# DEVELOPMENT AND IMPLEMENTATION OF THE FAILED MESSAGES INITIATIVE

PhilaVax

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# PRESENTATION OUTLINE

- **Overview**
  - Background & Importance
  - Failed Messages Scope
  - HL7 Messages
  - HL7 Message Structure
  - Acknowledgement Codes
- **Failed Message Initiative**
  - Failed Message Report
  - Investigation Process
  - Documentation
  - Common Errors
- **Results**
- **Conclusion**

# Overview

# BACKGROUND & IMPORTANCE

- PDPH's IIS, PhilaVax, contains >3 million patient records and >40 million immunizations
- Receives >100,000 Health Level 7 (HL7) messages a day
  - Of the many messages sent to PhilaVax, an average of 550 messages fail a day
- Vaccination data from failed messages do not get stored in the IIS
  - Negatively impacts the data integrity and completeness of the immunization registry

# FAILED MESSAGES INITIATIVE SCOPE

- Looks at failed HL7 messages
- Focus of the Failed Messages Initiative:
  - Identify Application Fail (AF) messages
  - Investigate root cause
  - Resolve Issue
  - Recover missing data when needed

# HL7 MESSAGES

- Two types of HL7 Messages
  - VXU (VXU^V04) – Vaccination Updates
    - Sends new or historical immunization data
  - QBP (QBP^Q11) – Query by Parameter
    - Provider requests patient information

- Every HL7 message is made up of multiple segments
- Each segment contains information for an immunization

# HL7 MESSAGE STRUCTURE

- Message Segment Header (MSH)
  - Sending Facility
  - Receiving Facility
  - Data/Time
  - Message Type
- Patient Identifier Segment (PID)
  - Name
  - DOB
  - Address
  - Race/Ethnicity
- Pharmacy/Treatment Administration Segment (RXA)
  - Date/time administered
  - Vaccine type
  - Manufacturer
  - Dosage
- Pharmacy/Treatment Route Segment (RXR)
  - Route
  - Site

# HL7 MESSAGES EXAMPLE

Message Code

Select a Theme to save your default: LIGHT WITH SYNTAX

```
1  MSH|^~\&|[redacted]|[redacted]|20250905082257+0000||VXU^V04^VXU_V04|17571037777638|P|2.5.1|||ER|
2  PID|1||3334^^^^MR||Kent^Clark^^^^^L|Fuoco^^^^^^M|19780108|M||2106-3^White^CDCREC|123 ^Test st^Philadelphia^pa^19134^^P||
3  PD1||||||||||||||||||||
4? ORC|RE|1706^IIS|3152^PDPH SANDBOX TEST||||||||K2YB9AROMnMx2a0^Lemke^Freddie^Adolfo^^^NP^test
5? RXA|0|1|20250905||03^MMR^CVX~00006-4681-01^M-M-R II^NDC|8.5|mL^milliliters^UCUM||00^New immunization record^NIP001|JmoNL
6  RXR|C38299^Subcutaneous^NCIT|LA^Left Upper Arm^HL70163
7? OBX|1|CE|64994-7^Eligibility Status^LN|1|MIA05^Medicare (parts A, B and D)^HL70064||||||F|||20250905|||VXC40^Eligibility
8  OBX|2|CE|30963-3^Vaccine funding source^LN|2|PHC70^^CDCPHINVS||||||F||||||
9? OBX|3|CE|69764-9^Document Type^LN|3|25308869830001271121080 6^MMR Vaccine (Measles, Mumps, and Rubella) VIS^cdcgs1vis||||
10 OBX|4|DT|29768-9^Date Vaccine Information Statement Published^LN|3|20250905||||||F|||20250905
11 OBX|5|DT|29769-7^Date Vaccine Information Statement Presented^LN|3|20250905||||||F|||20250905
12
```

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# CUSTOM ACKNOWLEDGEMENT CODES

- When HL7 messages are sent to the IIS, an acknowledge code is returned to the sending system
  - Helps to determine the quality of the HL7 message

- Six types of acknowledgement codes
  - Application Accept (AA)
  - Application Information (AI)
  - Application Warning (AW)
  - Application Error (AE)
  - Application Fail (AF)
  - Application Reject (AR)

- Failed messages initiative specifically looks at AF messages

# APPLICATION FAIL (AF) ACKNOWLEDGEMENT CODE

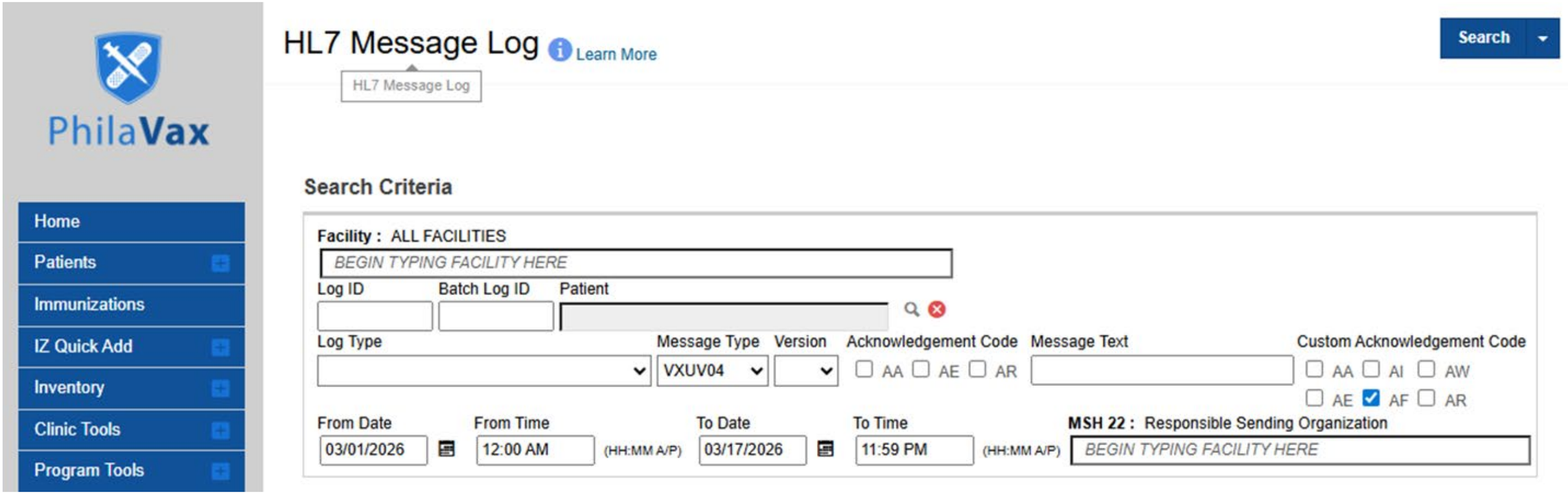
- HL7 messages with an AF acknowledgement code fail to execute
  - Prevents any part of the message from getting into IIS
  - Message contains a critical error
- Error typically occurs in a required field or due to a security error

# Failed Messages Initiative

# FAILED MESSAGE REPORT

- Using Microsoft SQL Server Management Studio, a weekly report of AF messages is generated
  - Gives overview of all the failed messages
  - Includes the following information: Vendor, Log ID, Facility ID, Reason for failure, Segment
- Reports are uploaded to SharePoint
- If the report cannot be run, AF messages can be viewed using the HL7 Messages Log in PhilaVax

# HL7 MESSAGE LOG



# INVESTIGATION PROCESS

- Use Log ID from report to locate VXU message in PhilaVax
- Examine the message using the HL7 Message Analyzer
  - Key information: Error details, Failing segment, Security log ID, Sending facility
- Identify Root Cause
    - Review detailed error box analyzer
- Search patient in PhilaVax to ensure immunization is not in their history
  - If immunization is present, provider may not need to be contacted

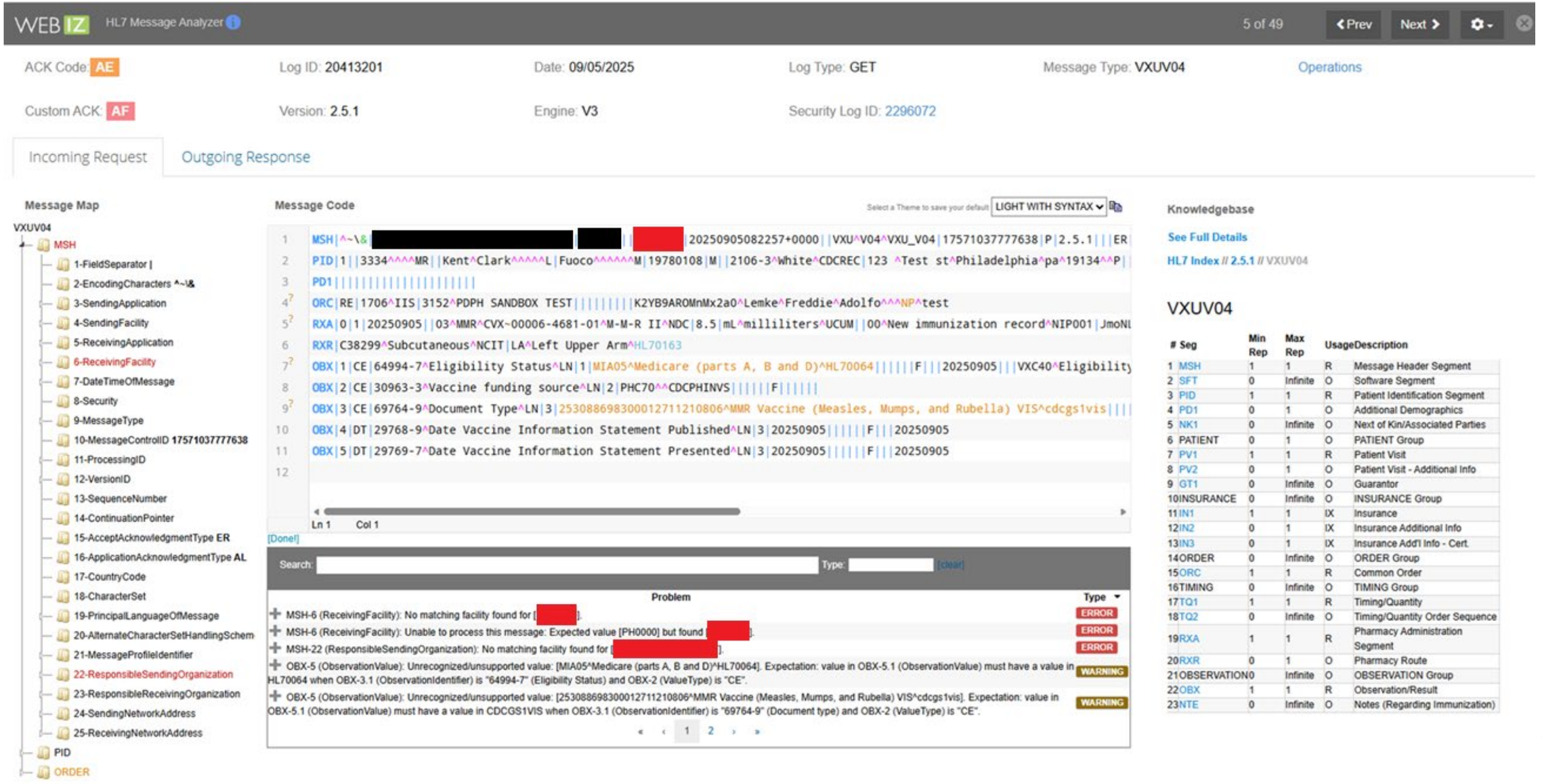
# HL7 MESSAGE EXAMPLE

09/05/25 20413201 16:23:54 **Incoming Request** ph5003 **VXUV04** AE AF **2.5.1** View | Analyze

**HL7 Message**

```
MSH |^~\&[redacted]|[redacted]||[redacted]|20250905082257+0000||VXU^V04^VXU_V04|175710377776
PID |1||3334^^^^MR||Kent^Clark^^^^^L|Fuoco^^^^^^M|19780108|M||2106-3^White^CDCREC|123 ^Test st^Philadelph
PD1 ||||||||||||||||||||||
ORC |RE|1706^IIS|3152^PDPH SANDBOX TEST|||||||||K2YB9AROMnMx2a0^Lemke^Freddie^Adolfo^^^NP^test
RXA |0|1|20250905||03^MMR^CVX~00006-4681-01^M-M-R II^NDC|8.5|mL^milliliters^UCUM||00^New immunization rec
RXR |C38299^Subcutaneous^NCIT|LA^Left Upper Arm^HL70163
OBX |1|CE|64994-7^Eligibility Status^LN|1|MIA05^Medicare (parts A, B and D)^HL70064||||||F|||20250905|||V
OBX |2|CE|30963-3^Vaccine funding source^LN|2|PHC70^^CDCPHINVS||||||F||||||
```

# HL7 MESSAGE ANALYZER



# INVESTIGATION PROCESS

- Compile information for provider
  - Patients Name, Type of Vaccine, Date of Vaccination
- Contact provider or vendor to inform them of the issue
- Two emails will be sent to provider
  - Email containing the cause of the message failure and any data quality issues
  - Encrypted email containing PHI
  - Request back data when needed

# FAILED MESSAGE EMAIL TEMPLATE

Hello,

I am reaching out to you because the Philadelphia IIS, PhilaVax, received a message that failed upon receipt from (facility name – facility code). The data in messages that fail do not get stored in PhilaVax.

The message failed because a required field, (insert segment & issue) was sent incorrectly. Please see below for more detail on the issue and the other errors in the message.

I will securely email a list of patients' names who need to have their immunization data resent. Please fix the errors listed below and resend the data that could not be stored by XXXX.

Thank you and let me know if you have any questions.

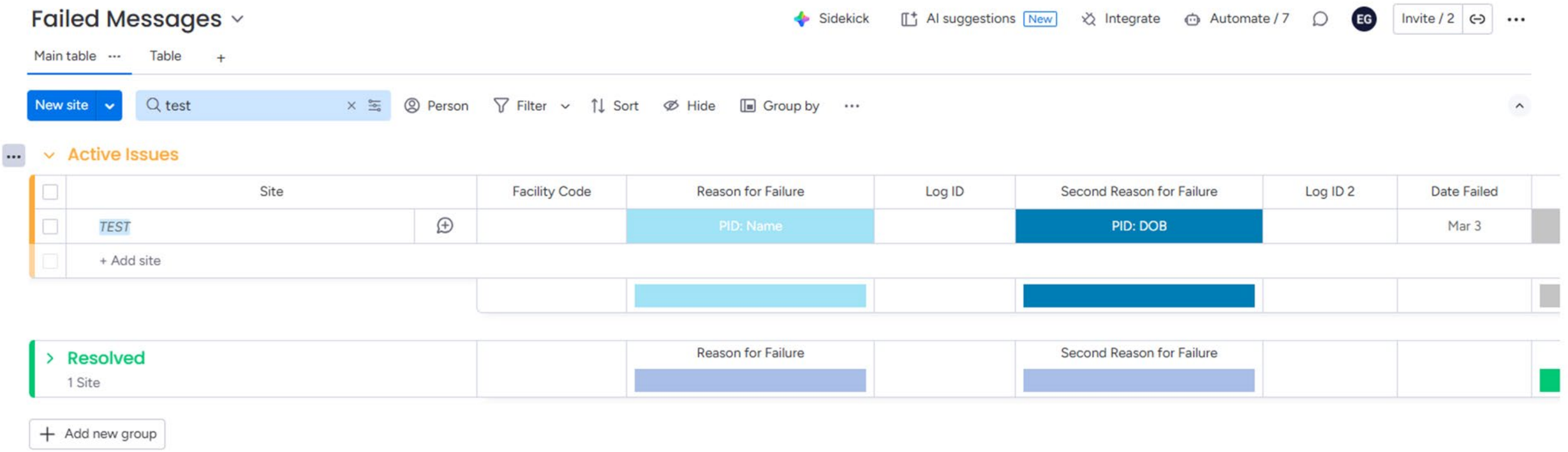
Best,

(Insert name)

# DOCUMENTATION

- All failed messages projects are documented on the Failed Message Board using the platform Monday.com
- Projects are categorized as Active Issues and Resolved Issues
  - This gives the ability to refer to previous projects
  - Site Facility ID, Reason for Failure, Log ID, Date Failed, Status, Notes
- Progress on each project is documented under the Notes tab

# FAILED MESSAGE BOARD



# COMMON ERRORS

## PID Errors

Errors with the patient demographics

Typically related to either PID-3 (Patient Identification List) or PID-7 (DOB)

Missing value or incorrectly formatting will cause message failure

## Resolution

- Gather patient data for all PID-related failed message per facility ID
- Draft two emails
  - Cause for the message failures and steps to resolve issue
  - Send the patient data in encrypted email
- Document progress
- Periodically check to ensure data has been resent correctly

# COMMON ERRORS

## Authorization Errors

- Errors typically occur when there is an issue with the providers E-user account or the HL7 message is missing their facility ID in the MSH-4 (Sending Facility)
- Once resolved, the failed messages will need to be reloaded
- Three types of Authorization Errors

## 1. Authorization Error: User does not have permission to send for this facility

- Occurs if the clinic is inactive or E-users password expires
  - Verify site is inactive in PhilaVax.
  - If site is not marked 'Active', check Master Log
  - If there are no issues, and site is active, check to see if user's password is expired

# COMMON ERRORS

## 2. Authorization Error: No matching facility found

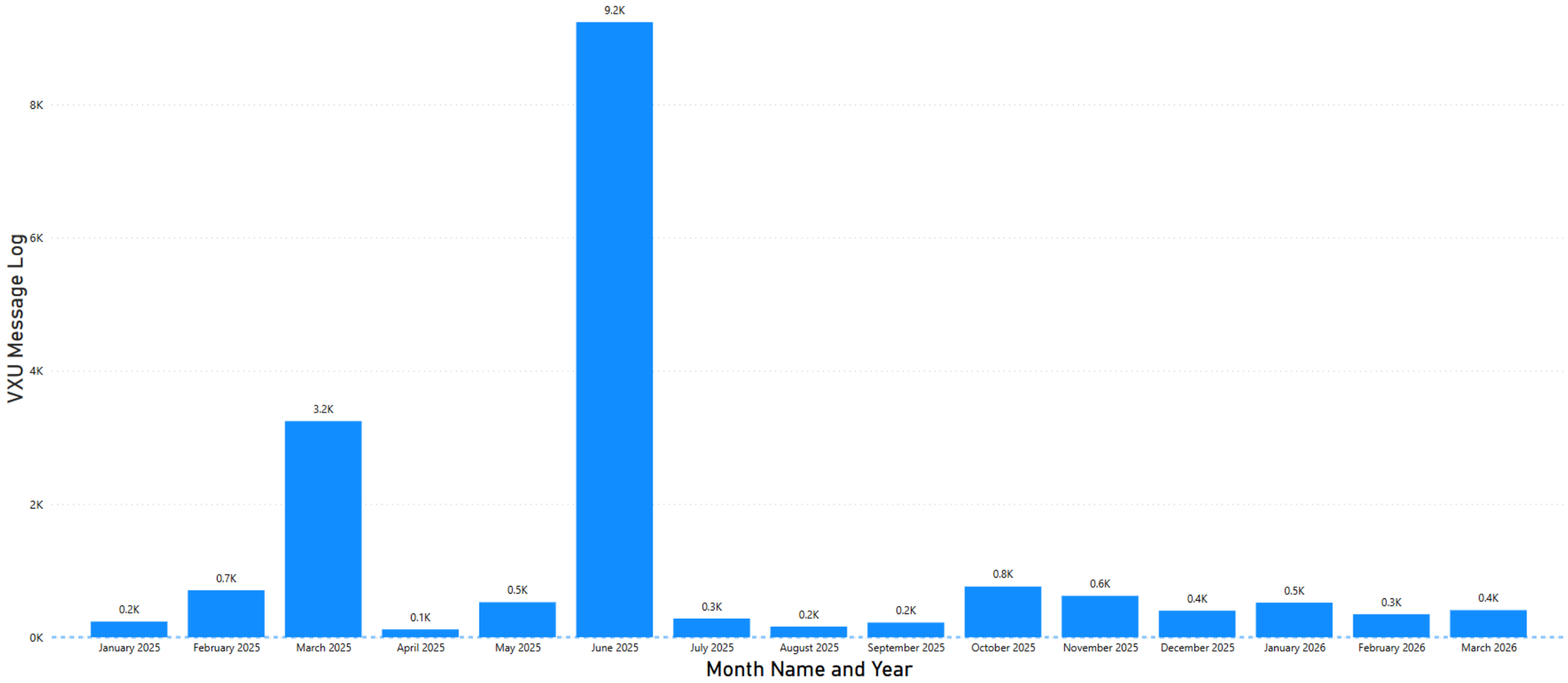
- Occurs when an HL7 message is missing MSH-4 (Sending Facility)
  - Check the security log
  - Looks for clues within the VXU message
  - Check to see if patient has an existing record
  - Reach out to the vendor found in the MSH segment

## 3. Authentication Error: Your account has been locked, Invalid Username or Password

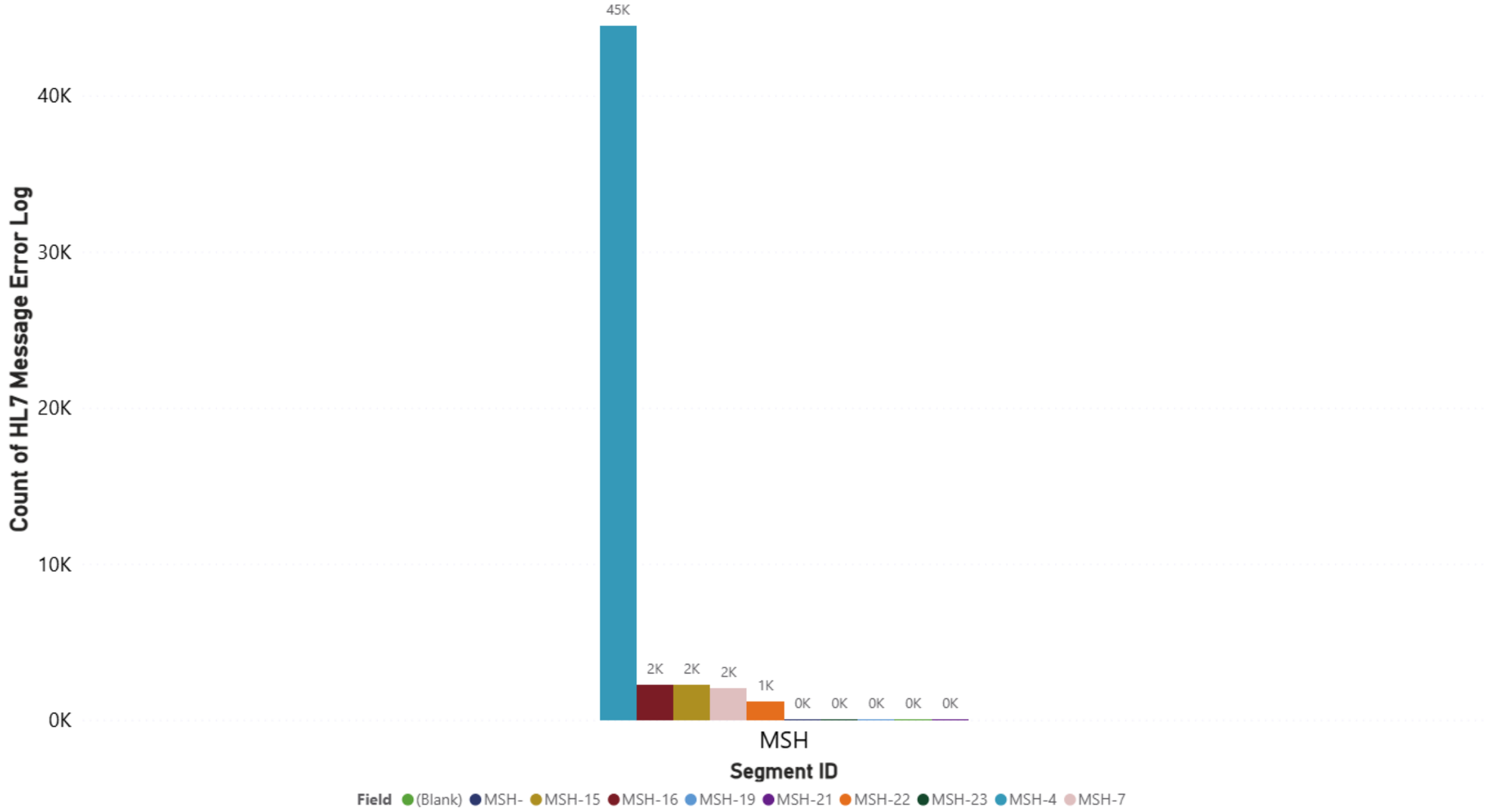
- Occurs when the password for the user account expires
- Typically, the provider's EHR system
  - Verify the issue in PhilaVax
  - If expired, update the expiration date
  - Once corrected, have the failed messages reloaded

# Results

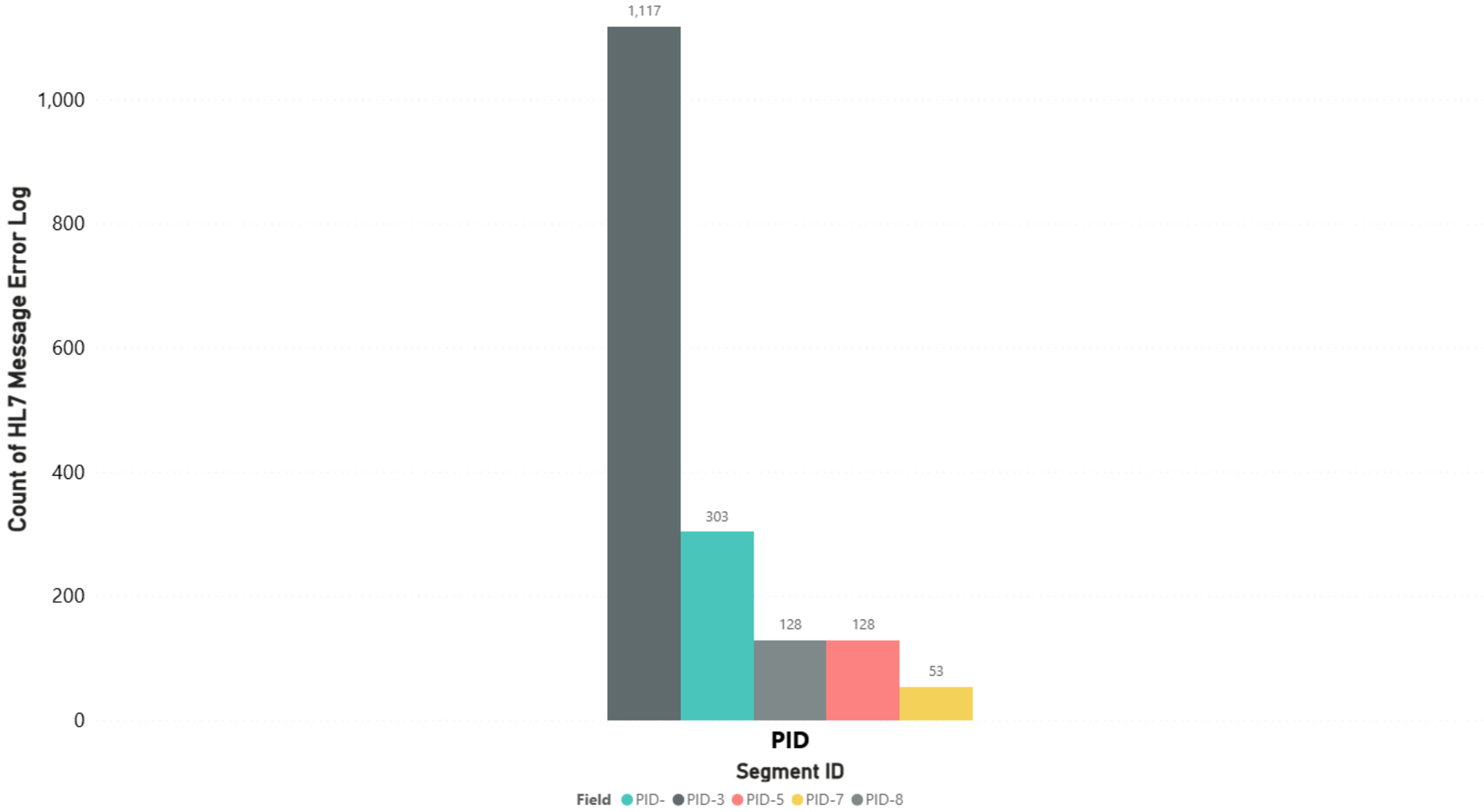
# COUNT OF VXU AF ERROR MESSAGES BY MONTH AND YEAR JANUARY 2025-MARCH 2026



# COUNT OF VXU AF MESSAGE ERRORS BY SEGMENT ID AND FIELD FOR JANUARY 2025-MARCH 2026



# COUNT OF VXU AF MESSAGE ERRORS BY SEGMENT ID AND FIELD JANUARY 2025-MARCH 2026



# Conclusion

# OUTCOME AND BENEFITS

- Allow us to monitor and quickly catch abnormal amounts of failed messages
- Contributes to more complete patient records
- Improves/maintains the integrity of the IIS
- Improves coverages rates
- Identifies data that did not store in IIS
  - Can request missing patient data

# NEXT STEPS

- Continue to investigate VXU messages with no site information
  - Messages have incorrect or missing MSH-4 or RXA-11 information
- Integrate monitoring QBP messages into the failed message initiative
  - Message failures are typically due to MSH-4 (sending facility) or authorization errors
  - If sites do not have bidirectional functionality, we can reach out to gauge interested in bidirectional functionality
- Track trends of failed messages to measure impact of the initiative
- Expand initiative to include AW messages

# Thank you!

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