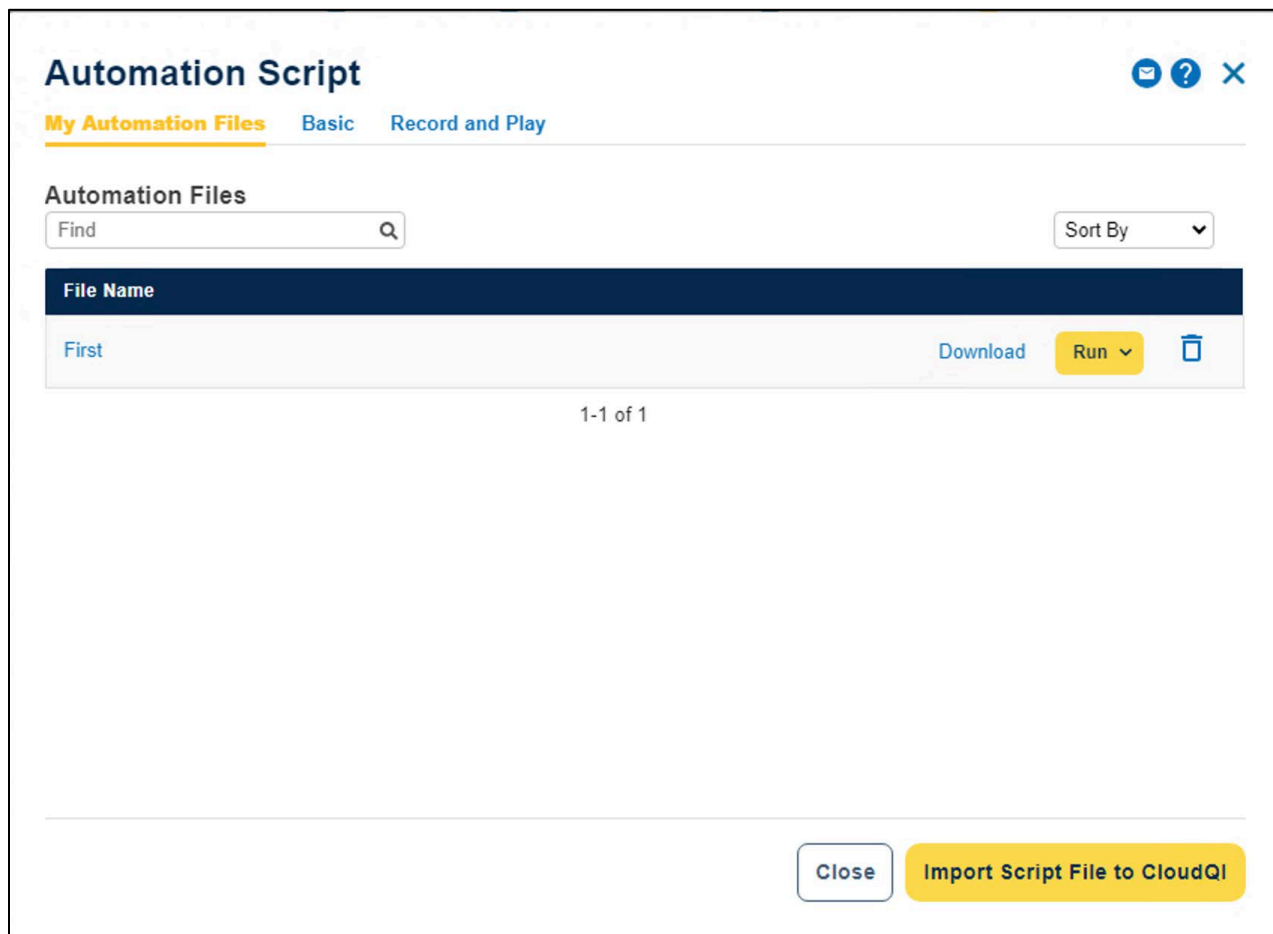
13.2.1.2. How is this screen organized?

This screen has the following parts:

1. **Sort By**—If you have multiple script files, you can sort them by date created (most recent first or least recent first) or alphabetical order (A–Z or Z–A).

Find—You can find a specific script file by typing in part of the name or description.

More Information—Hovering over the name of the file will enable you to see more information about that script file, such as the script type (Basic or Record and Play), the latest modified date, how the script file was created (shows "System Generated" if created by the user or shows "User Imported" if imported into CloudQI by the user), the input file in which it was created, and the CloudQI version with which it was created.

Download – This will download the script to your hard drive.

Run—This will run the corresponding script file in CloudQI. There are two options to run your script.

- **Run in the Application** – Selecting this option will display the existing parameters (such as Input file location, Mapping file location, etc.) configured in your automation script created with the Basic automation option (see screenshot 51). If the script was created using the Record & Play option, the screen will not show the existing parameters, but it will allow you to override the original setup used when recording the script with the Record & Play option.

Screenshot 51: Automation Script: Basic
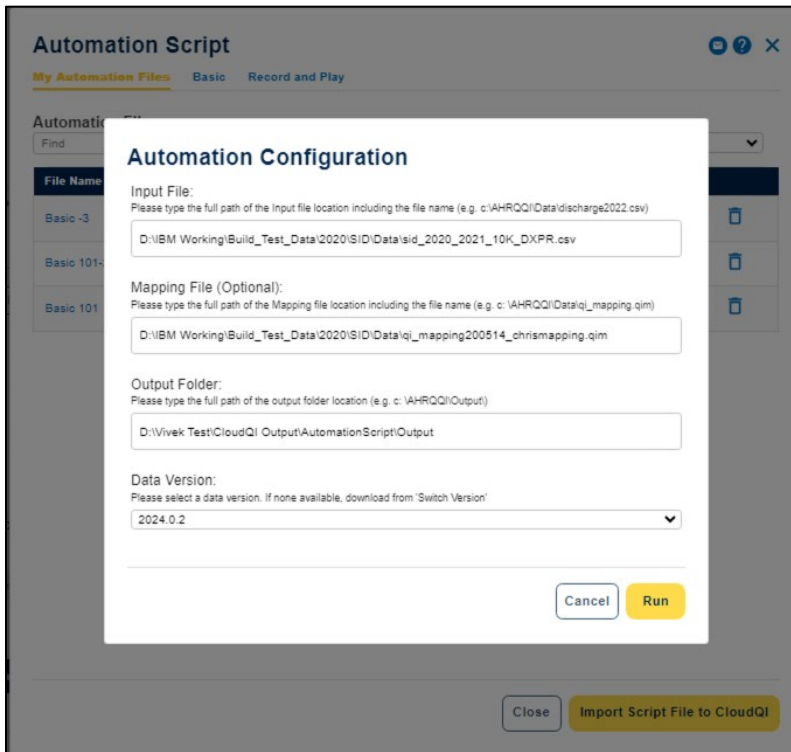
- **Run through Command Line** – You can download your script and run it using "curl" utility through the command line. This is a useful feature to process your files using scheduled jobs.

Starting with version 2024, in addition to classic desktop installation, CloudQI supports on-premises installation as a hosted application for multi-user access via a browser. The command line syntax has changed in v2024.

CloudQI utilizes the `curl` tool that can be run through the Windows Command Prompt or PowerShell to execute the automation scripts by interacting with CloudQI APIs. The `curl` tool may not be installed on your Windows machine by default. If you get an error saying "'curl' is not recognized...", you may install it by downloading the appropriate version for your OS from here.

In the multi-user mode. The system needs to know which user is running the automation script and requires you to identify yourself by providing login credentials when calling the scripts.

How to run automation script remotely with a command line console

Step 1: Download the automation file to your computer.

Step 2: Execute the curl utility with your parameters.

Use the syntax mentioned below (see Screenshot 52).

curl --location
http://localhost:5001/API/AutomationListService/RunAutomationScriptWithData --form
"automationFile=@[YOUR PATH TO AUTOMATION SCRIPT FILE] --form
"email=test12@test12.com" --form "password=[YOUR PASSWORD]"

This will run your automation batch file using the default parameters included in your script
file that you provided when saving the automation script.

Alternatively, you can call the automation batch files on the command prompt with parameters.
This is useful in overriding the values initially set up in the automation script file. The syntax
for this command with parameters is:

curl --location
http://localhost:5001/API/AutomationListService/RunAutomationScriptWithData --form
"inputFile=@[YOUR PATH TO INPUT FILE]" --form "mappingFile=@[YOUR PATH TO
MAPPING FILE]" --form "automationFile=@[YOUR PATH TO AUTOMATION SCRIPT
FILE]" --form "dataVersion=[DATA VERSION]" --output "C:\MyOutputFile.zip]" --form
"email=test12@test12.com" --form "password=[YOUR PASSWORD]"

Important Note:

1. The parameters 'email' and 'password' are only needed if CloudQI is hosted on your server
   and used in multi-user mode. If installed in desktop mode, these parameters are not
   required.

2. For the parameter "—output", please use FilePath\Filename.zip and make sure to mention a
   file name and not just the folder path.

Example:

curl --location
http://localhost:5001/API/AutomationListService/RunAutomationScriptWithData --form
"inputFile=@c:\myInput-File.ahrq" --form "mappingFile=@c:\MyMapping-file.ahrq" --form
"automationFile=@c:\MyAutomationscipt-file.ahrq" --form "dataVersion=2024" --output
"[File_Path\FileName.zip] --form "email=test12@test12.com" --form "password=
somepassword"

Automation scripts(.ahrq) may be "Basic" or "Record and Play".

Screenshot 52: Automation Script: Syntax
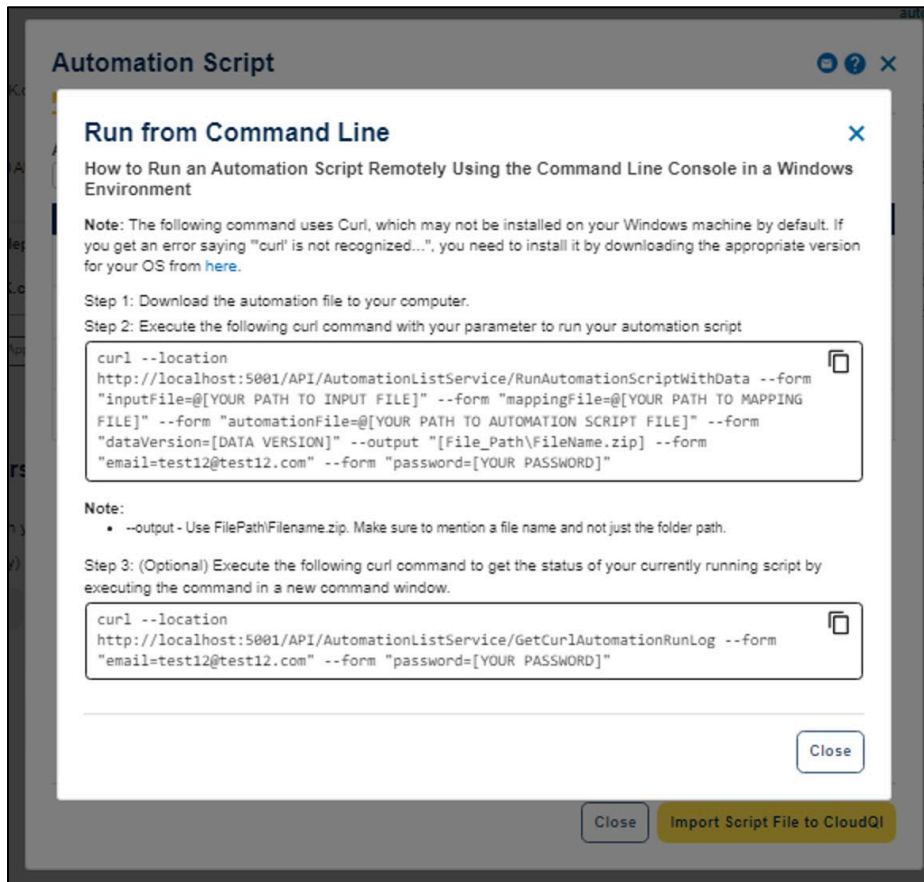
Delete—This will delete the script file previously created.

Import Script File to CloudQI—By clicking this button, you can import a script file created by another user of CloudQI. This will create an entry for the script in your **My Automation Files** screen with type **User Imported**. You can then run this script or view and edit it just like one of the scripts you created.

13.2.1.3. What should I do here?

Locate the script file you wish to work with. Then you may execute the script by clicking the corresponding **<Run>** link.

Additionally, you can click the "Import Script File to CloudQI" button and follow the prompts to import an externally created script file into your CloudQI installation.

13.2.1.4. Basic Automation

13.2.1.4.1. What is this screen for?

The automation script (Screenshot 53) allows you to run the CloudQI software to import data, generate rates, and create reports by running in the application or through the command line. You configure certain parameters once from the CloudQI user interface to generate the automation script; afterward, you can run the software without having to open the user interface through command line. This feature is useful for users who run the software frequently and are comfortable using the command line instead of the user interface.

This screen allows you to configure certain parameters (settings) and generate the Automation script. The script will be generated with the given settings on this screen like the input file, mapping file, modules to generate indicators for, reports to export and the location to export to.

Screenshot 53: Automation Script: Basic

Automation Script

My Automation Files   Basic   Record and Play

Select Data Type
Please select the data type of your input file.

[Inpatient ▾]

Script File Information
Please provide the file name and file description of this automation script file when it's saved.

File Name: *
0 of 50 characters

File Description:
0 of 100 characters

Import Data
Please provide the information below. The automation script will use this information.

Input File: *
Please type the full path of the input file location including the file name (e.g. c:\AHRQQI\Data\discharge2022.csv)

☐ Append File

Mapping File: *
Please type the full path of the Mapping file location including the file name (e.g. c:\AHRQQI\Data\oj_mapping.qim)

Generate Options
Indicate Treatment of COVID Diagnoses in Discharge Data (Not needed in V2024)
You have multiple options when analyzing the impact of COVID-19 on their data. Your selection will be used in generating rates for all modules. You will not be allowed to change your selection once you have generated the rates for at least one of the modules. You may change them once a new file is uploaded.

Note: the COVID exclusion options mentioned below are not applicable in v2024 and do not affect the outcomes. However, if you are utilizing an earlier version like v2023, please continue to use this option as needed.

○ **Exclude COVID Discharges**
Select to focus your analyses on non-COVID-19 cases. This will not suppress any rates and will display values for numerators, denominators, and observed rates, risk-adjusted rates, smoothed rates, and composites in the Hospital report.

● **No Exclusions for COVID**
This will only have values for numerators, denominators, and observed rates and will not calculate risk-adjusted rates, smoothed rates, and composites in the Hospital report.

○ **Exclude Non-COVID Discharges**
Select to focus solely on COVID-19 cases. This will only have values for numerators, denominators, and observed rates and will not calculate risk-adjusted rates, smoothed rates, and composites in the Hospital report.

Indicate MDC in discharge data
● **Data has MDC from MS-DRG Grouper**
Any records with missing MDC values will be excluded from all QI analysis.

○ **Data does not have MDC**
Risk-adjusted rates will be suppressed for hospital-level indicators.

Indicate if data on the number of days are available
*Your selection will be used in generating rates for **the selected** modules.*

PRDAY is the day on which the procedure is performed

● **PRDAY is included**
No suppression will be applied.

○ **PRDAY is not included**
This will suppress expected rates, risk-adjusted rates, smoothed rates, and composites rates for measures (PSI 04, 09, 10, 11, 12, 14, 15).

Run and Export Reports
Please select at least one report and folder location. The script will always have the default setting for the reports (such as, all indicators, report options etc.). The settings can be changed in the generated script directly.

☐ All Discharges (raw data)
☐ Hospital Level Report (Report Layout: Show indicators in rows)
☐ Patient Level Report

Folder Location to Export Reports and Data: *
Please type the full path of the output folder location (e.g. c:\AHRQQI\Output)

13.2.1.5. How is this screen organized?

The screen has various sections as described in the following sections.

13.2.1.5.1. Data Type Selection

With version 2024, CloudQI now supports multiple data types, including Inpatient and Emergency Department (ED) data. It is important to select the appropriate data type for processing your input file. If you are looking to automate PSI generation, choose the "Inpatient" data type. For PQE, select "Emergency Department" as the data type.

13.2.1.5.2. Script File Information

Enter a File Name for your script in the <**File Name**> field and then enter a description of your file in the **<File Description>** field.

13.2.1.5.3. Import Data

Enter your input file location/name and the corresponding mapping file location/name. Enter the full path (including the file name) of the Input and Mapping Files in the corresponding fields. Please note that the mapping file should be correct for the selected input file. You must specify both the input file and mapping file in order to generate the automation script.

You can create a basic automation script where you can choose to append your input data. Checking the <**Append File**> checkbox will append input file specified in the basic automation script to your existing uploaded data in CloudQI. The system will use the combined file to generate the rates.

Enter the complete file path for your input file and an appropriately match mapping file. Only Quality Indicators Mapping (.qim) files can be selected. These files can be produced from the software after importing a data file and specifying corresponding data mapping one time through the user interface. After entering the mapping file, please select the module(s) to generate indicators using the automation script. At least one module must be selected.

13.2.1.5.4. Choose Report Generation Options (only available if Inpatient data type is selected)

This section is only available if you select "Inpatient" as the data type at the top of the screen. For the PSI module using the Inpatient data type, the rate generation process considers your selections for specific options such as the COVID discharge flag (v2023), MDC availability in your data file, and inclusion of PRDAY. These selections will impact your results. You can read the onscreen description text to understand the impact of each selection.

13.2.1.5.5. Export Reports

At the end, choose the reports you would like to export from the automation script and the location where you would like to export them. At least one report needs to be selected.

Once you have entered the required information, click the "Save" button. Browse the folder where you want to save the generated automation script. The Automation script will be saved at the selected location. Run this script from the command prompt or from within the CloudQI application. See Section 13.2 for details on calling the automation script files with command prompt.

13.2.2. Record and play

13.2.2.1. What is this screen for?

On this screen (Screenshot 54), you can start the recording to create a customized automation script. Beginning such a recording will record all the actions that you subsequently perform on CloudQI related to importing a file, generating indicators, and/or running reports, which you can save as an automation script for later execution through CloudQI.

Note:

Running Record and Play batch scripts through a command line utility will always import your input file from a preset location on your machine and export your output to a preset location regardless of the location you may have selected for them when recording your script.

As a process, your input file is first uploaded to a temp folder [Typically: C:\Users\\[*username*]\AppData\Roaming\AHRQ\CloudQI\TempUploadedFiles] before processing.

Similarly, your output file is exported to a pre-fixed location [Typically: C:\Users\\[*username*]\AppData\Roaming\AHRQ\CloudQI\Downloads] independent of your selected location.

If you need to update these locations, you can do this in two ways.

1. Update the locations in the automation script file by opening in a notepad and saving it. The new location will be used in future runs.

2. Alternatively, you can use parameters to override these locations using the following parameters while calling the batch script on command prompt: "-inputfile", "-mappingfile", and "-exportlocation" (see Section 13.2.1.2 for details on how to use these parameters)

Screenshot 54: Automation Script: Record and Play (Shows multiple screens in the process)
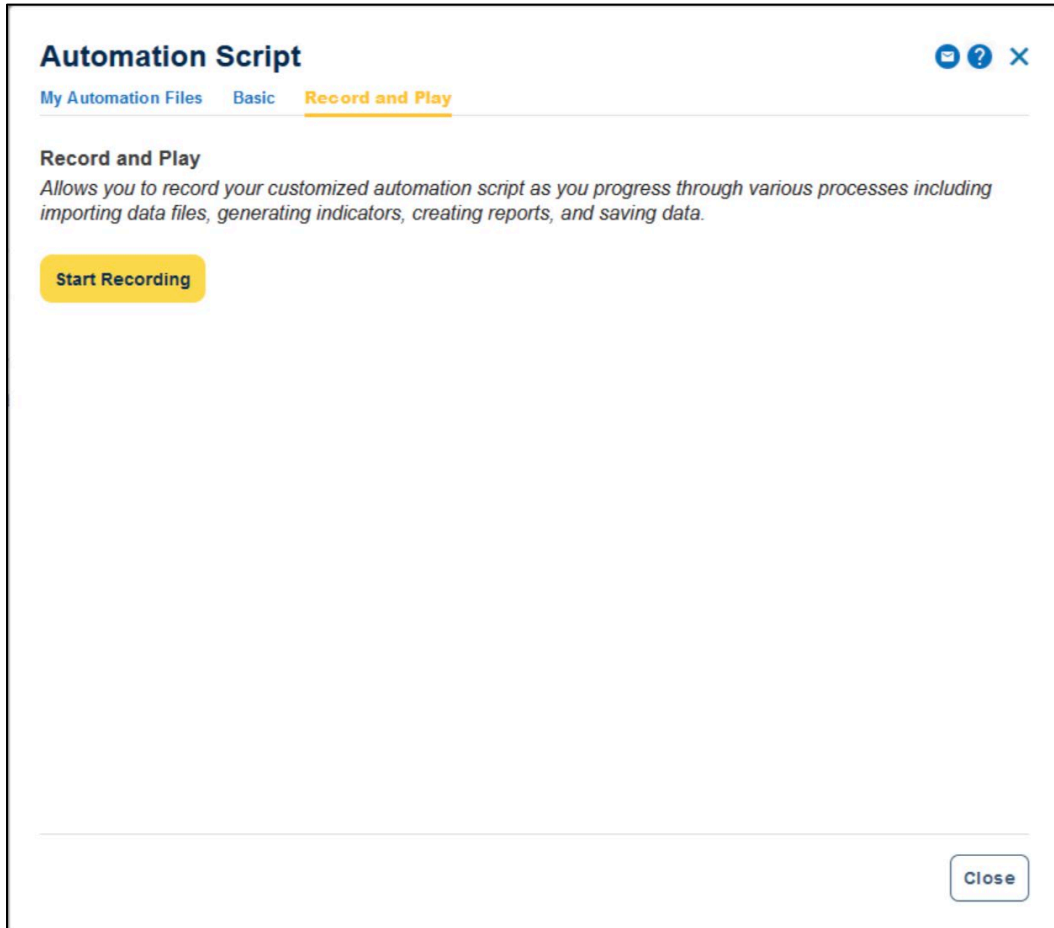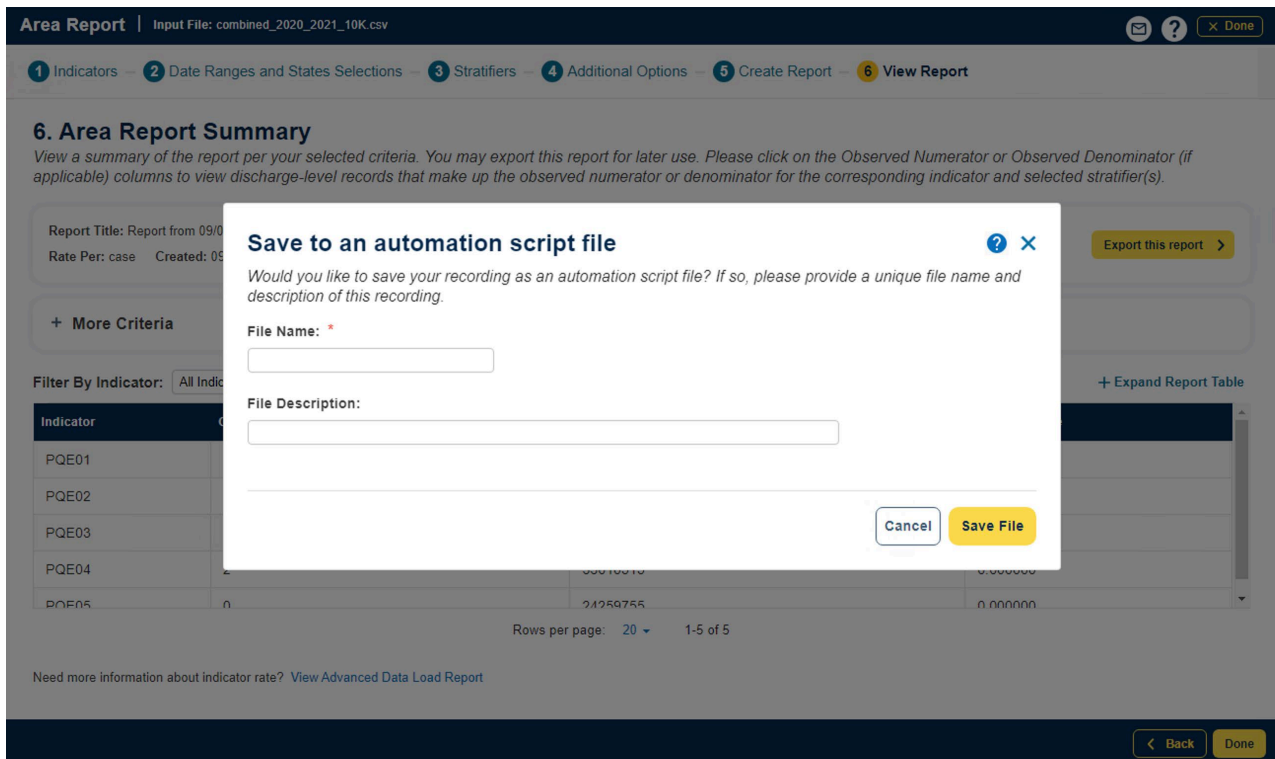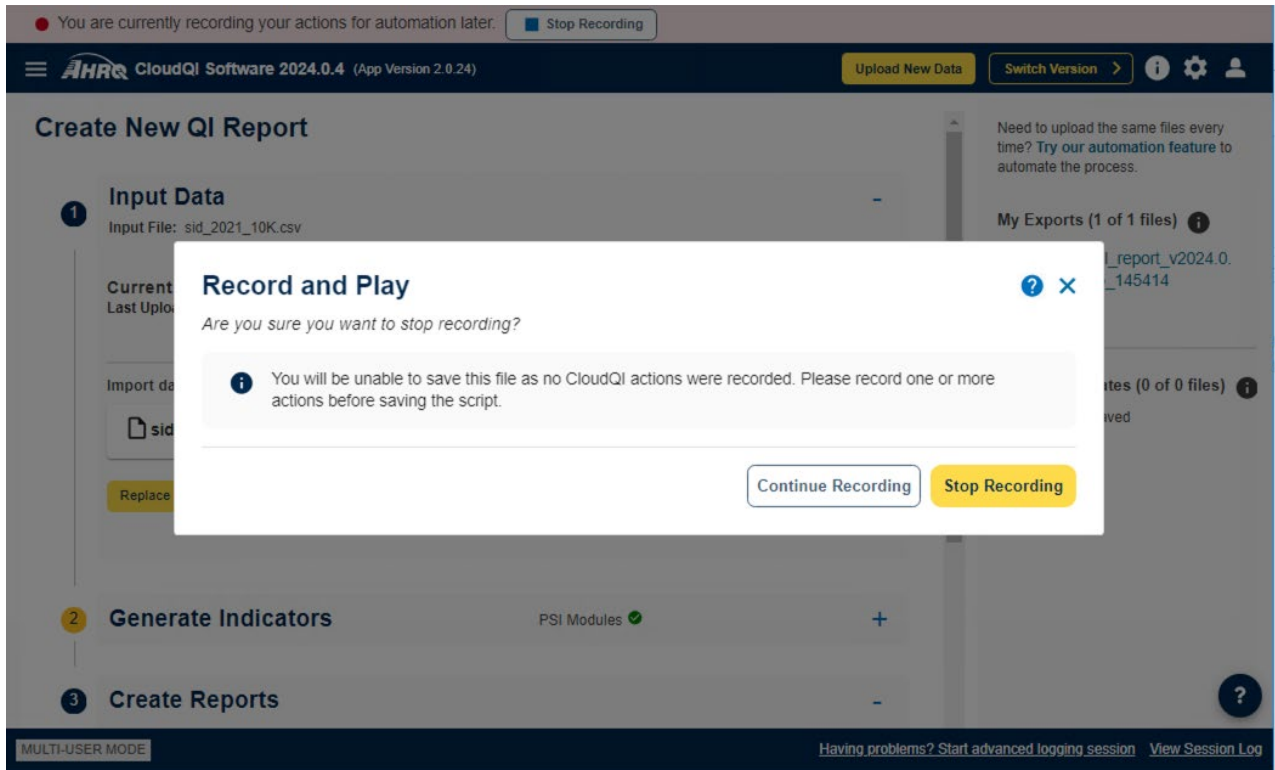
13.2.2.2. How is this screen organized?

There are multiple screens, hence the multiple steps in this process. The steps are as follows:

1. Click the <**Start Recording**> button.

Click and continue to perform your actions in the application, such as, import file, run report, etc.

Perform your actions.

Click the blue and white <**Stop Recording**> button located at the top of your screen.

Click the <**Continue Recording**> if you want to continue recording or the <**Stop Recording >** button to stop recording.

Provide the file name and a file description for the recording. This file will then begin showing on your **My Automation Files** screen.

13.2.2.3. What should I do here?

Click on <**Start Recording**> to begin the recording. Once you begin the recording, a pink bar will appear at the top of the page indicating that a recording is in progress until you click the corresponding <**Stop Recording**> button (see Screenshot 54 above). After completing your actions and clicking the <**Stop Recording**> button, be sure to save the recording by clicking on <**Stop Recording and Save**> and provide a file name and description. To continue recording rather than instead of stopping, click on <**Continue Recording**>.

13.2.2.4. Advanced logging

When you turn on the advanced logging feature, the CloudQI software will record details of your actions (including the corresponding timestamp) and the corresponding system responses in the Session log. Saving and sending this session log to the CloudQI support team will provide useful information to the team in troubleshooting any issues you may be encountering.

The Advanced logging has 4 steps:

1. **Turning on the advanced logging**—Please turn on the advanced logging before commencing your activities. Advanced logging may be turned on by

> a. Clicking the "Turn on Advanced Logging" feature under the top Tools menu if you have not yet imported a data file, or

> b. Clicking the "Having problems? Start advanced logging session" link on the Session log footer line.

2. **Perform your actions**—Once you turn advanced logging on, you can perform the actions you intend to (where you are experiencing issues).

3. **Turning off (ending) the advanced logging**—Once you complete the sequence of steps you wish to perform, you can turn off advanced logging by clicking "Turn off Advanced Logging" in the top Tools menu or by clicking "End Advanced Logging Session" in the Session log footer line.

4. **Saving your session log**—Upon ending the advanced logging, you will be asked to confirm how you want to proceed: choose either the <**Cancel**> button to continue your advanced logging session or click the button to "Turn Off Advanced Logging."

You will then be prompted to save the session log file. Please be sure to give it a meaningful file name and description. Once saved, you will be presented with an option of sending the advanced session log to AHRQ QI support in an email. This will open the installed email client in your machine so you can send the email and will also attach the normal and advanced session log. This advanced session log file will also appear in your "My Exports" section on the CloudQI Home screen. Email this session log to the QI Support email box.

14. Software Installation and Data Security

14.1. What software needs to be purchased in order to run the Quality Indicators?

The Quality Indicators Windows® CloudQI software is provided free of charge by the Agency for Healthcare Research and Quality (AHRQ) and is available for download from https://qualityindicators.ahrq.gov/software/default.aspx.

No additional software is required for purchase in order to use the CloudQI software. The software does require Microsoft® .NET Framework. The CloudQI installation process checks and installs the Framework if it is not installed.

14.1.1. What type of data is required by the AHRQ CloudQI software?

The AHRQ CloudQI software is provided with no data. The AHRQ CloudQI software is a tool that calculates the QIs based on an input data file containing either "Inpatient" or "Emergency Department" data types from your organization. See the Input Data Dictionary (Appendix A) for detailed descriptions of required data elements for each data type.

14.1.2. What information is collected by AHRQ?

No user registration is required to run this software. Beginning with v2024, AHRQ collects software telemetry information including usage and diagnostic information. Data collection does not include any personally identifiable information (PII) or protected health information (PHI). Users may opt out of telemetry information collection at any time. For additional information see Section 7.2.10. Users may also provide feedback within the software application (see Section 7.2.8) or by contacting the AHRQ QI Technical Support Team by emailing QIsupport@ahrq.hhs.gov.

14.1.3. What kind of individually identifiable health information is required by the AHRQ CloudQI software?

The AHRQ CloudQI software does not require any direct identifiers. However, the software does require detailed information for each case, including demographic data elements, like age and gender, and relevant diagnosis and procedure codes. Use of this information must comply with the Health Insurance Portability and Accountability Act (HIPAA) privacy and security policies of your organization.

14.1.4. What information is stored in the "Key" data element?

The **Key** data element is used by CloudQI for sorting discharge records and may facilitate possible exploration. The Key data element is typically unique and may be populated with a blind identifier for each case or patient, a medical record number, or a random sequence number. The intent is to give quality improvement staff the ability to conduct further analysis on individual cases that are flagged for specific indicators. The Key data element may be populated with any text, or it may be

left unmapped in the **Data Mapping** screen without affecting the flagging or rate calculation of the QIs.

14.1.5. What types of data files are used or generated by the AHRQ CloudQI software?

The AHRQ CloudQI software uses or generates the following types of files:

- **Input Data File**—The inpatient or emergency department file that the user prepares outside the AHRQ CloudQI software for loading with the Data Import Wizard. After the data load step has completed, this file is no longer required.
- **Patient-Level Report**—Users may export a file from the **Patient-Level Report** screen that contains the discharge-level indicator flags for the selected indicator and basic demographic data for each patient. This report allows users to see which cases were excluded, if desired.
- **Stratified Rate Report**—Users may export a file from the **View Report** screen that contains the stratified rates for selected area-level indicators. When the report is generated, users may select not to report rates with less than a specified number of cases in the numerator.
- **Case Details Report**—Users may save a copy of this report as a rich text format (RTF) file for later viewing. This contains individual medical information.
- **Data Load Reports**—Users may choose to save copies of the Data Load reports in RTF. These reports contain descriptive statistics about the input file and do not contain personal information.
- **Export QI File**—After using the Data Import Wizard, users may export a file that includes only those data elements used by the software as well as the indicator flags for each record. This file may be exported from the wizard or by using the <**Export Data**> option on the Main Menu. See Appendix C for a list of all the variables included in the exported data file for both "Inpatient" and "Emergency Department" data types.
- **Database Files**—Each time the user runs the Data Import Wizard, the data is populated into a database, which stores data in its own database file. Each time the Report Wizard is used, the resulting area-level report is stored in the database. These are overwritten the next time the user runs the wizard.
- **QI Session Log**—This is a log of debugging information generated by the software. You can view the location of this file in the **Program Options Configuration** screen under the Logging tab.

14.1.6. Does the AHRQ CloudQI Software require any data sharing or internet connection?

No. The AHRQ CloudQI software does not share data with any other computer and does not require an internet connection. Note that if the user is not connected to the internet, updates can be manually downloaded from the AHRQ QI Website. Please refer to the CloudQI FAQ document.

14.1.7. What sort of password protection is used by the AHRQ CloudQI Software?

The AHRQ CloudQI software relies on the Windows authentication and permissions of the local PC. See the local IT administrator for the relevant policies and procedures.

14.1.8. What permissions are required to install and run the AHRQ CloudQI software?

The AHRQ CloudQI software must be installed by a user with Windows administrator access. All users with access to the PC may run the AHRQ CloudQI software after it is installed.

14.2. Input data

14.2.1. What is the difference between these specifications and the Uniform Bill 04 (UB-04) specifications?

The data elements in the AHRQ QIs are based on the coding specifications used in the State Inpatient Databases (SID) and Emergency Department Databases (SEDD) from the Healthcare Cost and Utilization Project (HCUP). The SID and SEDD coding specifications are similar to those of UB-04 but not identical. For SID or SEDD data elements used in the AHRQ QIs, crosswalks between the data elements and UB-04 coding specifications are included in the documentation available at:

- SID - https://hcup-us.ahrq.gov/sidoverview.jsp#data

- SEDD - https://hcup-us.ahrq.gov/seddoverview.jsp#data

14.2.2. What if my ICD codes are in a different format?

You will need to translate your ICD codes into the required format for the software to interpret them properly. The software uses exact text comparison of procedure and diagnosis codes with the list of expected values to indicate each condition. If leading or trailing zeros are missing from the input file, the codes will not match.

14.2.3. Please give examples of correct ICD-10-CM codes.

Consider "011.0," a tuberculosis diagnosis. The required format for the CloudQI software is "0110," which is the complete code with the decimal point removed. The following are incorrect:

- "011.0"—wrong because the decimal point must be removed.
- "110"—wrong because the leading zero has been lost. This code would be interpreted as "110."—this is a completely different family of diseases.
- "011"—wrong because the required fourth digit is missing. This is not a complete diagnosis code.

14.2.4. Can I use ZIP Code™ instead of Patient State/County Code?

No. In order to calculate rates for area-level indicators, the CloudQI software contains a table of population figures for each county. If you do not have valid State/county codes, the population cannot be used for the denominator of area rates. If you are not interested in area rates, you can leave out the State/county code.

14.2.5. Why is the patient's State/County preferred to the hospital's State/County code?

Area-level indicators are designed to measure overall quality of care and access to care within the health system of a geographic area, such as a county. Patients in the numerator for an area-level indicator should be counted with the denominator based on the county in which they reside, and this location may not necessarily be the county in which they seek care.

14.2.6. What if I can't determine the correct crosswalk for a variable?

Consult the SID (https://hcup-us.ahrq.gov/sidoverview.jsp#data) SEDD (https://hcup-us.ahrq.gov/seddoverview.jsp) documentation for a detailed discussion of each data element. Also, check the AHRQ QI *Technical Specifications* for the indicators in which you are interested. For most of the mapped variables, only a few of the crosswalk values are of interest to the Cloud QI software.

14.2.7. My State has different crosswalk values. How can I determine the mapping?

If your State participates in the HCUP SID or SEDD you may wish to consult the State-specific HCUP documentation at https://hcup-us.ahrq.gov/databases.jsp.

14.3. Specifying and viewing reports

14.3.1. Can I stratify area-level indicators by hospital?

No. Area-level indicators are designed to measure potentially avoidable hospitalizations for the residents of a county.

14.3.2. Can reports be viewed after closing the Report Wizard?

Yes. The "View Saved Report" option on the main menu opens the **Reports** screen, displaying the data from the last set of reports generated using the Report Wizard.

14.3.3. What happens if a new report is generated?

A new report will be saved and be available to use under the "View Saved Report" screen.

14.3.4. Is there a way to save reports for later viewing?

Immediately following generation, a report can be exported to a comma-separated value format (CSV) or text (.txt) file and viewed in other software such as Microsoft Excel. After a different

report is generated, alternatively, to view an earlier report, use the "View Saved Report" screen from within the CloudQI software.

14.3.5. How can I get a list of cases that contributed to my rate for an indicator?

Use the Patient-Level Report (see Section 12.6).

14.3.6. Why was a particular case flagged by a particular indicator?

Use the Case Details Report to show you the definition of an indicator and how it is applied to a case (see Section 12.7).

14.3.7. Using different types of QI rates

When should you use the observed, expected, risk-adjusted, and/or smoothed rates generated by the AHRQ CloudQI software? Below are some guidelines. For additional information, see the Empirical Methods from the AHRQ QI website.

14.3.7.1. Observed rate

If the user's primary interest is to identify cases for further follow-up and quality improvement, then the observed rate would help to identify them. The observed rate is the raw rate generated by the CloudQI software from the data that the user provided. Areas for improvement can be identified by the magnitude of the observed rate compared to available benchmarks and/or by the number of patients affected.

Additional breakdowns by the default patient characteristics used in stratified rates (e.g., age, gender, or payer) can further identify the target population. Target populations can also be identified by user-defined patient characteristics supplemented to the case flags. Trend data can be used to measure change in the rate over time.

14.3.7.2. Expected rate

Another approach to identifying areas on which to focus is to compare the observed and expected rates.

The expected rate is the rate the hospital would have if it performed the same as the reference population given the hospital's actual case mix (e.g., age, gender, MS-DRG, and comorbidity categories).

If the observed rate is higher than the expected rate (i.e., the ratio of observed/expected is greater than 1.0, or observed minus expected is positive), then the implication is that the hospital performed worse than the reference population for that particular indicator. Users may want to focus on these indicators for quality improvement.

If the observed rate is lower than the expected rate (i.e., the ratio of observed/expected is less than 1.0, or observed minus expected is negative), then the implication is that the hospital performed

better than the reference population. Users may want to focus on these indicators for identifying best practices.

14.3.7.3. Population rate

Users can also compare the expected rate to the population rate reported in the v2024 Benchmark Data Tables to determine how their case mix compares to the reference population. The population rate refers to the overall rate for the reference population. The reference population is defined in the Benchmark Data Tables documents available on the [AHRQ QI website](#) for each module. If the population rate is higher than the expected rate, then the hospital's case mix is less severe than the reference population. If the population rate is lower than the expected rate, then the hospital's case mix is more severe than the reference population.

We use this difference between the population rate and the expected rate to "adjust" the observed rate to account for the difference between the case mix of the reference population and the hospital's case mix. This is the hospital's risk-adjusted rate.

If the hospital has a less severe case mix, then the adjustment is positive (population rate > expected rate), and the risk-adjusted rate is higher than the observed rate. If the hospital has a more severe case mix, then the adjustment is negative (population rate < expected rate), and the risk-adjusted rate is lower than the observed rate. The risk-adjusted rate is the rate the hospital would have if it had the same case mix as the reference population given the hospital's actual performance.

14.3.7.4. Risk-adjusted rate

The AHRQ QIs use indirect standardization to calculate the risk-adjusted rate:

Risk-adjusted $Rate$ = (Observed Rate ÷ Expected Rate) ∗ Reference Population Rate]

$$Risk-adjusted\ rate = \frac{observed\ rate}{expected\ rate} \times reference\ population\ rate$$

Note that for the reference population, the observed rate equals the expected rate equals the reference population rate equals the risk-adjusted rate. A risk-adjusted rate is the rate the hospital would have if it had an average case mix. In other words, it holds the hospital's performance on the QI constant and compares that to an average case mix.

14.3.7.5. Smoothed rate

Finally, users can compare the risk-adjusted rate to the smoothed, or "reliability adjusted," rate to determine whether this difference between the risk-adjusted rate and reference population rate is likely to remain in the next measurement period. Smoothed rates are weighted averages of the population rate and the risk-adjusted rate, where the weight reflects the reliability of the hospital's risk-adjusted rate.

A ratio (smoothed rate − population rate) / (risk-adjusted rate − population rate) greater than 0.80 suggests the difference is likely to persist (whether the difference is positive or negative). A ratio of less than 0.80 suggests that the difference may be due in part to random differences in patient characteristics (patient characteristics that are not observed and controlled for in the risk adjustment model). In general, users may want to focus on areas in which the differences are more likely to persist.

15. User Support

Technical assistance for the Quality Indicators (QI) software is available through an electronic user support system monitored by the Agency for Healthcare Research and Quality (AHRQ) QIs support team. The same email address may be used to communicate to AHRQ any suggestions for QI enhancements, general questions, and any QI-related comments you may have. AHRQ welcomes your feedback. The email address for user support and feedback is QIsupport@ahrq.hhs.gov.

AHRQ offers a listserv to keep you informed of changes or updates to the QIs. The listserv is also used to make announcements about new tools and resources and to distribute other QI-related information. This is a free service. Follow the process described below to begin receiving important QI information. All you need is a computer, internet access, and an email address. The listserv operates like other electronic distribution lists.

To register for the listserv, click on this link https://subscriptions.ahrq.gov/accounts/USAHRQ/subscriber/new?topic_id=USAHRQ_39 or follow the following process:

1. Send an email message to listserv@qualityindicators.ahrq.gov.

In the subject line, type **Subscribe**.

In the body of the message, type **sub Quality_Indicators-L** and **your full name**. For example: **sub Quality_Indicators-L John Doe**.

You will receive a message confirming that you are enrolled.

If you have any questions, contact the AHRQ QI support team at QIsupport@ahrq.hhs.gov. You should receive an automatic response email message confirming receipt. If you do not receive a confirmation message, please call (301) 427-1949.

Appendix A: Inpatient and Emergency Department (ED) Data Types

Table A.1. Inpatient Data Type Input Data Dictionary

Note: Only the PSI and PQE modules are supported in CloudQI. References to other modules are retained for future use.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Key (KEY)	Unique case identifier	String of up to 20 characters	User-defined unique identifier for each discharge record	Not required by the AHRQ CloudQI software but may facilitate possible exploration; available to allow users to link the discharge records in the Patient-Level Report back to the input data
Age (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.
Age in Days (AGEDAY)	Age in days at admission (coded only when the age in years is less than 1)	Numeric 0–364[1] days	Age in days	Used in the inclusion and exclusion criteria for several indicators. If this data element is missing (and age is 0), then generally an alternative specification applies.
Race (RACE)	Race of patient	Numeric	1=White 2=Black 3=Hispanic 4=Asian or Pacific Islander 5=Native American 6=other	Used to stratify the AHRQ Quality Indicator (QI) rates. For the area-level indicators,[2] all the input data values must be mapped to one of the listed values. For hospital-level indicators, user-defined values may be retained.
Sex (SEX or GENDER)	Gender of patient	Numeric	1=male 2=female	If this data element is missing, the discharge record will be excluded from the analysis.
Primary Payer (PAY1)	Expected primary payer, uniform	Numeric	1=Medicare 2=Medicaid 3=private, incl. HMO 4=self-pay 5=no charge 6=other	Used to stratify the AHRQ QI rates. Not used for the area-level indicators. The values of 1–5 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 hospital-level IQIs (01 to 25 and 30 to 34); hospital-level PDIs (01 to 13); and hospital-level PSIs (02 to 19).
Patient State/County Code (HOSPSTCO or PSTCO)	FIPS state/county code of patient's residence (Use hospital's state/county if the patient's is unavailable; however, patient county is recommended.[3])	Numeric; two-digit state code followed by three-digit county code (ssccc)	Modified FIPS state/county code[3]	Available at https://www.census.gov/library/reference/code-lists/ansi/ansi-codes-for-states.html. If this data element is missing, the discharge record will be excluded from area-level rate calculations. This variable may be renamed in the future to reflect the preference for the location of the patient rather than the hospital.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Hospital ID (HOSPID)	Data source hospital ID	String of up to 12 characters	Hospital identification number	Used to facilitate data exploration and possible troubleshooting. May also be selected as a stratifier for hospital-level indicators.
Discharge Disposition (DISP)	Disposition of patient	Numeric	1=routine 2=short-term hospital 3=SNF 4=intermediate care 5=another type of facility 6=home healthcare 7=against medical advice 20=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). Other values are recoded to missing by the software unless the user explicitly recodes them in the Crosswalk screen. This convention is different from the AHRQ QI SAS® application. Not used for PQIs.
Admission Type (ATYPE)	Admission type	Numeric	1=emergency 2=urgent 3=elective 4=newborn 5=delivery (1988–1997) 5=not used (1998–2002) 5=trauma center (2003–) 6=other	The values 3 and 4 are referenced by the AHRQ QI code (to identify elective surgeries and newborn admissions). PSIs 10, 11, 13, and 17 and PDIs 08 and 09 will be affected if admission type values are missing. Used for PQIs in newborn definition. Not used for IQIs.
Admission Source (ASOURCE)	Admission source	Numeric	1=ER 2=another hospital 3=another facility, including LTC 4=court/law enforcement 5=routine/birth/other	The values 2 and 3 are referenced by the PSI, IQI, PQI, and PDI code (to identify transfers from another hospital or facility).
POINTOFORIGINUB04 (POINTOFORIGIN04)	Point of origin	Numeric	4=transfer from a hospital 5=transfer from an SNF or ICF 6=transfer from another healthcare facility 15 (UB04 "F")=transfer from hospice IF ATYPE=4, then: 5=born inside this hospital 6=born outside of this hospital	Only these values are used by the QI programs.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Length of Stay (LOS)	Length of stay	Numeric	Number of days from admission to discharge	Same-day discharges are coded as 0 days stay. Not used for PQIs or IQIs.
Diagnosis Related Group (DRG or MS_DRG)	MS-DRG	Numeric	DRG from Federal (CMS) grouper	Required for generating most indicators. For Version 24 and earlier, this is the CMS DRG. For Version 25 and later, this is the MS-DRG.
Diagnosis-Related Group Version (DRG_VER)	DRG version	Numeric	Version of Federal (CMS) DRG grouper	For example, Version 25 for FY 2008 or Version 33 for FY 2016.
Major Diagnostic Category (MDC)	Major Diagnostic Category	Numeric	DRG from Federal (CMS) grouper	With v2023, the software includes setnames for MDC 14 and MDC 15, which are commonly used exclusion criteria for many QIs, so users without MDC can generate results for many QIs without MDC. However, CloudQI expects users to provide MDC values in the input file to apply the exclusion rules properly where needed. CloudQI does not impute MDCs if not passed by the user.
Principal Diagnosis (DX1)	ICD-10-CM diagnosis code. Diagnosis 1 is the principal diagnosis.	For ICD-10-CM - String; three to seven characters (do not include decimal point)	Diagnosis code	Required field for processing any indicator analysis. If this data element is missing, the discharge record will be excluded from the analysis.
Diagnosis Code 2–Diagnosis Code 35 (DX2–DX35) (up to 34 fields).	ICD-10-CM diagnosis codes. Diagnosis codes 2–35 are secondary diagnoses.	For ICD-10-CM - String; three to seven characters (do not include decimal point)	Diagnosis codes	By default, CloudQI accepts 35 diagnoses, users may specify to include additional diagnoses (up to 100).

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Present on Admission 1– Present on Admission 35 (DXATADMIT1 – DXATADMIT35 or POA 1– POA 35)	POA indicator for each diagnosis code	String	"Y" and "W" indicate present at the time of inpatient admission. "N," "U," "0," "E," and "1" indicate not present at the time of inpatient admission. A blank POA value is interpreted as indicating that the corresponding diagnosis was not present on admission unless the diagnosis code is exempt from POA reporting.	These are equivalent to the DXATADMITn fields in the UB-04 specification. Having the POA fields may eliminate "false-positives" from PSI and PDI results. By default CloudQI accepts 35 indicators of present on admission status, users may specify to include additional fields (up to 100).
Primary Procedure (PR1)	ICD-10-CM procedure codes. Procedure code 1 is the principal procedure.	String; three to seven characters (do not include decimal point)	Procedure code	Decimal points, if any, must be removed before loading data.
Procedure Code 2–Procedure Code 30 (PR2–PR30)	ICD-10-CM procedure codes. Procedure codes 2–30 are secondary procedures.	String; three to seven characters (do not include decimal point)	Procedure codes	By default, CloudQI accepts 30 procedures. It is not necessary to have 30 and users can specify additional procedures (up to 100).
Days to Procedure 1– Days to Procedure 30 (PRDAY1– PRDAY30)	Days from admission to procedure Procedure 1 is the principal procedure; procedures 2–30 are secondary procedures.	Numeric	Days from admission to procedure[4]	It is expected that the number of days-to-procedure variables agree with the number of procedure codes present. Valid values may be negative or zero. Applies only to PSI and PDI postoperative patient safety indicators. By default, CloudQI accepts 30 procedures, users can specify additional procedures (up to 100).
Year (YEAR)	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 present year.	Required data element and used to apply the proper fiscal year coding. If this data element is missing, the discharge record will be excluded from the analysis.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Discharge Quarter (DQTR)	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	Required data element and used to apply the proper fiscal year coding. If this data element is missing, the discharge record will be excluded from the analysis.
Custom Stratifier 1– Custom Stratifier 3	Custom stratification values	String; 1–20 characters	Any custom value you wish to stratify by	This can be used for a variety of purposes (e.g., groups of hospitals or groups of records with a hospital).
Birth weight in Grams (BIRTHWEIGHT)	Birthweight for newborns	Numeric		Optional data element. This field is not used for pediatric birth weight categories. ICD-10-CM diagnosis codes are used to indicate birth weight.
Date of Birth (BIRTH_DATE)	Patient date of birth	Date	MM/DD/YYYY	Optional (NOT RECOMMENDED). For identification purposes only on the data export. It is not recommended that you use this field unless required for external analysis.
Admission Date (ADMIT_DATE)	Date of patient admission	Date	MM/DD/YYYY	Optional (NOT RECOMMENDED). For identification purposes only on the data export. It is not recommended that you use this field unless required for external analysis.
Discharge Date (DISCHARGE_ DATE)	Date of patient discharge	Date	MM/DD/YYYY	Optional (NOT RECOMMENDED). For identification purposes only on the data export. It is not recommended that you use this field unless required for external analysis.
Patient ID (PATIENT_ID)	Patient ID or medical record number	String; 1–20 characters		Optional (NOT RECOMMENDED). For identification purposes only on the data export. It is not recommended that you use this field unless required for external analysis.

AHRQ=Agency for Healthcare Research and Quality; APR-DRG=All Patient Refined Diagnosis-Related Group; CMS=Centers for Medicare & Medicaid Services; ER=emergency room; FIPS=Federal Information Processing Standards; FY=fiscal year; HMO=health maintenance organization; ICD-10-CM=International Classification of Diseases, 10th Revision, Clinical Modification; ICF=intermediate care facility; IQIs=Inpatient Quality Indicators; LTC=long-term care; MS-DRG=Medicare Severity Diagnosis-Related Group; PDIs=Pediatric Quality Indicators; POA=present on admission; PQIs=Prevention Quality Indicators; PSIs=Patient Safety Indicators; QI=Quality Indicators; SNF=skilled nursing facility; UB-04=Uniform Bill 04; CloudQI=Quality Indicators Windows®.

[1] The 365-day range is to allow for leap years.

[2] Area-level indicators are all the PQIs and PDIs 14–18. Hospital-level indicators are IQIs, PDIs 01–12, Neonatal Quality Indicators (NQI) 03, and PSIs.

[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-level indicators.

[4] Variables Days to Procedure 1 to Days to Procedure 30 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 15 and had two procedures—the principal procedure on June 15 and a second procedure on June 18—then the value of Days to Procedure 1 would be zero (0) and the value of Days to Procedure 2 would be three (3). For more information,

consult the Healthcare Cost and Utilization Project data documentation at http://www.hcup-us.ahrq.gov/db/vars/prdayn/nisnote.jsp.

Table A.2. Emergency Department Data Type Input Data Dictionary

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Key (KEY)	Unique case identifier	String of up to 20 characters	User-defined unique identifier for each record	Used by the QI modules for sorting discharge records and may facilitate possible exploration; allow users to link the records in the Patient-Level Report back to the input data
Age (AGE)	Age in years at admission	Numeric	Age in years	If this data element is missing, the record will be excluded from the analysis.
Age in Months (AGEMONTH)	Age in months at admission (coded only when the age in years is less than 1)	Numeric 0–11 months	Age in months	Used in the inclusion and exclusion criteria for several indicators. If this data element is missing (and age is 0), then generally an alternative specification applies.
Sex (FEMALE)	Gender of patient	Numeric	0=male 1=female	If this data element is missing, the record will be excluded from the analysis.
Patient State/County Code (PSTCO)	FIPS State/county code of patient's residence (use hospital's state/county if the patient's is unavailable; however, patient county is recommended.)	Numeric; two-digit State code followed by three-digit county code (ssccc)	Modified FIPS State/county code[4]	Available at https://www.census.gov/library/reference/code-lists/ansi/ansi-codes-for-states.html. If this data element is missing, the record will be excluded from area-level rate calculations. This variable may be renamed in the future to reflect the preference for the location of the patient rather than the hospital. Note, PSTCO was named PSTCO2 in beta v2023.
Hospital ID (HOSPID)	Data source hospital ID	String of up to 12 characters	Hospital identification number	Used to facilitate data exploration and possible troubleshooting.
Hospital State (HOSPST)	Hospital state postal code	String	Hospital state postal code	Two-character state abbreviation e.g. "AL". Only used for PQE module.
Length of Stay (LOS)	Length of stay	Numeric	Number of days from admission to discharge	Same-day discharges are coded as 0 days stay.
Principal Diagnosis (DX1)	ICD-10-CM diagnosis code. Diagnosis 1 is the first-listed diagnosis.	String; three to seven characters (do not include decimal point)	Diagnosis code	Required field for processing any indicator analysis. If this data element is missing, the record will be excluded from the analysis.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Diagnosis Code 2–Diagnosis Code 35 (DX2–DX35)	ICD-10-CM Diagnosis codes 2–35 are secondary diagnoses.	String; three to seven characters (do not include decimal point)	Diagnosis codes	By default, CloudQI accepts 35 diagnoses, users may specify to include additional diagnoses (up to 100).
Year (YEAR)	The patient's year of the case. For example, a patient record on July 7, 2023, would have a year of 2023.	Numeric	YYYY Record year should be within the range of 2023 to present year.	Required data element and used to apply the proper fiscal year coding and to assign the APR-DRG if the limited license grouper is used. If this data element is missing, the record will be excluded from the analysis.
Discharge Quarter (DQTR)	The calendar quarter of the patient's record. For example, a patient record on July 7, 2023, would have a quarter of 3.	Numeric	1=January–March 2=April–June 3=July–September 4=October–December	Required data element and used to apply the proper fiscal year coding and to assign the APR-DRG if the limited license grouper is used. If this data element is missing, the record will be excluded from the analysis.
ED Admit (EDADMIT)	Emergency Department Admission	Numeric		If an Inpatient admission originated in ED, set this value to 1 otherwise 0.
VisitLink	Visit Link	Numeric		Unique number that identifies an individual. Used to track ED visits for the same patient across ED facilities and time. See Appendix G for details.
DIED_VISIT	Indicates in hospital death	Numeric	0 - did not die, 1 - died in ED, 2 - died in the hospital after admission from the ED	Used in v2023 only. For v2024, use the DIED field. Starting in v2024, DIED_VISIT is in fact imputed in the system.
DIED	Died during hospitalization	Numeric	0=Did not die 1=Died	Used together with EDADMIT to impute DIED_VISIT in the system. Used in v2024. For v2023, use the DIED_VISIT field.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
HCUP_ED	ED values defined based on hospital record	Numeric	1=Revenue center code indicating ED services 2=Another charge field indicating positive ED charge, if revenue center codes aren't available 3=Physician's CPT code indicating ED physician services 4=Condition Code of P7, or Point of origin of ED, or admission source of ED 0=None of the above	New in v2024. HCUP_ED = 0 cases are not used in the analysis.
RESIDENT	Identifies residents	Numeric	0 - Patient does not reside in the State in which the emergency department is located, 1 - Patient resides in the same State in which the emergency department is located	Not needed for v2024. The data element is calculated in the system. This is only needed if using v2023.
DaysToEvent	Days To Event	Numeric		Used to determine the timing between ED visits. See Appendix G for details.

Appendix B: Output Report Dictionary

Table B.1. CloudQI Hospital-Level Indicator Output for PSIs

Note: Only the PSI and PQE modules are supported in CloudQI. References to other modules are retained for future use.

VARIABLE GROUP	VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Indicator Identification (present if the user chooses to show indicators in rows)	Module	Indicator module identifier	Text	One of IQIs, PDIs, PQIs, or PSIs	
	Indicator Number	Identifier of the indicator within the module	Numeric		
	Name	Full name of the indicator	Text		
Stratifiers (the user may select between 0 and 10 of these variables in any order)	Age Category	Age category in years at admission	Numeric range	#–# OR "TOTAL"	Age categories as defined in benchmark tables (0–17, 18–39, 40–64, 65–74, 75+)
	Five Year Age Group	5-year age group in years at admission	Numeric range	#–# years	00–04, 05–09, 10–14, 15–17, 18–24, 25–29, and so on, ending with 85+
	Sex	Gender of patient	Numeric	1=male 2=female	
	Year	Year of discharge	Numeric		
	Quarter	Quarter of discharge	Numeric	1–4	
	Hospital ID	Data source hospital ID	Text	Up to 12 characters	
	Payer	Expected primary payer, uniform	Numeric	1=Medicare 2=Medicaid 3=private, including HMO 4=self-pay 5=no charge 6=other	If user had a value outside of these predefined values in the input file and user selects "Retain value" on the Crosswalk screen, then the retained value will also be reported on stratification. If user maps to "Missing" on the Crosswalk screen, then "0" will be reported.

VARIABLE GROUP	VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Stratifiers (the user may select between 0 and 10 of these variables in any order) (continued)	Race	Race of patient	Numeric	1=White 2=Black 3=Hispanic 4=Asian or Pacific Islander 5=Native American 6=other	If user had a value outside of these predefined values in the input file and user selects "Retain value" on the Crosswalk screen, then the retained value will be reported on stratification. If user maps to "Missing," then "0" will be reported.
	Pediatric Age Category	Pediatric age category in years at admission	Numeric range		<1 year, 1–2, 3–5, 6–12, 13–17
	Pediatric Age in Days	Pediatric age category in days at admission	Numeric range		0–28, 29–60, 61–90, 91–365 days
	Risk Category				The categories are indicator specific.
	Custom 1	Custom stratifier 1	Text	Up to 20 characters	
	Custom 2	Custom stratifier 2	Text	Up to 20 characters	
	Custom 3	Custom stratifier 3	Text	Up to 20 characters	
Calculated Values (always present, column names are prefixed with module and indicator number when the user chooses to show indicators in columns)	Observed Numerator	The number of discharge records included in the numerator (outcome of interest) as defined for the indicator	Numeric		
	Observed Denominator	The number of discharge records included in the denominator (population at risk) as defined for the indicator	Numeric		
	Observed Rate	The rate (observed numerator/observed denominator) as defined for the indicator	Numeric		

VARIABLE GROUP	VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Calculated Values (always present, column names are prefixed with module and indicator number when the user chooses to show indicators in columns) (continued)	Expected Rate	Rate calculated by assuming an "average" performance for each patient group based on the reference population, but with the hospital's actual case mix	Numeric		The reference population is based on all states participating in the most recently available HCUP SID.
	O-E Ratio	The ratio of the observed to the expected rate	Numeric		
	Reference Pop Rate	The rate for the current reference population	Numeric		
	Risk-Adjusted Rate	The estimated rate calculated by adjusting to an "average" case mix	Numeric		This average case mix is estimated using proportional indirect standardization: risk-adjusted rate=(observed rate/expected rate)×reference population rate.
	Risk Adj Conf Int. Low	The lower confidence bound of the risk-adjusted rate	Numeric		
	Risk Adj Conf Int. High	The upper confidence bound of the risk-adjusted rate	Numeric		
	Smoothed Rate	The smoothed rate calculated using multivariate signal extraction (MSX)	Numeric		MSX smoothing estimates the effect of random differences in the observed rate across hospitals or areas. In essence, smoothing describes how persistent a rate would be from year to year. Smoothing is a useful tool to "level the playing field" for hospitals or areas with a small number of cases.

HCUP=Healthcare Cost and Utilization Project; HMO=health maintenance organization; IQIs=Inpatient Quality Indicators; MSX=multivariate signal extraction; PDIs=Pediatric Quality Indicators; PQIs=Prevention Quality Indicators; PSIs=Patient Safety Indicators; SID=State Inpatient Databases.

Table B.2. CloudQI Hospital-Level Composite Indicator Report for PSIs

VARIABLE GROUP	VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Composite Indicator Name	Composite indicator name for hospital-level composites		Text	IQI Proc (IQI90 - Mortality for Selected Procedures) IQI Cond (IQI91 - Mortality for Selected Conditions) PSI Comp (PSI90 - Patient Safety for Selected Indicators) Ped Safety (PDI19	
Hospital ID	Hospital ID		Numeric		
Composite Rate or Ratio	Indicator rate or ratio		Numeric		
Variance	Variance		Numeric		
Standard Error	Standard error		Numeric		
Weight	Weight		Numeric		
Lower bound of the rate/ratio confidence interval	Lower bound	Lower bound of the rate/ratio confidence interval	Numeric		
Upper bound of the rate/ratio confidence interval	Upper bound	Upper bound of the rate/ratio confidence interval	Numeric		
[PSIxx and IQIxx] - Risk-adjusted rates		Risk-adjusted rate of component Indicators — accounts for the difference between the case mix of the reference population and the provider's (hospital's) case mix.	Numeric		
[PSIxx and IQIxx] - Population Denominator		Number of discharges in the denominator (population at risk) of component Indicators.	Numeric		
[PSIxx and IQIxx] - Noise variance		Noise variance of component Indicators.	Numeric		

VARIABLE GROUP	VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
[PSIxx and IQIxx] - Reliability Weights		Reliability weight of component Indicators.	Numeric		
[PSIxx and IQIxx] - Component Weights		Component weight of component Indicators.	Numeric		
[PSIxx and IQIxx] - Reference Population Rates		Reference population rate of component Indicators.	Numeric		

COMP1=indicator rate or ratio; COMP1LB=lower bound ; COMP1SE=standard error; COMP1UB=upper bound; COMPVAR1=variance; COMP1WHT=weight; IQI=Inpatient Quality Indicator; PSI=Patient Safety Indicator.

Table B.3. CloudQI Area-Level Indicator Output for PQEs

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Module	Indicator module identifier	Text	PQE	
Indicator Number	Identifier of the indicator within the module	Numeric		
Name	Full name of the indicator	Text		
Age Category	Age category in years at admission	Numeric range	#–# OR "TOTAL"	Age categories as defined in benchmark tables (0–17, 18–39, 40–64, 65–74, 75+)
Five Year Age Group	5-year age group in years at admission	Numeric range	#–# Years	00–04, 05–09, 10–14, 15–17, 18–24, 25–29, and so on, to 85+
Sex	Gender of patient	Numeric	1=male 2=female	
Year	Year of discharge	Numeric		
Quarter	Quarter of discharge	Numeric	1–4	
Race	Race of patient	Numeric	1=White 2=Black 3=Hispanic 4=Asian or Pacific Islander 5=Native American 6=other	If user had a value outside of these predefined values in the input file and user selects "Retain value" on the Crosswalk screen, then the retained value will be reported on stratification. If user had mapped to "Missing," then "0" will be reported.
County	County FIPS code (with independent areas left separate)	Numeric	Five-digit numeric identifier	
Modified FIPS County ID	County FIPS code (with independent areas combined)	Numeric	Five-digit numeric identifier	

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
State	State FIPS code	Numeric	Two-digit numeric identifier	
OMB 1999 Metro Area	OMB 1999 metropolitan statistical area identifier	Numeric	Five-digit numeric CBSA identifier	
OMB 2003 Metro Area	OMB 2003 metropolitan statistical area identifier	Numeric	Five-digit numeric CBSA identifier	
Observed Numerator	The number of discharge records included in the numerator (outcome of interest) as defined for the indicator	Numeric		
Observed Denominator	The number of discharge records included in the denominator (population at risk) as defined for the indicator	Numeric		
Observed Rate	The rate (observed numerator/observed denominator) as defined for the indicator	Numeric		
Expected Rate	Rate calculated by assuming an "average" performance for each patient group based on the reference population, but with the hospital's actual case mix	Numeric		The reference population is based on all states participating in the most recently available HCUP SID databases.
O-E Ratio	The ratio of the observed to the expected rate	Numeric		
Reference Pop Rate	The rate for the current reference population	Numeric		
Risk-Adjusted Rate	The estimated rate calculated by adjusting to an "average" case mix	Numeric		This average case mix is estimated using proportional indirect standardization: risk-adjusted rate=(observed rate/expected rate)×reference population rate.
Risk Adj Conf Int. Low	The lower confidence bound of the risk-adjusted rate	Numeric		
Risk Adj Conf Int. High	The upper confidence bound of the risk-adjusted rate	Numeric		

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Smoothed Rate	The smoothed rate calculated using MSX	Numeric		MSX smoothing estimates the effect of random differences in the observed rate across hospitals or areas. In essence, smoothing describes how persistent a rate would be from year to year. Smoothing is a useful tool to "level the playing field" for hospitals or areas with a small number of cases.

CBSA= Core Based Statistical Area; FIPS= Federal Information Processing Standards; HCUP=Healthcare Cost and Utilization Project; IQIs=Inpatient Quality Indicators; MSX=multivariate signal extraction; OMB=Office of Management and Budget; PDIs=Pediatric Quality Indicators; PQIs=Patient Quality Indicators; or PSIs=Patient Safety Indicators; SID=State Inpatient Databases.

Table B.4. Area-Level Indicator Output for PQE

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Indicator Number	Identifier of the indicator within the module	Numeric		
Name	Full name of the indicator	Text		
Age Category	Age category in years at admission	Numeric range	#–# OR "TOTAL"	Age categories as defined in benchmark tables (0–17, 18–39, 40–64, 65–74, 75+)
Sex	Gender of patient	Numeric	1=male 2=female	
County	County FIPS code (with independent areas left separate)	Numeric	Five-digit numeric identifier	
Modified FIPS County ID	County FIPS code (with independent areas combined)	Numeric	Five-digit numeric identifier	
OMB 1999 Metro Area	OMB 1999 metropolitan statistical area identifier	Numeric	Five-digit numeric CBSA identifier	
OMB 2003 Metro Area	OMB 2003 metropolitan statistical area identifier	Numeric	Five-digit numeric CBSA identifier	
Observed Numerator	The number of records included in the numerator (outcome of interest) as defined for the indicator	Numeric		
Observed Denominator	The number of records included in the denominator (population at risk) as defined for the indicator	Numeric		

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Observed Rate	The rate (observed numerator/observed denominator) as defined for the indicator	Numeric		
Expected Rate	Rate calculated by assuming an "average" performance for each patient group based on the reference population, but with the hospital's actual case mix	Numeric		The reference population is based on all States participating in the most recently available HCUP SID and SEDD databases.
O-E Ratio	The ratio of the observed to the expected rate	Numeric		
Risk-Adjusted Rate	The estimated rate calculated by adjusting to an "average" case mix	Numeric		This average case mix is estimated using proportional indirect standardization: risk-adjusted rate=(observed rate/expected rate)×reference population rate.
Risk Adj Conf Int. Low	The lower confidence bound of the risk-adjusted rate	Numeric		
Risk Adj Conf Int. High	The upper confidence bound of the risk-adjusted rate	Numeric		
Smoothed Rate	The smoothed rate calculated using multivariate signal Extraction (MSX)	Numeric		MSX smoothing estimates the effect of random differences in the observed rate across hospitals or areas. In essence, smoothing describes how persistent a rate would be from year to year. Smoothing is a useful tool to "level the playing field" for hospitals or areas with a small number of cases.

Appendix C: Export Data Dictionary

Table C.1. CloudQI Export Data Dictionary for PSIs

Note: Only the PSI module is supported in CloudQI. References to other modules are retained for future use.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Key				
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.
Age in Days	Age in days at admission (coded only when the age in years is less than 1)	Numeric (0–364[1] days)	Age in days	Used in the inclusion and exclusion criteria for several indicators. If this data element is missing (and age is 0), then generally an alternative specification applies.
Race	Race of patient	Numeric	1=White 2=Black 3=Hispanic 4=Asian or Pacific Islander 5=Native American 6=other	Used to stratify the AHRQ QI rates. For the area-level indicators,[2] all the input data values must be mapped to one of the listed values. For hospital-level indicators, user-defined values may be retained.
Sex	Gender of patient	Numeric	1=male 2=female	If this data element is missing, the discharge record will be excluded from the analysis.
Primary Payer	Expected primary payer, uniform	Numeric	1=Medicare 2=Medicaid 3=private, including HMO 4=self-pay 5=no charge 6=other	Used to stratify the AHRQ QI rates. Not used for the area-level indicators. For hospital-level indicators, user-defined values may be retained.
Patient State/County Code	FIPS state/county code of patient's residence	Numeric; two-digit state code followed by three-digit county code (ssccc)	Modified FIPS state/county code[3]	Available at https://www.census.gov/library/reference/code-lists/ansi/ansi-codes-for-states.html

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Hospital ID	Data source hospital ID	String; up to 12 characters	Hospital identification number	Used to facilitate data exploration and stratification.
Discharge Disposition	Disposition of patient	Numeric	1=routine 2=short-term hospital 3=SNF 4=ICF 5=another type of facility 6=home healthcare 7=against medical advice 20=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). Other values are recoded to missing by the software unless the user explicitly recodes them in the Crosswalk screen. This convention is different from the AHRQ SAS® QI application. Not used for PQIs.
Admission Type	Admission type	Numeric	1=emergency 2=urgent 3=elective 4=newborn 5=delivery (1988–1997) 5=not used (1998–2002) 5=trauma center (2003) 6=other	The values "3" and "4" are referenced by the AHRQ QI code (to identify elective surgeries and newborn admissions). PSIs 10, 11, 13, and 17 and PDIs 08 and 09 will be affected if admission type values are missing. Used for PQIs in newborn definition. Not used in IQIs.
Admission Source	Admission source	Numeric	1=ER 2=another hospital 3=another facility, including LTC 4=court/law enforcement 5=routine/birth/other	The values "2" and "3" are referenced by the PSI, IQI, PQI and PDI code (to identify transfers from another hospital or facility).
Length of Stay	Length of stay	Numeric	Number of days from admission to discharge	Same-day discharges are coded as "0" days stay. Not used for PQIs and IQIs.
DRG Version	Diagnosis-Related Group version	Numeric	Version of Federal (CMS) DRG grouper	For example, Version 25 for FY 2008

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Diagnosis Related Group	Diagnosis-Related Group	Numeric	DRG from Federal (CMS) grouper	For Version 24 and earlier, this is the CMS DRG. For Version 25 and later, this is the MS-DRG.
MS DRG	Diagnosis-Related Group	Numeric	DRG from Federal (CMS) grouper	This replaces CMS DRG for DRG Version 25 and later. DRG value is copied to MS-DRG, and DRG value is correspondingly set to blank in the export file.
Discharge Year	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 present year.	Used to apply the proper fiscal year coding.
Discharge Quarter	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	Required data element and used to apply the proper fiscal year coding.
Birth Weight Grams				
Custom Stratifier 1– Custom Stratifier 3	Custom stratification values	String; 1–20 characters	The value as was specified on the input file for the corresponding stratifier	
Patient ID	Patient ID or medical record number	String; 1–20 characters		For identification purposes only on the data export for external analysis
Discharge Date	Date of patient discharge	Date	MM/DD/YYYY	For identification purposes only on the data export for external analysis

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Point of Origin	Point of origin	Numeric	4=transfer from a hospital 5=transfer from an SNF or ICF 6=transfer from another healthcare facility IF ATYPE=4, then: 5=born inside this hospital 6=born outside of this hospital	Only these values are used by the QI programs.
ICD VER	ICD version number; calculated based on year and quarter	Numeric	Values range from 12 (1994) to 32 (2015)	http://www.who.int/classifications/icd/en/
has_medical_drg	Indicator flag denoting whether discharge has Diagnosis-Related Group: Medical	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
has_surgical_drg	Indicator flag denoting whether discharge has Diagnosis-Related Group: Surgical	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
has_adult_drg	Indicator flag denoting whether discharge has Diagnosis-Related Group: Adult	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
has_or_proc	Indicator flag denoting whether discharge has an operating room procedure	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
has_pediatric_or_proc	Indicator flag denoting whether discharge has an operating room procedure: Pediatric	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
has_pediatric_medical_drg	Indicator flag denoting whether discharge has Diagnosis-Related Group: Pediatric Medical	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
is_neonate	Indicator flag denoting whether discharge is neonate	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
is_newborn	Indicator flag denoting whether discharge is newborn	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
mdc	Major Diagnostic Category	Numeric	If this is not provided in the input file, then the value of MDC is calculated based on the value of DRG.	Only included if "Temporary Flag Variables" is selected during export.
bwhtcat	Birth weight category	Numeric	9=2,500+ grams 8=2,000–2,499 grams 7=1,750–1,999 grams 6=1,500–1,749 grams 5=1,250–1,499 grams 4=1,000–1,249 grams 3=750–999 grams 2=500–749 grams 1=<500 grams	Only included if "Temporary Flag Variables" is selected during export.
OR_Procedure_Count	Total number of procedures on the discharge that are also on the Operating Room Procedures list	Numeric		Only included if "Temporary Flag Variables" is selected during export.
Cardiac_Count	Count of total cardiac procedures	Numeric		Only included if "Temporary Flag Variables" is selected during export.
Cardiac_PDA	Indicator flag that denotes if any cardiac procedure is performed	Numeric	0=False 1=True	Only included if "Temporary Flag Variables" is selected during export.
hpd1	Accidental puncture or laceration rate Risk category for PDI 01	Numeric	1, 2, 3, 4, 5, 6, 7 (See https://qualityindicators.ahrq.gov/Downloads/Modules/PDI/V2023/Parameter_Estimates_PDI_v2023.pdf for definitions)	Only included if "Temporary Flag Variables" is selected during export.
hpd6	Risk category for PDI 06; RACHS-1 risk category	Numeric	1, 2, 3, 4, 5, 6 (See https://qualityindicators.ahrq.gov/Downloads/Modules/PDI/V2023/Parameter_Estimates_PDI_v2023.pdf for definitions)	Only included if "Temporary Flag Variables" is selected during export.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
hpd10	Risk category for PDI 10	Numeric	1=low 2=intermediate 3=high (See https://qualityindicators.ahrq.gov/Downloads/Modules/PDI/V2023/Parameter_Estimates_PDI_v2023.pdf for definitions)	Only included if "Temporary Flag Variables" is selected during export.
rachs_multiple	Flag indicating multiple heart surgeries; used to identify RACHS risk category	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
premature_mdx4d	Flag indicating premature infant	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
strcabn	Indicator flag for noncardiac structural anomalies	Numeric	1=true	Only included if "Temporary Flag Variables" is selected during export.
pdi1_risk_cat	Risk category stratification for PDI 01	Numeric	1, 2, 3, 4, 5, 6, or 9 (see *Technical Specifications* at https://qualityindicators.ahrq.gov/measures/PDI_TechSpec)	Only included if "Temporary Flag Variables" is selected during export.
pdi8_risk_cat	Risk category stratification for PDI 08	Numeric	1=low 2=high (see *Technical Specifications* at https://qualityindicators.ahrq.gov/measures/PDI_TechSpec	Only included if "Temporary Flag Variables" is selected during export.
pdi10_risk_cat	Risk category stratification for PDI 10	Numeric	1, 2, 3, 4, or 9 (see *Technical Specifications* at https://qualityindicators.ahrq.gov/measures/PDI_TechSpec	Only included if "Temporary Flag Variables" is selected during export.
pdi12_risk_cat	Risk category stratification for PDI 12	Numeric	1=low 2=intermediate 3=high (see *Technical Specifications* at https://qualityindicators.ahrq.gov/measures/PDI_TechSpec	Only included if "Temporary Flag Variables" is selected during export.
Principal Diagnosis (DX1)	ICD-10-CM diagnosis code; diagnosis 1 is the principal diagnosis	For ICD-10-CM - String; three to seven characters	Diagnosis code	Decimal points, if any, must be removed before loading data.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Diagnosis Code 2–Diagnosis Code 35 (DX2–DX35)	ICD-10-CM diagnosis codes; diagnosis codes 2–35 are secondary diagnoses	For ICD-10-CM - String; three to seven characters	Diagnosis codes	
Principal Procedure (PR1)	ICD-10-CM procedure codes; procedure code 1 is the principal procedure	For ICD-10-CM - String; three to seven characters (do not include decimal point)	Procedure code	Decimal points, if any, must be removed before loading data.
Procedure Code 2–Procedure Code 30 (PR2–PR30)	ICD-10-CM procedure codes; procedure codes 2–30 are secondary procedures	For ICD-10-CM - String; three to seven characters (do not include decimal point)	Procedure codes	Include up to 30 procedures. It is not necessary to have 30.
Days to Procedure 1–Days to Procedure 30 (PRDAY1–PRDAY30)	Days from admission to procedure. Procedure 1 is the principal procedure; procedures 2–30 are secondary procedures.	Numeric	Days from admission to procedure[4]	It is expected that the number of days-to-procedure variables agree with the number of procedure codes present. Valid values may be negative or zero. Applies only to PSI and PDI postoperative patient safety indicators.
IQIxx PQIxx PSIxx PDIxx	Indicator flag values for appropriate QIs	Boolean (0,1, or null)	1=true (flagged for numerator) 0=false (not flagged for numerator; included in denominator) Null=not flagged for denominator or numerator	Only included if "Indicator Flags" is selected during export.
POAxxx	Flag value for discharge level POA	Boolean (0,1, or null)	1=true 0= false Null=not flagged	Only included if "Present on Admission" indicator flags under the discharge level is selected during export.
IQIxx_expected PQIxx_expected PDIxx_expected PSIxx_expected	Expected value (i.e., expected outcome of interest given demographics, comorbidities, and risk of mortality) for appropriate QIs	Numeric	Discharge level expected rates	Only included if "Discharge level expected rate" is selected during export

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
AIDS	Comorbidity category code flag: acquired immune deficiency syndrome	numeric	1=true 0=false	Used in risk adjustment
ALCOHOL	Comorbidity category code flag: alcohol abuse	numeric	1=true 0=false	Used in risk adjustment
ANEMDEF	Comorbidity category code flag: deficiency anemia	numeric	1=true 0=false	Used in risk adjustment
AUTOIMMUNE	Comorbidity category code flag: autoimmune conditions	numeric	1=true 0=false	Used in risk adjustment
BLDLOSS	Comorbidity category code flag: chronic blood loss anemia	numeric	1=true 0=false	Used in risk adjustment
CANCER_LEUK	Comorbidity category code flag: leukemia	numeric	1=true 0=false	Used in risk adjustment
CANCER_LYMPH	Comorbidity category code flag: lymphoma	numeric	1=true 0=false	Used in risk adjustment
CANCER_METS	Comorbidity category code flag: metastatic cancer	numeric	1=true 0=false	Used in risk adjustment
CANCER_NSITU	Comorbidity category code flag: solid tumor without metastasis, in situ	numeric	1=true 0=false	Used in risk adjustment
CANCER_SOLID	Comorbidity category code flag: solid tumor without metastasis, malignant	numeric	1=true 0=false	Used in risk adjustment
CBVD	Comorbidity category code flag: cerebrovascular disease	numeric	1=true 0=false	Used in risk adjustment
COAG	Comorbidity category code flag: Coagulopathy	numeric	1=true 0=false	Used in risk adjustment
DEMENTIA	Comorbidity category code flag: dementia	numeric	1=true 0=false	Used in risk adjustment
DEPRESS	Comorbidity category code flag: depression	numeric	1=true 0=false	Used in risk adjustment

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
DIAB_CX	Comorbidity category code flag: diabetes with chronic complications	numeric	1=true 0=false	Used in risk adjustment
DIAB_UNCX	Comorbidity category code flag: diabetes without chronic complications	numeric	1=true 0=false	Used in risk adjustment
DRUG_ABUSE	Comorbidity category code flag: drug abuse	numeric	1=true 0=false	Used in risk adjustment
HF	Comorbidity category code flag: heart failure	numeric	1=true 0=false	Used in risk adjustment
HTN_CX	Comorbidity category code flag: hypertension, complicated	numeric	1=true 0=false	Used in risk adjustment
HTN_UNCX	Comorbidity category code flag: hypertension, uncomplicated	numeric	1=true 0=false	Used in risk adjustment
LIVER_MLD	Comorbidity category code flag: liver disease, mild	numeric	1=true 0=false	Used in risk adjustment
LIVER_SEV	Comorbidity category code flag: liver disease, moderate to sever	numeric	1=true 0=false	Used in risk adjustment
LUNG_CHRONIC	Comorbidity category code flag: chronic pulmonary disease	numeric	1=true 0=false	Used in risk adjustment
LUNG_MOVT	Comorbidity category code flag: neurological disorders affecting movement	numeric	1=true 0=false	Used in risk adjustment
NEURO_OTH	Comorbidity category code flag: other neurological disorders	numeric	1=true 0=false	Used in risk adjustment
NEURO_SEIZ	Comorbidity category code flag: seizures and epilepsy	numeric	1=true 0=false	Used in risk adjustment
OBESE	Comorbidity category code flag: obesity	numeric	1=true 0=false	Used in risk adjustment

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
PARALYSIS	Comorbidity category code flag: paralysis	numeric	1=true 0=false	Used in risk adjustment
PERIVASC	Comorbidity category code flag: peripheral vascular disease	numeric	1=true 0=false	Used in risk adjustment
PSYCHOSES	Comorbidity category code flag: psychoses	numeric	1=true 0=false	Used in risk adjustment
PULMCIRC	Comorbidity category code flag: pulmonary circulation disease	numeric	1=true 0=false	Used in risk adjustment
RENLFL_MOD	Comorbidity category code flag: renal failure, moderate	numeric	1=true 0=false	Used in risk adjustment
RENLFL_SEV	Comorbidity category code flag: renal failure, severe	numeric	1=true 0=false	Used in risk adjustment
THYROID_HYPO	Comorbidity category code flag: hypothyroidism	numeric	1=true 0=false	Used in risk adjustment
THYROID_OTH	Comorbidity category code flag: other thyroid disorders	numeric	1=true 0=false	Used in risk adjustment
ULCER_PEPTIC	Comorbidity category code flag: peptic ulcer disease x bleeding	numeric	1=true 0=false	Used in risk adjustment
VALVE	Comorbidity category code flag: valvular disease	numeric	1=true 0=false	Used in risk adjustment
WGHTLOSS	Comorbidity category code flag: weight loss	numeric	1=true 0=false	Used in risk adjustment
DNR	Comorbidity category code flag: do not resuscitate	numeric	1=true 0=false	Used in risk adjustment

AHRQ=Agency for Healthcare Research and Quality; CCS=Clinical Classifications Software; CMS=Centers for Medicare & Medicaid Services;; ER=emergency room; FIPS=Federal Information Processing Standards; FY=fiscal year; HMO=health maintenance organization; ICD-10-CM=International Classification of Diseases, 10th Revision, Clinical Modification; ICF=intermediate care facility; IQIs=Inpatient Quality Indicators; LTC=long-term care; MDC=Major Diagnostic Category; MS-DRG=Medicare Severity Diagnosis-Related Group; PDIs= Pediatric Quality Indicators; PQIs=Prevention Quality Indicators; PSIs=Patient Safety Indicators; QI=Quality Indicators; RACHS=risk adjustment for congenital heart surgery; SNF=skilled nursing facility; CloudQI=Quality Indicators Windows®.

[1] The 365-day range is to allow for leap years.

[2] Area-level indicators are all the PQIs, PDIs 14–18. Hospital-level indicators are IQIs, PDIs 01–12, Neonatal Quality Indicators (NQI) 03, and PSIs.

[3] Federal Information Processing Standards, 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-level indicators.

[4] Variables Days to Procedure 1 to Days to Procedure 30 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 15 and had two procedures—the principal procedure on June 15 and a second procedure on June 18—then the value of Days to Procedure 1 would be zero (0) and the value of Days to Procedure 2 would be three (3). For more information, consult the Healthcare Cost and Utilization Project data documentation at http://www.hcup-us.ahrq.gov/db/vars/prdayn/nisnote.jsp.

Table C.2. CloudQI Export Data Dictionary for PQE

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Key				
Age	Age in years at admission	Numeric	Age in years	If this data element is missing, the record will be excluded from the analysis.
Age in Months	Age in months	Numeric (1–11 months)	Age in days	Used in the inclusion and exclusion criteria for several indicators. If this data element is missing (and age is 0), then generally an alternative specification applies.
Sex	Gender of patient	Numeric	1=male 2=female	If this data element is missing, the record will be excluded from the analysis.
Patient State/County Code	FIPS State/county code of patient's residence	Numeric; two-digit State code followed by three-digit county code (ssccc)	Modified FIPS State/county code	Available at https://www.census.gov/library/reference/code-lists/ansi/ansi-codes-for-states.html
Hospital ID	Data source hospital ID	String; up to 12 characters	Hospital identification number	Used to facilitate data exploration and stratification.
Discharge Year	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 present year.	Used to apply the proper fiscal year coding.
Discharge Quarter	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	Required data element and used to apply the proper fiscal year.

VARIABLE NAME	DESCRIPTION	FORMAT	VALUE DESCRIPTION	COMMENTS
Principal Diagnosis (DX1)	ICD-10-CM diagnosis code; diagnosis 1 is the principal diagnosis	For ICD-10-CM - String; three to seven characters	Diagnosis code	
Diagnosis Code 2– Diagnosis Code 35 (DX2–DX35)	ICD-10-CM diagnosis codes; diagnosis codes 2– 35 are secondary diagnoses	For ICD-10-CM - String; three to seven characters	Diagnosis codes	
PQExx	Indicator flag values for appropriate QIs	Boolean (0,1, or null)	1=true (flagged for numerator) 0=false (not flagged for Numerator; included in denominator) Null=not flagged for numerator	Only included if "Indicator Flags" is selected during export
EXCLUDEQExx	Flag value for discharge level exclusion	Numeric	values>0 are excluded records for various criteria, the purpose is to tally counts later. Only records with value=0 will be considered for numerator (and denominator for some).	

Appendix D: Links

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

Patient Safety Indicators (PSI):
https://qualityindicators.ahrq.gov/measures/psi_resources

Prevention Quality Indicators in Emergency Department Settings (PQE)
https://qualityindicators.ahrq.gov/measures/pqe_resources

AHRQ Quality Indicators Software:
https://qualityindicators.ahrq.gov/software/qi

Table D.1. AHRQ Quality Indicators Version 2024 Documents and Software

TITLE	DESCRIPTION
PSI Technical Specifications PQE Technical Specifications	Provide detailed definitions of each indicator (including composites), including all ICD-10-CM and MS-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.
PSI v2024 Benchmark Data Tables PQE v2024 Benchmark Data Tables	These documents provide the average volume, hospital rate, and population rate, as appropriate, for each indicator.
Log of Changes to PSI Documents and Software Log of Changes to PQE Documents and Software	The Change Log document provides a cumulative summary of all changes to the software, software documentation, and other documents made since the release of version 2.1 of the software in March 2003. This document also summarizes changes to indicator definitions resulting from all fiscal year changes to ICD-10-CM coding and MS-DRG changes. Changes to indicator specifications that were not a result of new ICD-10-CM and MS-DRG codes are also described in the Change Log.
PSI Risk Adjustment Coefficient Tables PQE Risk Adjustment Coefficient Tables	Tables for each indicator provide the stratification and coefficients used to calculate the risk-adjusted rate for each stratum.
Quality Indicators Software Instructions	This software documentation provides detailed instructions on how to use the CloudQI version of the software, including data preparation, calculation of the rates, and interpretation of output.
AHRQ QI Population File	Population data that are constructed from public-use Census data and provided for use with the Quality Indicators syntax for area-level
Version v2024 (Release Note)	This document announces the release of v2024 of the CloudQI software and documentation and provides a summary of changes and links to relevant screens.
PSI User Guide: Composite Measures	These user guides provide technical overviews of the composite measures.

SAS QI Software Version 2024

The SAS QI software v2024 calculates rates for the respective AHRQ QI modules. It is available at
https://qualityindicators.ahrq.gov/software/qi_resources.. The SAS QI 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.

Additional Documents

Several documents are cataloged within the Archive section of the AHRQ QIs web page for historical purposes: https://qualityindicators.ahrq.gov/Archive/default.aspx.

Additional documents may be accessed at the AHRQ Quality Indicator Measures page: https://qualityindicators.ahrq.gov/measures/qi_resources

Other Tools and Information

QI rates can be calculated using the modified Federal Information Processing Standards (FIPS) State/county codes. A list of codes is available at https://www.census.gov/library/reference/code-lists/ansi/ansi-codes-for-states.html.

AHRQ provides a free, online query system based on HCUP data that provides access to health statistics and information on hospital stays at the national, regional, and State levels. It is available at http://hcupnet.ahrq.gov/.

The CDC National Diabetes Surveillance System provides State-level estimates of diabetes prevalence by age: https://gis.cdc.gov/grasp/diabetes/DiabetesAtlas.html.

Appendix E: Hospital-Level and Area-Level Indicators

Table E.1. List of Hospital-Level Indicators

Note: Some hospital- and area-level indicators have been retired over time. The table below contains the most up-to-date list.

INDICATOR NAME
IQI 08 Esophageal Resection Mortality Rate
IQI 09 Pancreatic Resection Mortality Rate
IQI 11 Abdominal Aortic Aneurysm (AAA) Repair Mortality Rate
IQI 12 Coronary Artery Bypass Graft (CABG) Mortality Rate
IQI 15 Acute Myocardial Infarction (AMI) Mortality Rate
IQI 16 Heart Failure Mortality Rate
IQI 17 Acute Stroke Mortality Rate
IQI 18 Gastrointestinal Hemorrhage Mortality Rate
IQI 19 Hip Fracture Mortality Rate
IQI 20 Pneumonia Mortality Rate
IQI 21 Cesarean Delivery Rate, Uncomplicated
IQI 22 Vaginal Birth After Cesarean (VBAC) Delivery Rate, Uncomplicated
IQI 30 Percutaneous Coronary Intervention (PCI) Mortality Rate
IQI 31 Carotid Endarterectomy Mortality Rate
IQI 33 Primary Cesarean Delivery Rate, Uncomplicated
IQI 90 Mortality for Selected Procedures
IQI 91 Mortality for Selected Conditions
NQI 03 Neonatal Blood Stream Infection Rate
PDI 01 Accidental Puncture or Laceration Rate
PDI 05 Iatrogenic Pneumothorax Rate
PDI 08 Perioperative Hemorrhage or Hematoma Rate
PDI 09 Postoperative Respiratory Failure Rate
PDI 10 Postoperative Sepsis Rate
PDI 12 Central Venous Catheter-Related Blood Stream Infection Rate
PSI 02 Death Rate in Low-Mortality Diagnosis Related Groups (DRGs)
PSI 03 Pressure Ulcer Rate
PSI 04 Death Rate among Surgical Inpatients with Serious Treatable Complications
PSI 05 Retained Surgical Item or Unretrieved Device Fragment Count
PSI 06 Iatrogenic Pneumothorax Rate
PSI 07 Central Venous Catheter-Related Blood Stream Infection Rate
PSI 08 In-Hospital Fall-Associated Fracture Rate
PSI 09 Perioperative Hemorrhage or Hematoma Rate
PSI 10 Postoperative Acute Kidney Injury Requiring Dialysis Rate
PSI 11 Postoperative Respiratory Failure Rate

INDICATOR NAME
PSI 12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate
PSI 13 Postoperative Sepsis Rate
PSI 14 Postoperative Wound Dehiscence Rate
PSI 15 Abdominopelvic Accidental Puncture or Laceration Rate
PSI 17 Birth Trauma Rate – Injury to Neonate
PSI 18 Obstetric Trauma Rate – Vaginal Delivery With Instrument
PSI 19 Obstetric Trauma Rate – Vaginal Delivery Without Instrument
PSI 90 Patient Safety and Adverse Events Composite

Table E.2. List of Area-Level Indicators

INDICATOR NAME
PDI 14 Asthma Admission Rate
PDI 15 Diabetes Short-Term Complications Admission Rate
PDI 16 Gastroenteritis Admission Rate
PDI 18 Urinary Tract Infection Admission Rate
PDI 90 Pediatric Quality Overall Composite
PDI 91 Pediatric Quality Acute Composite
PDI 92 Pediatric Quality Chronic Composite
PQI 01 Diabetes Short-Term Complications Admission Rate
PQI 03 Diabetes Long-Term Complications Admission Rate
PQI 05 Chronic Obstructive Pulmonary Disease (COPD) or Asthma in Older Adults Admission Rate
PQI 07 Hypertension Admission Rate
PQI 08 Heart Failure Admission Rate
PQI 11 Bacterial Pneumonia Admission Rate
PQI 12 Urinary Tract Infection Admission Rate
PQI 14 Uncontrolled Diabetes Admission Rate
PQI 15 Asthma in Younger Adults Admission Rate
PQI 16 Lower-Extremity Amputation among Patients with Diabetes Rate
PQI 90 Prevention Quality Overall Composite
PQI 91 Prevention Quality Acute Composite
PQI 92 Prevention Quality Chronic Composite
PQI 93 Prevention Quality Diabetes Composite (Numerator)
PQE 21 Visits for Non-Traumatic Dental Conditions in Emergency Department
PQE 02 Visits for Chronic Ambulatory Care Sensitive Conditions in Emergency Department
PQE 03 Visits for Acute Ambulatory Care Sensitive Conditions in Emergency Department
PQE 04 Visits for Asthma in Emergency Department
PQE 05 Visits for Back Pain in Emergency Department
PQE 01 Visits for Non-Traumatic Dental Conditions in ED
PQE 02 Visits for Chronic Ambulatory Care Sensitive Conditions in ED

INDICATOR NAME
PQE 03 Visits for Acute Ambulatory Care Sensitive Conditions in ED
PQE 04 Visits for Asthma in ED
PQE 05 Visits for Back Pain in ED

Appendix F: Creating an Input File for the PQE Software

This appendix describes how to prepare the data for input into the CloudQI software for the PQE module. It explains how to create an *ED input file* by selecting ED records from data files that contain all inpatient (hospital) and outpatient (ED) records.

Creating an ED Input File for the PQE Module

Many organizations collect and store records for inpatient (hospital) stays separate from records from outpatient ED visits. To create an ED input file, admissions originating in the ED from the broader inpatient data file must be identified, as must outpatient ED visits (e.g., treat and release or transfers) from the broader outpatient file. The two are then combined into one ED input file.

Selecting ED Admissions from a Broader Inpatient Data File

Inpatient admissions originating in the ED can be identified from evidence of ED services in the inpatient record. The following is a list of data elements possibly coded on inpatient data that would indicate evidence of ED services, each of which can be used to identify such records. Definitions for these data elements are available in the National Uniform Billing Committee (NUBC) Official Uniform Billing 2004 (UB-04) Data Specifications Manual (available at http://www.nubc.org). Not all data elements will be available in all data. The list of data elements is divided by those often coded on inpatient data and possibly coded on inpatient data.

- Data Elements often coded on inpatient data

    – Revenue center code of 450–459 indicating ED services

    – Another charge field indicating a positive emergency department charge, if revenue center codes are not available

    – Condition Code of P7 (NUBC preferred coding for public reporting as of July 1, 2010)

    – Point of origin of ED, value 7 (NUBC preferred coding from October 1, 2007 to June 30, 2010)

    – Admission source of ED, value 7 (NUBC preferred coding prior to October 1, 2007)

- Data Elements possibly coded on inpatient data

    – Physician's Current Procedural Terminology (CPT) procedure code of 99281–99285 indicating ED physician services reported on record.

If an inpatient record has any one of the above pieces of evidence of ED services, it should be considered an ED admission record and selected out of the broader inpatient file.

To indicate these inpatient records in the PQE input file, add the variable EDADMIT (numeric length 3) to the data file and set the value to 1 to indicate an ED inpatient admission record. In v2024, HCUP_ED = 0 cases are also filtered out in the software.

Selecting ED Outpatient Visits from a Broader Outpatient Data File

Outpatient ED visits can be identified by evidence of ED services on the outpatient record. The following is a list of data elements coded on outpatient data that would indicate evidence of ED services. Definitions for

these data elements are available in the NUBC Official UB-04 Data Specifications Manual. The list of data elements is divided by those often coded on outpatient data and possibly coded on outpatient data:

- Data elements often coded on outpatient data

    – Revenue center code of 450–459 indicating ED services

    – Another charge field indicating a positive emergency department charge, if revenue center codes are not available

    – Physician's Current Procedural Terminology (CPT) procedure code of 99281–99285 indicating ED physician services reported on record.

- Data Elements possibly coded on outpatient data

    – Condition Code of P7 (NUBC preferred coding for public reporting as of July 1, 2010)

    – Point of origin of ED, value 7 (NUBC preferred coding from October 1, 2007, to June 30, 2010)

    – Admission source of ED, value 7 (NUBC preferred coding prior to October 1, 2007).

If an outpatient record has any one of the above pieces of evidence of ED services, it should be considered an ED outpatient visit record and selected out of the broader outpatient file. Add the variable EDADMIT (numeric length 3) to the data file and set the value to 0 to indicate the record is not an ED outpatient admission. Beginning with v2024, HCUP_ED = 0 cases are also filtered out in the software.

Creating an ED Input File from Extracted Records for ED Admissions and ED Outpatient Visits

After adding the data elements specified to each of the ED extracts, combine the records for ED admissions and ED outpatient visits into one ED input file. The data element EDADMIT distinguishes the two types of data with the value 1 for ED admission records and the value 0 for ED outpatient visits. Records with EDADMIT = 0 or 1 can be included in PQE rate calculations.

Another requirement for inclusion is that the hospital state and the patient's state of residence are the same. In v2023, this match is indicated by the variable RESIDENT, which should be assign 1 if the two match and 0 if they do not. Beginning in v2024, RESIDENT is created by the software using PSTCO and HOSPST.

In v2023, another variable, DIED_VISIT is used to restrict the set of visits to those from which the patient is discharged alive (DIED_VISIT=0), instead of dying in the ED (DIED_VISIT=1) or as an inpatient (DIED_VISIT=2). In v2024, the software uses the data element DIED to restrict the set of visits.

Appendix G: Variables Needed to Track Multiple ED Visits for a Patient

One of the PQE indicators, Visits for Back Pain in ED (PQE 05), requires the use of "revisit" variables that can track patients across EDs over time and identify the days between visits. As described in Appendix F, the input data to the PQE software are "encounter-level" files, meaning that each record in the file represents one ED encounter. Thus, if the same individual visited the ED multiple times in a given year, the input file includes a separate record for each ED visit.

To identify multiple visits and calculate the number of days between them as specified for PQE 05, the software requires two data elements. These elements can be created easily, if the data set already includes a unique patient identifier and admission date:

- **visitLink** must be a numeric variable that uniquely identifies an individual. If there is already a patient identifier on the administrative database, just convert it to a numeric variable and rename it visitLink.

- **daysToEvent** is a numeric variable that identifies the date of the ED encounter. The variable can be defined as a numeric variable representing the number of days between an arbitrary starting date and a visit admission date, as long as the same starting date is used for all of the individual's visits.

The number of days between ED visits is the difference of **daysToEvent** between two selected visits for a unique **visitLink**. More information on these variables and how they can be created using HCUP data is available on the HCUP User Support Web site (http://www.hcup-us.ahrq.gov/toolssoftware/revisit/revisit.jsp).

The HCUP Web site has two Methods Series Reports specific to readmission and revisit analyses:

- Report #2012-04: *Overview of Key Readmission Measures and Methods* describes 12 key measures of hospital readmissions

- Report #2011-01: *Methodological Issues when Studying Readmissions and Revisits using Hospital Administrative Data* discusses challenges encountered when designing a readmission analysis using hospital administrative data.

Both reports are available at https://www.hcup-us.ahrq.gov/reports/methods/methods.jsp.