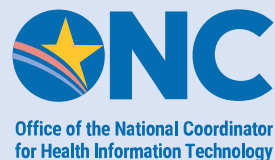


# External Appendix: Quick Start Guide

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Advancing PDMP-EHR Integration Project  
PDMP-EHR Integration Toolkit



This document was developed by Accenture Federal Services as the contractor leading the Advancing Prescription Drug Monitoring Programs - Electronic Health Record (PDMP-EHR) Integration Project under contract #GS-35F-540GA order # HHSP233201800327G. The project team from Accenture Federal Services served as a contractor to the Office of the National Coordinator for Health Information Technology (ONC). ONC served as the implementer partner to the Centers for Disease Control and Prevention (CDC). Funding for this contract award was provided by the CDC.

The PDMP-EHR Integration Toolkit was developed based on lessons learned by the Accenture team through collaborations with PDMP-EHR integration technical demonstration sites and Clinical Decision Support Proofs-of-Concept sites that participated in the Advancing PDMP-EHR Integration Project from 2018 - 2021. The PDMP-EHR Integration Toolkit is supplemented by the Integration Framework.

The findings and conclusions in this document are those of the authors and do not necessarily represent the official position of, the Centers for Disease Control and Prevention/the Agency for Toxic Substances and Disease Registry, the Office of the National Coordinator for Health Information Technology, or the other organizations involved, nor does the mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

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## Purpose

The External Appendix translates learnings from the Office of the National Coordinator for Health Information Technology/Centers for Disease Control and Prevention Advancing Prescription Drug Monitoring Program – Electronic Health Record (PDMP-EHR) Integration Project into a high-level overview of the background information necessary to implement PDMP-EHR integration. This document was developed to address common technical questions raised during the ONC/CDC Advancing PDMP-EHR Integration Project and is one of several documents within the PDMP-EHR Integration Toolkit created under the project.

This document provides context and background related to the terms, acronyms, and other technical and non-technical language used in integration planning. The intended audience for the External Appendix includes health care systems which plan to integrate their EHR with their state PDMP and require either deeper technical insight to begin discussions with state PDMPs or vendors, or supplemental context to better understand the standards and general approaches to integration.



## Integration Overview

Figure 1. Integration Technical Transaction Overview

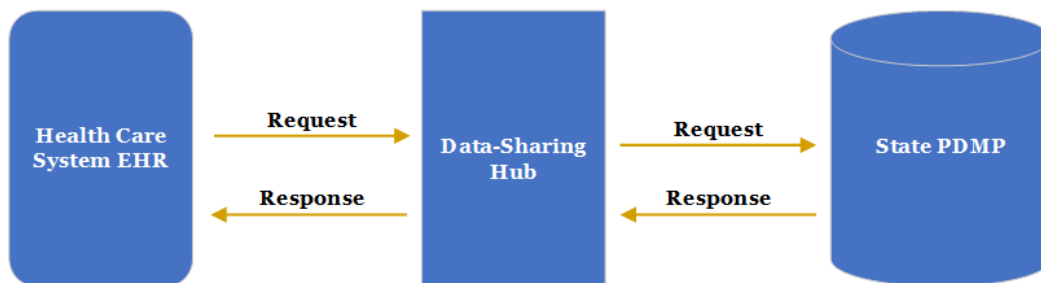


Figure 1 offers a high-level overview of the integration query request and response process and the entities involved in integration. In general, the EHR system requests a patient's data from the state PDMP, and if available, the state PDMP responds to the request by sending the patient's data back to the EHR. This transaction relies on various information exchange standards between the entities and is often mediated by a data-sharing hub. While the process of requesting and receiving data are typically described as a single transaction, it is often composed of smaller individual transactions between the different systems.

The subsequent sections discuss the different elements and entities involved in an integration transaction in the following order: Standards, Data-Sharing Hubs, Vendors (which include both EHR and integration vendors), and State PDMPs. Finally, the different transactions involved in PDMP-EHR integration are discussed in the Technical Interactions section.

# Standards

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*Standards define the structure and content of the data exchange message.*

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Information exchange standards (as defined by [HL7](#)) “define how information is packaged and communicated from one party to another, setting the language, the structure, and data types required for seamless integration between systems.” Standards help different information systems, such as EHR systems, communicate using a commonly agreed-upon structure and data element representations and coding. These standards are developed and maintained by a standards development organization (SDO), a body that strives to achieve consensus on standards for a particular domain. Below is a glossary of the most commonly used health information exchange standards mentioned throughout the PDMP-EHR Integration Toolkit.



## PMIX

The Prescription Monitoring Information eXchange National Architecture (PMIX) is an information exchange standard that enables information sharing and interoperability between systems for PDMP data. The PMIX standard establishes a common data vocabulary and format without requiring states to adopt any particular system or data-sharing hub solution (see [Data-Sharing Hubs](#) section).

- The PMIX architecture comprises a formal set of technical requirements, specifications, and reusable infrastructure for the secure, reliable, and sustainable interstate exchange of PDMP data.
  - These technical requirements, specifications, and infrastructure pertain to request and response addressing/routing, message exchange patterns, and security, rather than the message's contents.
- State PDMP systems, data-sharing hubs, and other exchange partners or intermediaries use PMIX.
- PMIX architecture constitutes open standards built directly by the PMIX community and national subject matter experts and is a part of the National Information Exchange Model (NIEM).
- The PMIX Standards Organization is state-run and sponsored by the Bureau of Justice Assistance (BJA). They operate by the following guiding principles:
  - Protect [the] state's full rights and control of data ownership.
  - Promote the adoption of security standards that protect the confidentiality, integrity, and availability of the data in transit and at rest.
  - Promote fair, open, and transparent competition by selecting IT solution providers that provide the best value products or services to PDMP participating states, while maintaining the public's trust and fulfilling public policy objectives.
  - Promote uniformity in the selection of a limited set of approved common data standards.
- PMIX encrypts all patient identifiable information at the message level and promotes other commonly used security practices so that private data are not visible to any intermediary servers. For more information, see PMIX's [Information Security Standard](#).
- PMIX is available to anyone at no cost.

A notable feature of PMIX is the PMIX user roles. Similar to EHR user roles (e.g., Nurse, Physician, etc.), PMIX user roles categorize or define types of health care providers recognized by the PMIX standard. For integration, the health care system, the state PDMP, or both must map the native EHR user roles to the appropriate PMIX user roles. This is an important point of consideration as states

often have policy restrictions on the type of users permitted to access and review PDMP information; PMIX user role permissions often implement these restrictions at the data-sharing hub level<sup>1</sup>. For more information, please reference the list of [PMIX Health Care Roles](#) and [Role Implementation Considerations](#).



**Key Takeaway for Health Care Systems:** Health care systems likely will not need to utilize the PMIX standard but should be familiar with its role as state PDMPs, the public data-sharing hub, and some integration vendors use it. Health care systems should work with their EHR vendor and their state PDMP to map user roles in their EHR to PMIX to create the requesting transaction, using the PMIX role structure. For more information, visit [www.pdmpassist.org/PMIX](http://www.pdmpassist.org/PMIX).

## NCPDP

The National Council for Prescription Drug Programs (NCPDP) standard was created by NCPDP members and action groups based on business needs and patient safety issues. The "NCPDP standard" refers to a group of standards developed by the NCPDP, many of which are referenced in federal legislation, including the Health Insurance Portability and Accountability Act (HIPAA), the Medicare Prescription Drug, Improvement, and Modernization Act (MMA), and the Health Information Technology for Economic and Clinical Health Act (HITECH).

- The NCPDP standard is named for the organization that develops it: [the National Council for Prescription Drug Programs](#). The NCPDP organization is a not-for-profit, American National Standards Institute (ANSI)-accredited SDO.
- The NCPDP standards are created via a problem-solving forum which may take the shape of a member action group, a work group, or a task group.
- NCPDP standards may only be accessed by NCPDP members, who must pay an annual per-person membership fee.



**Key Takeaway for Health Care Systems:** Some health care systems may need to utilize NCPDP standards because many EHR vendors use and support NCPDP drug codes in integration transactions. Please verify the state-specific data-sharing standards and approaches supported by your vendor. Furthermore, please note that the translation from NCPDP to PMIX is typically handled automatically by the data-sharing hub's routing service and does not require health care system involvement.

- If your EHR vendor uses NCPDP, it will be helpful for your IT or technical employees to have NCPDP knowledge for troubleshooting and reviewing XML messages. For more information on the NCPDP standard, visit [standards.ncdpd.org](http://standards.ncdpd.org).
- If your EHR vendor does not use NCPDP, there is no need to become familiar with this standard for integration purposes.

*(NCPDP FAQs, n.d.; NCPDP Who We Are, n.d.)*

## HL7

HL7 is an acronym for [Health Level Seven](#) International, a not-for-profit, ANSI-accredited SDO that develops a set of commonly used health information exchange standards. HL7 standards define how information is packaged and communicated by setting the language, structure, and type of data to be exchanged.

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<sup>1</sup> Please note that viewing permissions by role may vary across different states, which may present challenges for interstate data-sharing within integrations and between PDMPs.

- HL7® Admission, Discharge, Transfer (ADT) is one of the most common HL7 messaging types. It contains information on patient administration and keeps this information synchronized across health care systems.
- HL7 FHIR® stands for HL7's Fast Healthcare Interoperability Resources. It allows for information access using an Application Programming Interface (API). The FHIR standards represent clinical concepts that can be exchanged discretely or aggregated into documents.
  - FHIR is growing in popularity and can be used for PDMP-EHR integration.
  - Many PDMP-EHR integrations use the Substitutable Medical Applications, Reusable Technology (SMART) on FHIR framework. The framework provides specifications for the use of API endpoints to launch service-based URLs to enable apps to access data. Ask your EHR or integration vendor for additional details.
- HL7's primary standards and other select products are licensed at no cost, with some restrictions on use and distribution. Some uses may require the purchase of an HL7 membership.
- As of August 2021, 95% of U.S. health care organizations use the HL7 version 2 standard.

(HL7 Version 2 Product Suite, n.d., p. 7)

### Key Takeaway for Health Care Systems:



- Health care systems may need to utilize the HL7 standards because some EHR vendors use and support HL7 in integration transactions. Please verify the state-specific data-sharing standards and approaches supported by your vendor. Furthermore, please note that the translation from HL7 to PMIX is typically handled automatically by the data-sharing hub's routing service and does not require health care system involvement.

- If your EHR vendor uses HL7, it will be helpful for your IT or technical employees to have HL7 knowledge for troubleshooting and reviewing XML representations of HL7 messages. For more information, including implementation guides and introductions to the standards, visit [www.hl7.org/index.cfm](http://www.hl7.org/index.cfm).
- If your EHR vendor does not use HL7, there is no need to become familiar with this standard for integration purposes.

(American Health Information Management Association, n.d.; *HL7's Standards Licensed At No Cost*, n.d., p. 7; *Introduction to HL7 Standards*, n.d.; PDMP|TTAC, 2018)

### ASAP

[The American Society for Automation in Pharmacy](#) (ASAP) standard is the format state PDMPs use to collect prescription data from dispensers and pharmacy information systems. ASAP also has a request and response standard entitled *Web Service Standard*.

- ASAP defines data elements as either required or situational. Required elements are mandated in all states, maintaining a level of consistency across PDMPs nationwide. States can further customize and add situational data elements to accommodate state-specific data collection needs and relevant state laws.
- The ASAP standard organizes prescription data into "segments" (collections of data elements) and transmits them as a single transaction.
- Different ASAP versions are available for purchase, and the cost varies depending on the version and whether the purchaser is a member or non-member.
- As of August 2021, 48 PDMPs use ASAP version 4.2 or higher for dispensation reporting.

(PDMPs Using ASAP 4.2 & Higher, n.d.)



**Key Takeaway for Health Care Systems:** Health care systems will not need to utilize the ASAP standard for PDMP-EHR integration purposes, but should be familiar with its role as pharmacy information systems use it to submit data to state PDMPs. Pharmacy data submission is not a part of PDMP-EHR integration but is a tangential topic that may arise in conversations with the state PDMP.

(ASAP PDMP Implementation Guide, n.d.; PDMP|TTAC, 2018)

## Markup Languages

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A markup language is a set of codes or tags that describe the text in a digital document or package of information.

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Markup languages allow information exchange between systems, and data-sharing standards establish a common vocabulary and format for that information. XML and HTML are two of the most well-known and widely used markup languages. Both are frequently utilized to display the PDMP report information in integration.

### HTML (HyperText Markup Language)

HTML is the primary markup language used to format web pages. HTML transmits information and tells a system how a document or package of information should be displayed. For integration, HTML is often used for the response, but not the request.

(Roche, 2000; "What Is HTML?" n.d.)

### XML (Extensible Markup Language)

XML transmits and organizes information, but it does not dictate how it should be displayed. In essence, XML only transmits the discrete data elements, and it is up to the receiving system to determine how it will be displayed. Again, data-sharing standards – such as NCPDP, HL7, and ASAP – are XML-specific formats.



**Key Takeaway for Health Care Systems:** The EHR or integration vendor often determines which markup language is used and, therefore, health care systems might not need to perform technical work in either HTML or XML. However, health care systems should familiarize themselves with the EHR's preferred markup language to help troubleshoot potential issues: for example, if the health care system, EHR vendor, integration vendor, or PDMP are not satisfied with the PDMP data display generated by the EHR system or if the markup language does not meet state requirements. In this case, if the data were transmitted via XML, changing the response to HTML allows these entities to format the display of the data, similar to a webpage. The public data-sharing hub can generate an HTML response and customize it to different states' requirements and preferences. If the data were already transmitted via HTML, these entities might be able to alter the existing HTML response to their preferences or requirements.



## Data-Sharing Hubs

PDMPs conduct interstate data-sharing and EHR integration through intermediaries called data-sharing hubs, often abbreviated "hubs." These data-sharing hubs securely receive and route health information between a state's PDMP system and other states' PDMP systems, EHR systems, or Health Information Exchange (HIE) systems. Currently, two different data-sharing hubs are used in the United States.



### Public Data-Sharing Hub

The public data-sharing hub is operated by the BJA and supported by a non-profit organization to allow PDMPs to functionally perform intra- and interstate data-sharing as well as implement the PMIX architecture.

States already connected to the data-sharing hub or that plan to connect to the data-sharing hub may opt to participate in the governance board. This governance board provides guidance, stewardship, and leadership, while the non-profit arm provides management and maintenance.

- The public data-sharing hub was designed with input from the state PDMP practitioner community, private industry, and the federal government.
- The participating states maintain full ownership and control of their data.
- The majority of U.S. states and territories are actively sharing through the public data-sharing hub.
- States or territories are required to maintain their connection to the public data-sharing hub if they receive federal funding from BJA or the CDC to support their PDMPs.
- The data-sharing hub does not charge user, subscription, or transaction fees to facilitate the connection to health care organizations.

### Routing Service

The public data-sharing hub offers a free web service to facilitate routing transactions. The routing service is essentially a PDMP transaction client for EHR systems and state PDMPs (analogous to an email service for PDMP messages) and handles most of the encryption and security requirements necessary for sharing PDMP data. Typically, health care systems will need to work closely with the state PDMP and the public data-sharing hub to set up proper credentials and routing permissions.

(Bureau of Justice Assistance's Comprehensive Opioid, Stimulant, and Substance Abuse Program Resource Center, n.d.; National Information Sharing Standards (NISS) Information Exchange Package Documentation (IEPD) & Justice Standards Clearinghouse, n.d.; PDMP|TTAC, n.d.-a, 2018, 2020)

### Private Data-Sharing Hub

The National Association of Boards of Pharmacy (NABP) developed the private data-sharing hub. According to the NABP, the data-sharing hub facilitates the transfer of PDMP data across state lines. Similar to the public data-sharing hub, it allows participating state PDMPs to share data securely. A steering committee composed of participating PDMPs and PDMPs who have active MOUs advises the private data-sharing hub.

- The private data-sharing hub does not house any data.
- The majority of U.S. states are actively sharing data through the private data-sharing hub.
- State PDMPs can connect to the private data-sharing hub at no cost. However, to integrate PDMP data received from the private data-sharing hub, health care systems must use a proprietary integration solution that incurs charges. In some cases, states may choose to pay these costs for the health care systems in their state.

(National Association of Boards of Pharmacy, n.d.; *PMP Gateway*, n.d.)



**Key Takeaway for Health Care Systems:** Health care systems may have to choose to route integrated queries through the public or private data-sharing hub. However, in some states, the state PDMP may specify which data-sharing hub it prefers or requires. Exploring this landscape is a necessary initial step of integration and should involve the state PDMP and may involve the EHR vendor. There are several distinguishing factors between the two data-sharing hubs. At a high level, the private data-sharing hub has a previously developed integration interface and at this time, only enables access for health care systems via specific vendors. In contrast, the public data-sharing hub requires health care systems and/or their EHR vendors to develop their interface solution. Regardless of the data-sharing hub, health care systems should expect to incur costs from vendors facilitating the integration. Several integration vendors exist to assist in interface development for the public data-sharing hub.

## Vendors

Vendors are private companies involved in integration development and/or maintenance. These third parties are usually companies contracted by either the state PDMP department, the health care system, or both. All PDMP-EHR integrations should coordinate with the health care system's EHR vendor, and some integrations may require coordination with PDMP vendors or integration vendors.



### EHR Vendors

An EHR system is software used to securely document, store, retrieve, share, and analyze clinical patient information. EHR vendors are companies who develop and maintain these types of software for health care systems. [ONC reports](#) that 90% of office-based clinicians and 96% of hospitals in the United States use an EHR system and, thus, have an EHR vendor (Office of the National Coordinator for Health Information Technology, n.d.).

### PDMP Vendors

PDMP vendors are companies that create and support states' PDMP platforms. These platforms track and store controlled substance prescription information. PDMPs provide useful data that clinicians can use to inform their clinical care. They often offer additional solutions such as patient-matching systems, data delivery traceability, and analytics dashboards. Many PDMP vendors offer different platform solutions to states, and some may also offer support to integrate with EHRs within the state. In some cases, PDMP vendors are also integration vendors. States may use a PDMP vendor or develop and maintain their own home-grown solutions.

### Integration Vendors

An integration vendor is a company that facilitates integration between health care systems and state PDMPs. They are often used to connect the EHR system to the state PDMP via a data-sharing hub. The solutions offered by integration vendors can vary based on the needs of the health care system and their EHR system. They may include connectivity development and support, auditing dashboards, and different APIs. Some health care systems may choose to use an integration vendor or may choose to develop, build, and test their own integration. The approach followed by each health care system may be influenced by the state PDMP's and/or the EHR vendor's requirements, offerings, or partnerships with specific integration vendors.



### Key Takeaways for Health Care Systems:

- Health care systems should engage their EHR vendor early in the integration development process. Almost all EHR vendors enable PDMP-EHR integration with varying levels of support. EHR vendors may charge health care systems for

integration functionality. Business agreements with the EHR vendor should be written, agreed upon, and signed at the start of the integration process.

- A PDMP vendor is selected and contracted by the state, or a PDMP may be developed and operated by the state. Health care systems should be aware of the role of the PDMP vendor and if the PDMP prefers or requires the vendor to use a particular data-sharing hub and/or integration vendor.
- Health care systems can determine if they need to contract with an integration vendor through conversations with their EHR vendor and their state PDMP. If so, health care systems should select their integration vendor early in the integration development process and determine if the state has a preferred vendor.
- Regardless of approach, health care systems should ensure that storage of personal identifiable information (PII) complies with HIPAA and other applicable privacy and security requirements.

## State PDMPs

According to the Pew Charitable Trusts, PDMP systems are electronic databases that allow health care professionals to view their patients' controlled substance prescription histories to better inform prescribing, dispensing, and treatment decisions. In this way, PDMP data can help reduce the misuse and diversion of prescription opioids and other controlled substances. State PDMPs' software systems are either operated by a PDMP vendor on behalf of the state or operated by the state directly via a state-developed system. PDMP information is typically derived from data submissions from pharmacies that dispense within the respective state and may also include external data such as patient overdose history or judicial records. In a few states, PDMPs are a part of a larger health information exchange. (The Pew Charitable Trusts, 2018)



**Key Takeaway for Health Care Systems:** State PDMPs are essential partners in an integration effort, and health care systems should begin integration efforts by first contacting the state PDMP. The Advancing PDMP-EHR Integration project found that by working in close collaboration with the state PDMP throughout the various

phases of integration, health care systems could ensure compliance, maximize project coordination, and build a strong relationship with the state PDMP.

## Technical Interactions

Health care systems, EHR systems, state PDMPs, vendors, data-sharing hubs, and health information standards must all interact to successfully communicate PDMP information to clinicians. This section provides high-level overviews of these interactions.

### Without an Integration Vendor

When a query initiates within the EHR system, the EHR system sends patient and requester data elements to a routing service client, likely hosted on their local network, which then creates and sends the request to the public data-sharing hub. The public data-sharing hub provides the routing service client, and it is installed locally within the EHR system's secure network. The request is translated from the data standard used by the EHR system to the data standard used by the state PDMP. Finally, the state PDMP response is returned via the reverse process and rendered for clinician use in the EHR system.

The diagram and table below describe technical transactions using the public data-sharing hub.

Figure 2. Public Data-Sharing Hub Transaction Without an Integration Vendor

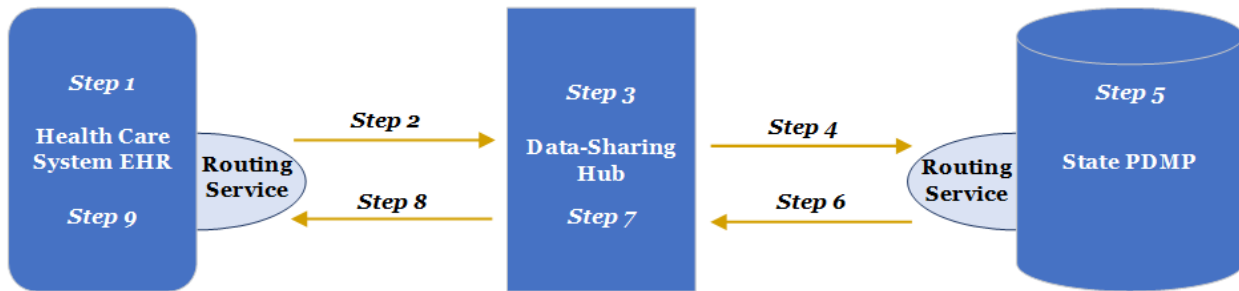


Table 1. Technical Transactions Using the Public Data-Sharing Hub Without an Integration Vendor

Step #	Standard	Description
1	Standard used by EHR system	A query is initiated within the EHR system. For different options on how queries may be initiated (e.g., automatically triggered, generated ad-hoc by a clinician, etc.) see the <a href="#">Integration Taxonomy</a> . The EHR system sends the query information to its routing service client as a request. <sup>2</sup>
2	Standard used by EHR system → PMIX	The routing service translates the request to PMIX, encrypts the patient identifiable data in the request, adds the routing information, encrypts the entire request, and routes the request to the data-sharing hub.
3	PMIX	The data-sharing hub receives the request. Using request header data elements, the data-sharing hub validates the requestor role, logs the transaction, and routes it to the correct routing service client. In this case, it is the routing service client associated with the state PDMP. In some cases, the data-sharing hub may reject the request; for example, when the requester role is not permitted to query in that state or if the request is improperly formatted.
4	PMIX	The request is sent to the state PDMP's routing service client.
5	PMIX	The PDMP routing service client decrypts the request and verifies its digital signature. The state PDMP is given request payload data to gather related patient information. It puts together the data package (the response) and sends it to its routing service client.
6	PMIX	The state PDMP's routing service encrypts the response and routes the response to the data-sharing hub.

<sup>2</sup> A **request** consists of both a header (requestor and recipient information) and a payload (patient information). While both components are encrypted, the header data elements can be accessed by the data-sharing hub.

Step #	Standard	Description
7	PMIX	The data-sharing hub receives the response and routes it to the correct routing service client. In this case, it is the routing service client associated with the health care system.
8	PMIX → Standard used by the EHR system	The routing service client decrypts the response, verifies its digital signature, and translates it to the standard used by the EHR system. Patient information (the payload) can then be accessed by the EHR system.  Note: The individual data elements may or may not be accessible to the health care system or the end user in a discrete format. For example, the response may be displayed as a static PDF.
9	Standard used by the EHR system	The EHR system uses the data elements of the response to generate the patient report. The report can be accessed as a module of the EHR user interface.

Note, the private data-sharing hub necessitates the use of an integration vendor, and this process is illustrated in the subsequent section.

**With an Integration Vendor**

When a query initiates within the EHR system, the EHR system sends patient and requester data elements to the integration vendor in their chosen standard. Either internally or using its routing service client, the integration vendor's system translates the request in alignment with the PMIX standard, routes the request to the state PDMP via one of the data-sharing hubs, and renders the returned state PDMP report for clinician use in the EHR system.

Figure 3 and Table 2 below describe technical transactions using the public data-sharing hub.

*Figure 3. Public Data-Sharing Hub Transaction with an Integration Vendor*

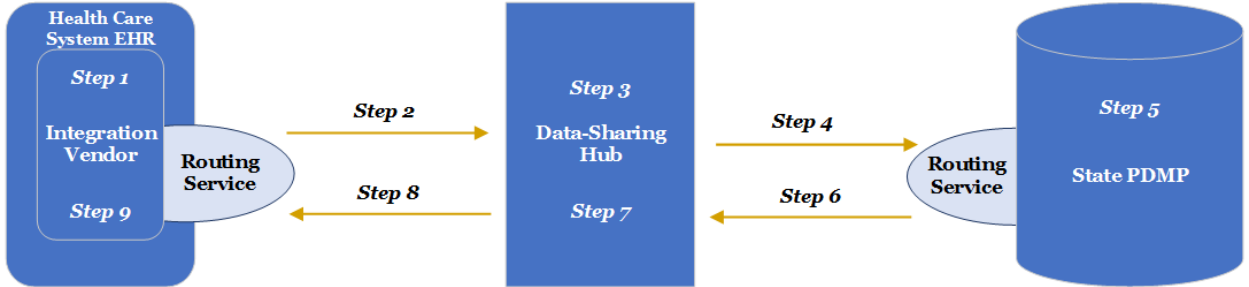


Table 2. Technical Transactions Using the Public Data-Sharing Hub with an Integration Vendor

Step #	Standard	Description
1	Standard used by the integration vendor	A query is initiated within the EHR system. The integration vendor formats the query into a request <sup>3</sup> using their chosen standard. Then, the integration vendor sends the request to its routing service client.
2	Standard used by integration vendor	The EHR system's routing service translates the request in alignment with the PMIX standard, encrypts and routes the request to the data-sharing hub.
3	Standard used by integration vendor → PMIX	The data-sharing hub receives the request. Using request header data elements, the data-sharing hub validates the requestor role, and logs the transaction.
4	PMIX	The data-sharing hub sends the request to the state PDMP's routing service client.
5	PMIX	The PDMP routing service client decrypts the request and verifies its digital signature. The PDMP routing service sends the request payload data to the PDMP system. The PDMP system utilizes all or some of the patient demographic information to match a patient in their system. It compiles the data package (the response) and sends it to its routing service client.
6	PMIX	The state PDMP's routing service client encrypts the response and routes the response to the data-sharing hub.
7	PMIX → standard used by integration vendor	The data-sharing hub receives the response, translates it in alignment with the EHR system's standard and routes it to the requesting EHR system's routing service client. In this case, it is the client associated with the health care system.
8	Standard used by integration vendor	The EHR system's routing service client decrypts the response, verifies its digital signature, and passes along the prescription record response package to the integration vendor. The patient's prescription record information (the payload) can be accessed by the integration vendor.

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<sup>3</sup> **Requests and responses** consist of both a header (requestor and recipient information) and a payload (patient information). While both components are encrypted, the header data elements can be accessed by the data-sharing hub.

Step #	Standard	Description
9	Not Applicable	The integration vendor uses the data elements of the response to generate the patient report. It may calculate Morphine Milligram Equivalents (MME), risk score, and other opioid intelligence metrics from the data. The integration vendor's report can be accessed within the EHR user interface.



Figure 4. Private Data-Sharing Hub Transaction with an Integration Vendor

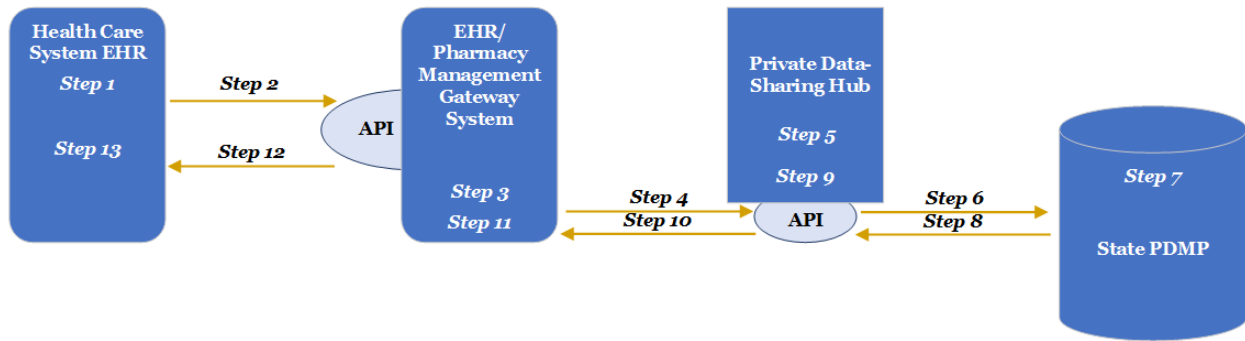


Table 3. Technical Transactions Using the Private Data-Sharing Hub and Integration Vendor

Step #	Standard	Description
1	Standard used by EHR system	A query is initiated within the EHR system. For different options on how queries may be initiated (e.g., automatically triggered, generated ad-hoc by a clinician, etc.) see the <a href="#">Integration Taxonomy</a> .
2	Proprietary system	The EHR system connects to the electronic health record/pharmacy management system Gateway's API to post the request.
3	Standard used by EHR system → PMIX	The Gateway translates the request to PMIX, encrypts the patient identifiable data in the request, adds the routing information, and encrypts the entire request.
4	Proprietary system	The EHR connects to the data-sharing hub API and posts the request to the data-sharing hub.
5	PMIX	The data-sharing hub receives the request. Using request header data elements, the data-sharing hub validates the requestor role, logs the transaction, and routes it toward the correct routing service client. In this case, it is the routing service client associated with the state PDMP. In some cases, the data-sharing hub may reject the request; for example, when the requester role is not permitted to query in that state or if the request is improperly formatted.
6	PMIX	The request is sent to the state PDMP's system by the data-sharing hub's API connecting to the state PDMP's external service.
7	PMIX	The state PDMP system decrypts the request using public and private keys. The state PDMP processes the payload data to gather related patient information. It puts together the data package (the response) and sends it to its routing service client.
8	PMIX	The state PDMP's system encrypts the response and posts the response to the data-sharing hub API.
9	PMIX	The data-sharing hub receives the response.



Step #	Standard	Description
10	PMIX	The data-sharing hub reads the routing information and posts the response to the Gateway.
11	PMIX → Standard used by the EHR system	The Gateway decrypts the response using the applicable public and private keys and creates a view-only report in their system. The EHR system can then access patient information (the payload).  Note: The individual data elements are not accessible to the health care system or the end user in a discrete format. For example, the response is displayed through an URL sent to the requesting system which is displayed in a user interface.
12	Standard used by the EHR system	The Gateway posts the response with an URL to the EHR system.
13	Standard used by the EHR system	The EHR system displays the URL in an embedded view-only window.

**Note:** The above transactions are specific to intrastate data transactions. Additionally, the routing service for the private data-sharing hub is a built-in solution and may not be apparent to users.



**Key Takeaways for Health Care Systems:** Administrators or project managers should be aware of the general process of an integrated query to better lead integration development; however, they do not need to understand it in detail. IT or technical employees may find the full technical transaction diagram helpful. However, they will only be responsible for the EHR system to data-sharing hub and data-sharing hub to EHR system transactions.

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