

Resourceful Data Analytics: Leveraging Accessible Tools and Techniques to Translate Results Into Action— Additional State Examples

In July 2014, the Centers for Medicare & Medicaid Services launched a collaborative effort between the Center for Medicaid and Children’s Health Insurance Program (CHIP) Services and the Center for Medicare & Medicaid Innovation called the Medicaid Innovation Accelerator Program (IAP). Through targeted technical assistance, IAP aims to improve the health and health care for Medicaid beneficiaries and to reduce associated costs by supporting states in their ongoing payment and delivery system reforms. In 2017, IAP began to offer general data analytics technical assistance to states. IAP also is working with states on health care delivery system reform efforts in value-based payment and program areas such as reducing substance use disorders, improving care for Medicaid beneficiaries with complex care needs and high costs, promoting community integration through long-term services and supports, and supporting physical and mental health integration.

Introduction

This resource document provides examples and insights on the breadth of analytic tools used by Medicaid agencies that participated in Medicaid IAP Data Analytics technical assistance cohorts. It showcases how five state or territory Medicaid agencies: (1) used tools that were available or tools with which they were most familiar; and (2) adopted new tools and techniques to broaden their analytic endeavors. Medicaid agencies and other relevant stakeholders (e.g., health plans) will be able to apply this information to their efforts to improve data analytic capacity and drive delivery system reform.

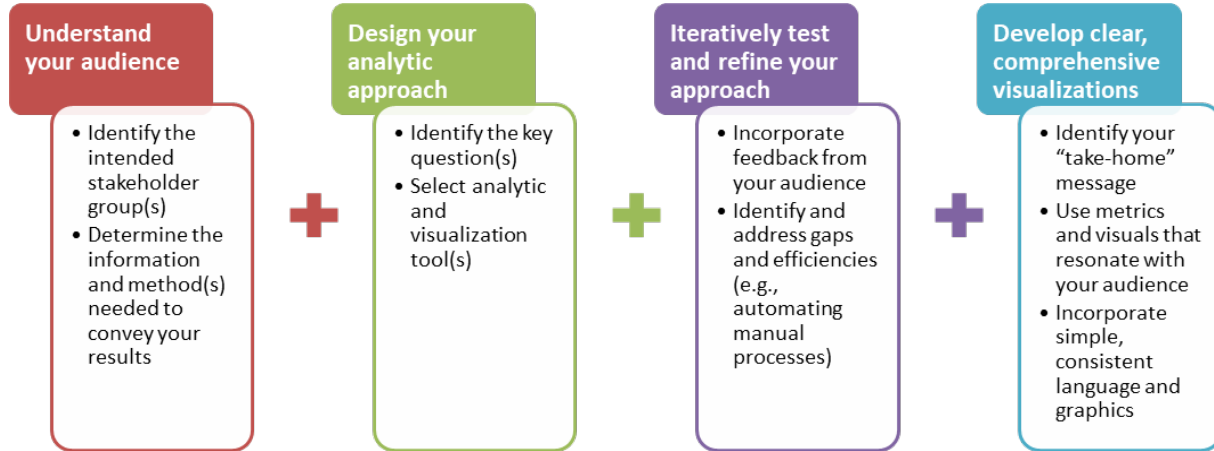
The resource document complements the Medicaid IAP Data Analytics state learning webinar held in August 2020, titled *Resourceful Data Analytics: Leveraging Accessible Tools and Techniques to Translate Results Into Action*. The webinar provided information and considerations for the use of accessible analytic tools and showcased how two Medicaid programs that received IAP Data Analytics technical assistance—the Iowa Medicaid Enterprise and the Oklahoma Health Care Authority¹—used new tools to conduct data analytics with Medicaid and other relevant data and to communicate analytic results to key stakeholders to inform Medicaid policy decisions.

Overview of Resourceful Data Analytics

As the amount of available data and data sources increases, it becomes more critical for states to consider the most effective ways to both collect and analyze these data, as well as clearly convey results to the intended stakeholders through visual presentations. By doing so, state Medicaid data can better inform timely and appropriate action, such as identifying areas for performance improvement, designing interventions, and implementing policy reform. **Figure 1** below provides a high-level overview of key considerations and best practices, including the incorporation of accessible tools, in successfully preparing and presenting Medicaid data.

¹ For more information on the data analytic projects from the Iowa Medicaid Enterprise and the Oklahoma Health Care Authority, please refer to the slide deck from the webinar on August 5, 2020, available on [Medicaid.gov](https://www.medicaid.gov).

Figure 1. Key Considerations and Best Practices for Analytics



The webinar reviewed five tools that Medicaid IAP Data Analytics participants have used as part of their technical assistance projects: Excel®, Tableau®, SAS®, R, and Python™. States also regularly use and have interest in other tools, such as Power BI® and SQL. **Table 1** shows the key features of tools commonly used in analyzing and presenting Medicaid data, categorized as follows:

- Data management tools (Excel, SQL)
- Proprietary statistical software (SAS, SPSS®, Stata®)
- Open source tools (R, Python)
- Data visualization software (Tableau, Power BI)

Table 1. Characteristics of Accessible Analytic Tools

Feature	Data Management Tools	Proprietary Statistical Software	Open Source Tools	Data Visualization Software
License requirement	Annual	Annual	Not required	Annual/monthly ^a
Staff experience	Common	Less common	Rare	Less common
Compatibility among software versions	Low	Low	Moderate	Moderate
Statistical features	Moderate	High	High	Low
Ease of use	High	Moderate	Moderate	High
Standard visualization quality	Low	Low	High	High
Capability to produce dashboards	Yes	Yes	Yes	Yes
Ease of visualization customization	Moderate	Moderate	High	Moderate

^a Tableau requires an annual license; Power BI requires a monthly license.

IAP Technical Assistance Highlights: State Examples of Resourceful Data Analytics

This section describes the journeys and results of five states and territories that received targeted data analytic technical assistance to improve their overarching analytic capacity by employing the tools described above.

Building Analytic Capacity: U.S. Virgin Islands

The U.S. Virgin Islands (USVI) Medical Assistance Program’s technical assistance engagement focused on developing basic data analytic skills among staff using Excel and, to a lesser extent, Python to support programmatic decisions. This skill development was an important part of USVI’s work to implement the five-stage data analytic strategy for conducting future research projects, shown in **Figure 2**.

Figure 2. U.S. Virgin Islands’ Data Analytic Strategy



With this analytic framework in mind, USVI analyzed data extracted from its Medicaid Management Information System (MMIS) on the level of care beneficiaries received in the territory, as well as the total cost of services. Due to USVI’s geographic location and shortage of medical professionals who can provide an intensive level of care, particularly related to a cancer diagnosis, USVI frequently transports Medicaid beneficiaries from the territory to the United States. This transportation results in administrative costs that account for a uniquely large percentage of total Medicaid spending. Therefore, USVI’s specific topic of interest for this technical assistance opportunity was to review the cost and level of service of treating Medicaid beneficiaries with a cancer diagnosis in the territory compared with transporting similar individuals to the United States for a more intensive level of care. The IAP team tailored presentations to this topic to showcase how data analytics could be used to inform the policy of providing this level of care in the territory in the future.

Using data from the territory’s MMIS, USVI worked on building the Excel skills necessary to complete this analytic project and support future policy decisions. Specific analytic capabilities included calculating frequency rates and measures of central tendency, organizing data into pivot tables, and visualizing results in common graphs and tools. When a smaller subset of the USVI team expressed interest in applying these techniques to a software package with capabilities for more robust analytics, the team identified Python as an available option to learn and use. USVI’s ability to use Python to explore topics of interest allowed for faster calculation and produced more sophisticated visualizations for presenting information.

Understanding Analytic Tool Fundamentals: Commonwealth of the Northern Mariana Islands and Guam

The Guam Department of Public Health and Social Services and the Commonwealth of the Northern Mariana Islands (CNMI) Medicaid agency sought technical assistance to expand their analytic capabilities and implement an analytic strategy that improved on their processes for monitoring and calculating data. CNMI leveraged its relationship with the sole hospital in the territory to review data available to help drive programmatic decision-making. Guam analyzed the prevalence of chronic conditions, including diabetes, hypertension, and obesity, so it could target high-risk populations to receive appropriate care.

Both CNMI and Guam chose to use R open source software to conduct the analytics necessary to meet their goals. Presentations and hands-on activities covered a myriad of topics, simplified into four main categories:

- Introduction to R open source analytic software
- Overview of cleaning and manipulating data
- Understanding data using descriptive statistics
- Advanced techniques with data

As a result, both CNMI and Guam were able to install and download R to begin flagging beneficiaries in the data with certain diagnoses and calculating quality measures to assess beneficiary care. CNMI and Guam also had the opportunity to procure SAS licenses for staff. They are leveraging their knowledge of R to expand their analytic capabilities in SAS, which will improve their ability to collaborate with stakeholders who exclusively use SAS. They also engaged in presentations that introduced the SAS language with hands-on demonstrations using a synthetic research-ready file. These demonstrations mimicked topics addressed in the R sessions. The training emphasized using and creating data elements needed to define cohorts and determine length of stay, costs per discharge, and total costs by subgroup.

CNMI and Guam also received a compendium of training materials to support further development of their SAS capacity. These readily available guides helped them leverage their newly acquired programming skills to learn a second language quicker. Additionally, the CNMI and Guam made data available to the IAP team so Medicaid staff could receive guidance in loading adjudicated claims data for analysis using SAS. This allowed for easier collaboration between the CNMI and Guam Medicaid staff and their partners while still meeting their analytic goals for their programs.

Translating Data Into Action: Georgia and Connecticut

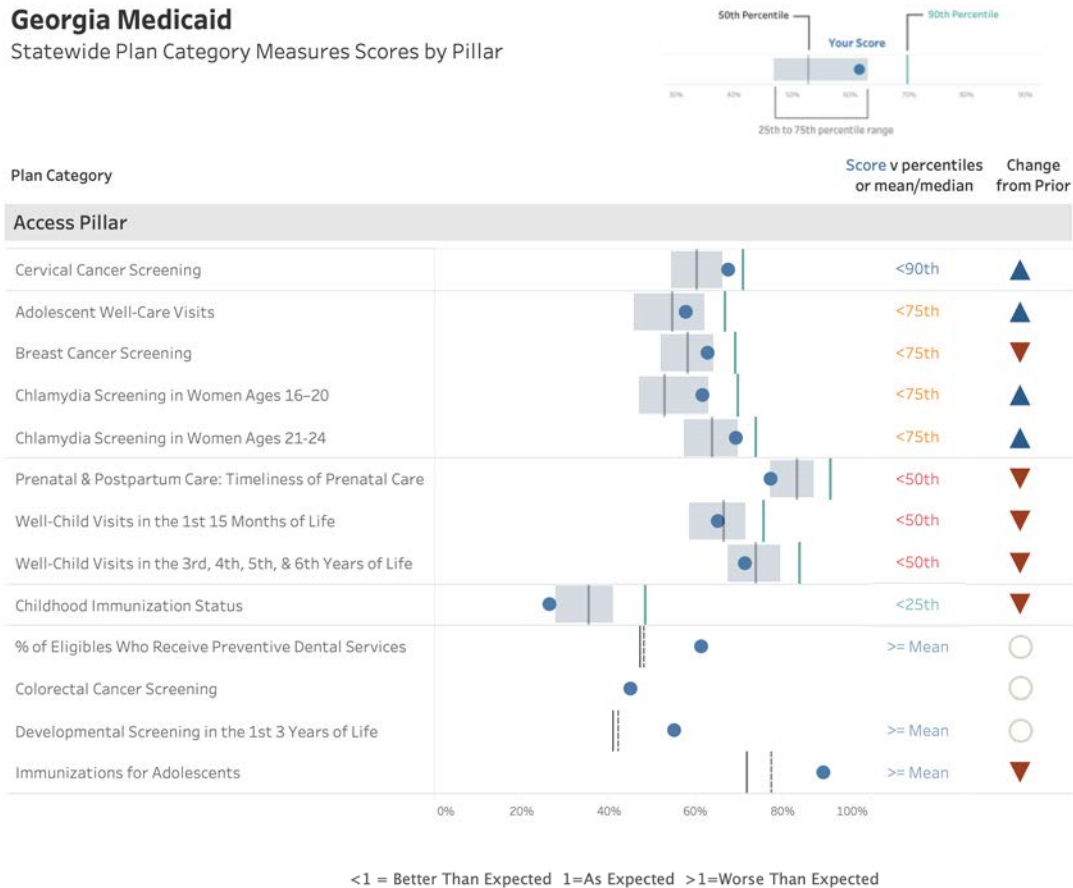
As part of its technical assistance project, the Georgia Department of Community Health (DCH) sought to build its analytic and visualization capacity through use of Excel and Tableau. Georgia DCH has strategically realigned its vision and activities around four strategic pillars: access, quality, service (patient experience), and stewardship. Within those pillars, Georgia selected measures to monitor and improve performance of its four Care Management Organizations (CMOs). It also designed and developed dashboards in Tableau for CMOs, providers, and the general public.

Georgia used its in-house claims data to calculate the quality measures, which include the following:

- Short-Term Complications Admission Rate for Diabetes
- Heart Failure Admission Rate
- Ambulatory Care (Emergency Department Visits)
- Plan All-Cause Readmissions
- Well-Child Visits in the First 15 Months of Life

Georgia developed a template to organize de-identified data pertaining to its CMOs and member populations in a comprehensive Excel workbook, organized in a narrow and long format to ensure smooth integration into Tableau. Use of Excel as a starting point helped Georgia solidify the dashboard structure (shown in **Figure 3** below in a prototype Tableau dashboard) and key data elements to support performance improvement among the CMOs.

Figure 3. Georgia's CMO Prototype Dashboard



In addition to information on CMO member populations, such as age, geography, race, ethnicity, Medicaid eligibility group, and risk group, the final Tableau dashboard presents the following elements for each quality measure on a quarterly basis, with the ability to filter by CMO:

- Numerator and denominator
- Validated value
- Change from the previous year
- Statewide average
- National average (used for non-Healthcare Effectiveness Data and Information Set [HEDIS] measures without a benchmark)
- Mean and median

Use of these analytic tools has allowed Georgia to identify trends in CMOs' performance and areas for improvement to ensure high-quality care and better outcomes among the Medicaid population.

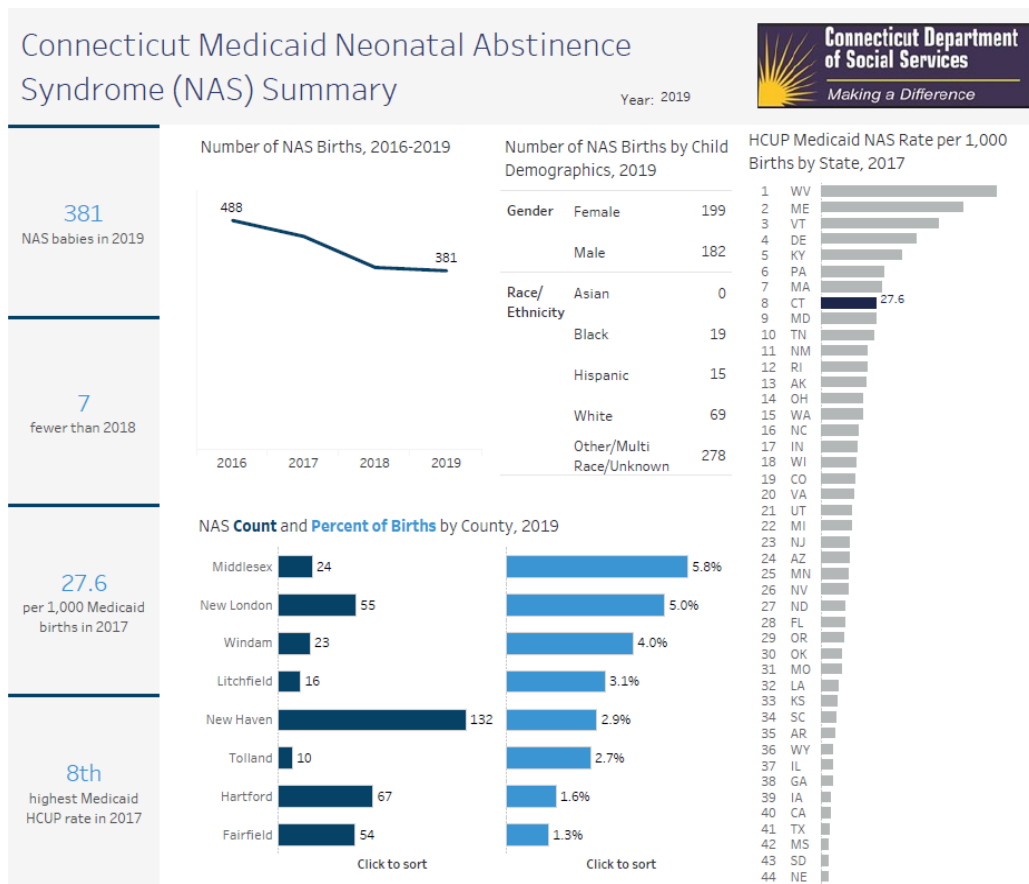
The Connecticut Department of Social Services leveraged its IAP opportunity to develop a data analytic strategy for identifying and assessing Medicaid beneficiaries with alcohol use disorder and babies born with neonatal abstinence syndrome (NAS), as well as to create a data dashboard. The goal of this effort is to support development of appropriate interventions to address reports of increased NAS among

Connecticut’s Medicaid population. Similar to Georgia, Connecticut’s project has involved use of Excel for analytics and Tableau for visualizations that effectively demonstrate results. The intended audience for Connecticut’s NAS dashboard is state Medicaid leadership and stakeholders in the state legislature.

Connecticut and the IAP team realized that, to complete this analytic project as intended, data between mothers and newborns must be linked. Using Excel, Connecticut and the IAP team identified the best method for linking newborns’ and mothers’ claims data—beginning with the facility identification number and ZIP Code on the mother’s claim for where the birth occurred and then iteratively incorporating other variables (street address) and conditional logic (e.g., newborn date of birth between mother’s admission and discharge date) to enhance the match rate to 84 percent.

Using the de-identified linked data, Connecticut organized analytic results for Medicaid-enrolled newborns with NAS and their mothers in calendar years 2016 to 2019 into narrow and long tables within Excel. Connecticut stratified NAS prevalence by various factors, including county, race/ethnicity, model of delivery (i.e., cesarean or vaginal). To enhance the Excel tables and broaden analytic and visualization capacity, Connecticut began to adapt results into two dashboards in Tableau: one for infants with NAS and one for mothers. **Figure 4** shows one of the prototype dashboards, which includes charts presenting the distribution of NAS cases by county, the NAS rate in Connecticut compared with the rate in other states according to Healthcare Cost and Utilization Project (HCUP) data, and the multiyear trend in the NAS rate.

Figure 4. Connecticut’s NAS Prototype Dashboard



Conclusion

This resource aims to provide state Medicaid agencies with key insights into the effective use of easy-to-access data management, analytic, and visualization platforms. The examples of USVI, CNMI, Guam, Georgia, and Connecticut provide real-life examples of how Excel, Tableau, SAS, R, and Python have been successfully incorporated into these Medicaid agencies' analytic activities. Although the specific needs and starting points of these Medicaid agencies—along with those highlighted during the webinar—varied, they all focused on the end goal and used an overall data analytic framework or strategy to guide their efforts. These states and territories demonstrated the importance of understanding the target audience to develop and refine their original analytic approaches, as well as identifying new tools and methods to build capacity and enhance the power of their results. The details on resourceful analytic tools, methods, and state/territory examples included in this resource document may serve to support Medicaid agencies in effectively conveying results to inform policy and delivery system reform.



Information on the IAP Data Analytics program, including materials from national webinars, is available on the [IAP Data Analytics webpage list here](#).