Perceptive Reach

Integrated Reach Database System

(IRDS)

Database Design Specification



Department of Veterans Affairs

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# About this document

The Database Design Specification Document defines and documents the database architecture, physical and logical data models, database design, and data dictionary. This document will further describe the methods used to validate and standardize imported data, and the manner in which records are linked using common identifiers. This document was prepared and delivered 90 days after contract award and updated monthly thereafter.

# Introduction

The Department of Veterans Affairs (VA) is seeking to expand suicide prevention to include upstream approaches, designed to reduce initiation or escalation of a risk factor. Upstream suicide interventions target individuals or groups who exhibit biological, psychological, or social risk factors that are more prominent among high-risk groups than among the larger population. Understanding the unique needs of our nation’s Veterans and the military culture as it relates to stigma and mental health is important for early intervention. The goal of the Integrated Reach Database System (IRDS) innovation is to promote the general health of the Veteran population and effectively intervene in issues before they escalate in crisis.

The IRDS solution innovates the current process of risk data collection, analysis, and use in effective intervention strategy. The solution will harness the power of large and diverse data stores to aggregate, analyze and identify risk onset as well as reveal previously unidentified at-risk individuals and populations as a holistic and integrated approach.

The IRDS innovation will serve to bolster the three major components of Veterans Health Administration’s (VHA) Strategic Plan for Suicide Prevention: surveillance, risk and protective factors, and prevention interventions. The IRDS innovation will target antecedent events specific to Veteran populations prior to the onset of risk to mitigate the development of risk.

## Purpose

The purpose of the Database Design Specification is to give detailed documentation of the Data and Database components of the IRDS system.

## Scope, Approach and Methods

This document covers the following items:

* Database Properties and Configuration
* Database Conceptual Design
* Database Objects and Table Schemas
* External Data Sources and Interfaces

## Acronyms and Abbreviations

**Table 1: Acronyms and Abbreviations**

| Acronym | Term |
| --- | --- |
| API | Application Programming Interface |
| CDW | Corporate Data Warehouse |
| DOB | Date of Birth |
| EDW | Enterprise Data Warehouse |
| ETL | Extract, Transform, Load |
| GB | Gigabyte |
| HDD | Hard Disk Drive |
| ICD | International Classification of Diseases |
| ID | Identification |
| IRDS | Integrated Reach Database System |
| JSON | JavaScript Object Notation |
| MS | Microsoft Server |
| MUMPS | Massachusetts General Hospital Utility Multi-Programming System |
| NDI | National Death Index |
| NODE JS | An open source, cross-platform runtime environment for server-side and networking applications |
| PACER | Public Access to Court Electronic Records |
| PTSD | Post-Traumatic Stress Disorder |
| RAM | Random Access Memory |
| RPC | Remote Procedure Call |
| SDCD | State Death Certificate Data |
| SDR | Suicide Data Repository |
| SFTP | Secure File Transfer Protocol |
| SPAN | Suicide Prevention Applications Network |
| SQL | Structured Query Language |
| SSIS | SQL Server Integration Services |
| SSMS | SQL Server Management Studio |
| SSN | Social Security Number |
| TBD | To Be Determined |
| TBI | Traumatic Brain Injury |
| T-SQL | Transact-SQL |
| VA | Department of Veterans Affairs |
| VAMC | VA Medical Center |
| VBA | Veterans Benefits Administration |
| VCL | Veterans Crisis Line |
| VHA | Veterans Health Administration |
| VISN | Veterans Integrated Service Networks |
| VistA | Veterans Health Information Systems and Technology Architecture |
| VLER | Virtual Lifetime Electronic Record |

# System Overview

The main components of the IRDS system are:

* **Reach Database -**  A Structured Query Language (SQL) Server database on the IRDS server that stores data from the various VA sources imported into the system.
* **Analytics Risk Model/Surveillance Model** – A program written in R that will run periodically to update a list of high risk factors associated with Veteran suicide. These factors will be persisted in one or more tables in the Reach database. A SQL process will run on a regular basis to monitor Veterans as being high risk for suicide based on factors as determined by the Analytics Risk model.
* **Direct Messaging** -. As Veterans are identified by the surveillance model as being high risk, the VA staff will be notified via the direct messaging component of the IRDS system, which leverages the Virtual Lifetime Electronic Record (VLER) solution adopted by the VA.
* **Perceptive Reach Dashboard** – VA staff can login to the dashboard to read messages and review data associated with their regional or functional responsibility within the VA (i.e. region, facility).

## Business Process

1. Data sources will be imported into the staging area of Reach database on the IRDS server via a SQL Server Integration Services (SSIS) import solution. Each data source will have its own SSIS package (.dtsx). The import solution will transform the data and load it into the appropriate tables in the Reach database.
   1. NOTE: For Corporate Data Warehouse (CDW) data the staging area will be the IRDS project database (VACI\_IRDS) on the CDW server VHACDWA01. This is where the transformations will take place.
2. By analyzing the data sources, the Perceptive Reach Risk Model will be developed, which will be persisted as a set that of risk factor/coefficient pairs to be stored in the Reach database. Periodically the Model may be reviewed and possibly enhanced, leading to updates to the coefficient values for the risk factors. On a regular basis (monthly, bi-monthly) a SQL Server process will run that will do surveillance against a list of Veterans tracked in the Reach database, against the variables in the Risk Model. A risk score is calculated for each Veteran and that value is placed in the record for that Veteran in the ‘Patient’ table, a master list of all Veterans imported into the IRDS system. After the scoring is complete, at risk Veterans will be identified.
3. For each Veteran identified as at risk for suicide, for the first time, the system will notify appropriate VA authorized outreach and intervention staff member(s) through a secure message, leveraging the VA Virtual Lifetime Electronic Record (VLER) Health Direct messaging service. In addition, detailed information about each at risk veteran, such as emergency contact and medication data will be imported into the Reach database for the purpose of being viewed in the Perceptive Reach dashboard.
4. An IRDS user opens up the dashboard via a compatible web browser and a client side java component connects to a server side java component (residing on the IRDS Application Server), which queries the Reach (residing on the IRDS Database Server) database for both specific and aggregate data regarding at risk Veterans at the users’ management level (region, state, Veterans Integrated Service Networks (VISN), VA Medical Center (VAMC)). The query results are passed to the client browser and populated in the web page.

**Figure 1: Business Process Diagram**

## System Information

### Hardware Requirements

**Table 2: Hardware Requirements**

| Hardware Component | Requirements |
| --- | --- |
| Processor | Intel Xeon E5-2600 Family (2670 or 2690), 2.6GHZ |
| Random Access Memory (RAM)/Memory | 64 Gigabyte (GB) |
| Storage/Hard Disk Drive (HDD) | 500GB |

NOTE: The IRDS is a virtualized solution; the table above is a list of resources required for the virtual solution.

### Support Software

**Table 3: Support Software**

| Product | Version | Purpose |
| --- | --- | --- |
| Microsoft (MS) Windows | 2008 R2 or later | Operating System |
| Microsoft (MS) SQL Server | 2012 | Database platform and data store |
| MS SQL Server Integration Services (SSIS) |  | Data import solution development tool Performs ETL work. |
| Transact SQL (T-SQL) |  | Query language native to SQL Server |
| Attachmate Reflection |  | Secure File Transfer Protocol (SFTP) software to download data files onto the IRDS server. |
| Python | 2.7 | Programming language. Used for Individual de-duping functionality |
| R | 3.1.2 | Programming language. Program will be developed in R to analyze Reach database data and develop Risk Model and store results in a SQL table. |
| Node JS | 0.10.33 | Tool to develop server side component of the dashboard. The dashboard sends requests to the Node JS, which queries the database and returns the result back to the client browser. |
| BIRT | 4.4 | Business intelligence and reporting tool. |

## Architecture

### Software Architecture

* **Data Imports** – SSIS will be the primary tool for importing external data sources into the IRDS Reach database. For a specific data import, an SSIS package will be developed to

1. Make a connection to the source (SQL table, text file, other)
2. Import the data into a staging area
3. Make the appropriate data transformations (cleaning, standardization)
4. Load the transformed data into the appropriate Reach data store tables

The execution of SSIS packages (.dtsx files) can be automated by scheduling them as a Windows process via SQL Server Agent.

* **Remote Procedure Calls (RPCs) –** The VA uses the Veterans Health Information Systems and Technology Architecture (Vista) system, for managing Veterans health data. Data will be imported into the IRDS system directly from VistA using RPC calls. VistA data is stored against a Massachusetts General Hospital Utility Multi-Programming System (MUMPS) back end, which uses text based files for data storage. For each set of VistA data imported into IRDS:

1. Either a custom RPC will be written (in M) or a currently existing one will be leveraged
2. An automated java process will execute the RPC and return the query results in text format
3. Those results will be stored in a flat file on the IRDS server to be imported into the reach database via an SSIS package

**NOTE: At the time of this version of the document there are no specification pull data directly from VistA to IRDS and no RPC calls have been leveraged or developed.**

**Figure 2: IRDS Database Software Architecture**

### Interfaces

* **Corporate Data Warehouse (CDW)** – Data warehouse for Veterans Health Administration (VHA) data, primarily VistA data. Records are stored in SQL Server tables.
* **Suicide Data Repository (SDR)** – Suicide and Mortality Data from four sources are stored on a centralized server in SQL Server tables. Those sources are: Mortality Search Results from the National Death Index (NDI), State Death Certificate Data (SDCD), Veterans Crisis Line (VCL), Suicide Prevention Applications Network (SPAN)
* **Veterans Health Information Systems and Technology Architecture (VISTA)** – Open source enterprise system used by VHA network. Data is stored in a MUMPS back end.

**NOTE: At the time of this version of the document there are no specification pull data directly from VistA to IRDS.**

* **VA Enterprise Data Warehouse (EDW)** – Data warehouse that stores Veteran Benefits Administration (VBA) data.

**NOTE: At the time of this version of the document there are no specification pull data from EDW.**

NOTE: At this time there is an attempt to include VBA data elements housed at EDW in the IRDS system. It is unclear whether access to the data will be available within timeframe set to develop the IRDS system.

* **Perceptive Reach Dashboard** – Users of the IRDS system will connect through a web based dashboard.
* **Analytics Sandbox** – VA users will be able to run ad-hoc reporting by connecting to the IRDS database using tools such as R or BIRT.
* **Data Sources External to VA** – The IRDS system may potentially pull data from one or more outside sources such as LexisNexis or Public Access to Court Electronic Records (PACER).
* **NOTE: At the time of this version of the document there are no specifications to pull data from data sources external to VA.**

### Data Stores

* All data stored in the IRDS system will be captured in SQL Server tables.
* In the event that some data will be accessed via a file format, such as FLAT files, those files will be uploaded to the IRDS server via SFTP and placed in a specified location on the IRDS server file system, to be processed for import.

# Database Design Decisions

The decision was made to use SQL Server as opposed to other data platforms such as MySQL or Microsoft Access because:

* Microsoft SQL Server is approved and is widely used within the VA
* Several of the systems from which data will be imported are stored in SQL Server tables
* The IRDS development team has expertise in SQL Server and has successfully developed and deployed the SDR system into production
* The platform is scalable enough to handle the size and performance requirements that are expected for this system

The initial database will be configured to the default configuration for a SQL server database. As technical requirements evolve, that setup will change to accommodate the updated specifications (i.e., breaking the database file into multiple files).

Data Imports are developed using SQL Server Integration Services (SSIS). SSIS solutions are developed on an ETL server provided by CDW (see the IRDS developers guide for more information).

## Assumptions

There are currently no technical assumptions being made for the Database portion of the IRDS system.

## Issues

There are currently no issues for the Database portion of the IRDS system.

## Constraints

There are currently no constraints for the Database portion of the IRDS system.

# Database Administrative Functions

## Naming Conventions

**Table 4: Database Naming Conventions**

| Type | Guideline |
| --- | --- |
| Reference Tables | Begin with “Ref\_” (ex: Ref\_Gender) |
| Table names | Mountain style (ex: SuicideEvents) |
| Constraints | Begin with constraint abbreviation then underscore (foreign key example: fk\_VetID) |
| Unique Identifier | All tables will have an ID field of type integer – identity. |

## Database Identification

**Table 5: Database Identification**

| Element | Element Name | Meaning |
| --- | --- | --- |
| db\_name | Reach | Production/Master Database |
| db\_name | Reach\_Dev | Development database (on cloud development server) |
| db\_name | Reach\_Preprod | Test/Pre-production database |
| db\_path |  | The full path to the location where the database is stored on the system. |
| db\_file | Reach.mdf | Database filename |
| db\_log | Reach\_log.ldf | Database log file |

## Schema Information

### Description

The Reach database will contain the following schemas:

* .dbo – The MS SQL Server default schema, will contain data imported from VA data sources, such as the VA Suicide Data Repository (SDR). Reference data will be stored here as well, such as a list of VAMC and a list of International Classification of Disease (ICD) codes. The risk model output will be persisted into one or more tables in this schema as well.
* SSIS – Will contain tables created during source data import processes, developed using MS SQL Server Integration Services (SSIS). The records created by the last run per SSIS solution (.dtsx) will be persisted in the SSIS schema tables, leaving a footprint available for troubleshooting and debugging
* PRSystem – Tables used by the IRDS dashboard, such as a list of preferences for each dashboard user.
* Staging – This will be the staging area for data imported into IRDS before it is transformed by SSIS import packages and imported into tables described in the .dbo schema

### Logical Data Model

The Reach Database contains the following tables:

Data Tables

**Patient** - The master list of Veterans that will be scored for suicide risk in the IRDS system. This table contains:

* Reach ID - Unique IRDS system ID (all child tables to the Patient table will be linked by Reach ID)
* VA Identifiers - Scrambled SSN
* Demographics - Name, Social Security Number (SSN), Date of Birth (DOB)
* Current Risk Score and Risk Level
* Date First Identified as High Risk

NOTE: The DateIdentifiedAsAtRisk field represents that date the user was first available to be viewed in the individual level views of the IRDS dashboard. The decision was made by the VA that instead of making all at risk patients available to be reviewed in the dashboard (roughly 350k patients), only a handful of randomly selected patients would at each facility would be presented in the dashboard. A SQL script is manually run after each risk score run that randomly selects patients (per VA specifications) and sets those patient’s DateIdentifiedAsAtRisk to the current date.

* ScoringStatus

The stored procedure that calculates patient risk scores, only scores patients that have a scoring status = 1 in their patient record.

The SSIS packages that are run against the database manage the value of this field:

When new patients are added to the IRDS population the ScoringStatus field in their Patient record is set to 1

The value can change if at a later time they are determined to:

not have used VHA services in the past 2 years (ScoringStatus set to 2)

have been flagged as being deceased in CDW (ScoringStatus set to 3)

**RiskFactors** - The Risk Factors table will store risk factors for each Veteran, which will be used to calculate that Veteran's risk score. One record will contain all of the risk factor values for a Veteran. There will be a 1 to 1 relationship between the Patient table and the RiskFactors table.

**RiskLevelHistory** – Each time risk scores are re-run for the Veterans, the Veteran’s old risk level (TOP or MIDDLE) will be moved to the RiskLevelHistory table. The table will have a 1 to many relationship with the patient table.

**ScoreHistory** - Each time risk scores are re-run for the Veterans the old scores will be moved to a ScoreHistory table, so each Veteran score can be mapped over time. The table will have a 1 to many relationship with the Patient table.

**Veteran details tables** - Any data that will be displayed in the IRDS dashboard for high risk Veterans will be stored in one to many child tables to the Patient tables. Ex: There will be an emergency contact table in the Reach database. Any time a Veteran becomes identified as high risk, the emergency contact data for that Veteran will be added to an EmergencyContact table.

Veterans that are identified as deceased in CDW will be filtered from being imported into the IRDS patient population.

Reference Tables

Examples are lists to be used for reporting and normalizing of the data such as a list VAMCs and a list of ICD Codes that contain a diagnosis description associated with each code.

VeteranStation

Each Veteran will be tied to a primary VAMC in the IRDS system.

System Tables

Tables used by the dashboard such as User roles and Preferences (see Data Access).

* Prsystem.PatientDashboardFilter – The table dictates to the dashboard which patients are included in the dashboard. The table has 4 fields

ReachID – the unique identifier for each patient

Surveillance (NOT BEING USED AT THIS TIME)

Facility (NOT BEING USED AT THIS TIME)

Patient – bit field

Only patients who have their a value = 1 in the Patient column of the Prsystem.PatientDashboardFilter table are displayed in the dashboard, even if they are in top 5% based on their risk score.

Days Use tables

There are 4 days use tables in database

* DaysUse\_IP (for Days Use - Inpatient)
* DaysUse\_OP (for Days Use - Outpatient)
* DaysUse\_IPMH (for Days Use – Inpatient Mental Health specific)
* DaysUse\_OPMH (for Days Use – Outpatient Mental Health specific)

These tables track patient days use for a 730 day period. This table is used by an SSIS package to calculate values in the PatientRiskFactor table (ex: IPMH DaysUse 1 month previous, IPMH DaysUse 2 month previous).

All 4 tables have the exact same columns.

In the example below, which looks at the table DaysUse\_IP,it is assumed that risk scores are being calculated with data from the period of 9/1/2014 – 8/31/2016. The DaysUse\_IP table has the following columns:

ScrSSN = VA scrambled SSN (the unique identifier for the patient)

Day730 = Did the patient have an inpatient visit on 9/1/2014 (1=yes,0=no)

Day729 = Did the patient have an inpatient visit on 9/2/2014 (1=yes,0=no),

Day1= Did the patient have an inpatient visit on 9/2/2014 (1=yes,0=no)

Each column has the real date that is represented in the column stored in description extended property of the column, as opposed to the relative day of the column which is in the column name.

If the following query where run in SQL Server Management Studio (SSMS)

Select value From fn\_listextendedproperty('Description', 'SCHEMA', 'dbo', 'TABLE', 'DaysUse\_IP', 'COLUMN', 'Day730')

would return the value “Run on 2014-09-01’ because day 730 represents that day

Every time new Days Use data is imported into the system (via an SSIS package):

1. One Day’s worth of patient usage is calculated and stored in a temporary table
2. The Day730 field is removed from the table
3. The Day729 field is renamed to Day730, Day728 field is renamed to Day729, etc..
4. A new Day1 field is added to the table and the data from the temp table listed from above is moved into this column

With the current example:

Day730 would now contain the days use data from 2014-09-02 and this can be confirmed by running the query above.

Tables for 6500 Compliance

To satisfy VA Handbook 6500, item AU3, IRD must meet VA 6500 audit record content requirements, the Reach database will have tables to capture data entry by the users of the IRDS Dashboard: These tables will contain the following elements:

* Patient’s ReachID (if the data entry pertains to a specific Patient with the Reach system)
* Dashboard user’s UserID (from the prsystem.User table)
* Timestamp – Date/time that the user updated the record in the system
* The data entry value entered by the user

Facility Surveillance

The Attempt Prediction Chart widget on the IRDS Dashboard shows the effect of gaps in reporting attempted suicides by each VAMC. IRDS has incorporated a process for calculating values using an algorithm developed by VA. The data for these calculations is obtained by pulling SPAN Event data from the Suicide Data Repository (SDR) and aggregating it per facility.

Three tables have been added to the staging schema of the Reach database to support this functionality:

* SpanEvent - Holds SPAN event data imported from SDR to be aggregated per VAMC by an IRDS SSIS process
* VAMC\_Covariate - Contains year end patient enrollment totals per facility, which are used as a variable in the VA algorithm.
* FaclityResults - The per facility output of the VA algorithm, which is queried and displayed by the dashboard.



**Figure 3: IRDS Reach Database Logical Data Model**

### Physical Data Model



### Data Dictionary

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE NAME | COLUMN NAME | DATA TYPE | NULLS? |
| dbo.Appointments | ReachID | int | N |
| dbo.Appointments | ApptDate | date | Y |
| dbo.Appointments | CancelNoShowCode | varchar(5) | Y |
| dbo.Appointments | PrimarySecondaryStopCodeName | varchar(125) | Y |
| dbo.Appointments | ApptID | int | N |
| dbo.ClinOutreach\_GeneralComments | ReachID | int | N |
| dbo.ClinOutreach\_GeneralComments | EntryDate | datetime | Y |
| dbo.ClinOutreach\_GeneralComments | Comment | nvarchar | Y |
| dbo.ClinOutreach\_GeneralComments | Revision | int | N |
| dbo.ClinOutreach\_HighRisk\_SPANImport | ReachID | int | N |
| dbo.ClinOutreach\_HighRisk\_SPANImport | ImportDate | datetime | Y |
| dbo.ClinOutreach\_HighRisk\_SPANImport | HighRisk | bit | Y |
| dbo.ClinOutreach\_HighRisk\_SPANImport | DateFirstIdentifiedAsHighRisk | datetime | Y |
| dbo.ClinOutreach\_HighRisk\_SPANImport | DateHighRiskLastUpdated | datetime | Y |
| dbo.ClinOutreach\_HighRisk\_SPANImport | Revision | int | N |
| dbo.ClinOutreach\_HighRisk\_UserNotes | ReachID | int | N |
| dbo.ClinOutreach\_HighRisk\_UserNotes | EntryDate | datetime | Y |
| dbo.ClinOutreach\_HighRisk\_UserNotes | UserNotes | nvarchar | Y |
| dbo.ClinOutreach\_HighRisk\_UserNotes | Revision | int | N |
| dbo.ClinOutreach\_PrimaryHealthProvider\_UserNotes | ReachID | int | N |
| dbo.ClinOutreach\_PrimaryHealthProvider\_UserNotes | EntryDate | datetime | Y |
| dbo.ClinOutreach\_PrimaryHealthProvider\_UserNotes | UserNotes | nvarchar | Y |
| dbo.ClinOutreach\_PrimaryHealthProvider\_UserNotes | Revision | int | N |
| dbo.ClinOutreach\_SafetyPlan\_SPANImport | ReachID | int | N |
| dbo.ClinOutreach\_SafetyPlan\_SPANImport | ImportDate | datetime | Y |
| dbo.ClinOutreach\_SafetyPlan\_SPANImport | SafetyPlanCurrent | bit | Y |
| dbo.ClinOutreach\_SafetyPlan\_SPANImport | DateSafetyPlanCompletedOrUpdated | datetime | Y |
| dbo.ClinOutreach\_SafetyPlan\_SPANImport | Revision | int | N |
| dbo.ClinOutreach\_SafetyPlan\_UserNotes | ReachID | int | N |
| dbo.ClinOutreach\_SafetyPlan\_UserNotes | EntryDate | datetime | Y |
| dbo.ClinOutreach\_SafetyPlan\_UserNotes | UserNotes | nvarchar | Y |
| dbo.ClinOutreach\_SafetyPlan\_UserNotes | Revision | int | N |
| dbo.EmergencyContact | ReachID | int | N |
| dbo.EmergencyContact | NameOfContact | varchar(50) | N |
| dbo.EmergencyContact | StreetAddress1 | varchar(50) | Y |
| dbo.EmergencyContact | StreetAddress2 | varchar(50) | Y |
| dbo.EmergencyContact | StreetAddress3 | varchar(50) | Y |
| dbo.EmergencyContact | City | varchar(50) | Y |
| dbo.EmergencyContact | State | varchar(30) | Y |
| dbo.EmergencyContact | Zip | varchar(50) | Y |
| dbo.EmergencyContact | Zip4 | varchar(50) | Y |
| dbo.EmergencyContact | Phone | varchar(50) | Y |
| dbo.EmergencyContact | PhoneWork | varchar(50) | Y |
| dbo.MedsasDemographics | ScrSSN | varchar(50) | Y |
| dbo.MedsasDemographics | ServiceConnectedGroup | int | Y |
| dbo.MedsasDemographics | DOB | date | Y |
| dbo.MedsasDemographics | Region | smallint | Y |
| dbo.MedsasDemographics | UrbanRural | char(1) | Y |
| dbo.MedsasDemographics | Marital | char(1) | Y |
| dbo.MedsasDemographics | Sex | char(1) | Y |
| dbo.MedsasDemographics | Race | smallint | Y |
| dbo.OutreachStatusHistory | ReachID | int | Y |
| dbo.OutreachStatusHistory | OutReachStatus | smallint | Y |
| dbo.OutreachStatusHistory | UpdateDate | datetime | Y |
| dbo.OutreachStatusHistory | UpdateUser | int | Y |
| dbo.Patient | ReachID | int | N |
| dbo.Patient | LastName | varchar(50) | Y |
| dbo.Patient | FirstName | varchar(50) | Y |
| dbo.Patient | SSN | varchar(50) | Y |
| dbo.Patient | Address1 | varchar(50) | Y |
| dbo.Patient | Address2 | varchar(50) | Y |
| dbo.Patient | Address3 | varchar(50) | Y |
| dbo.Patient | City | varchar(50) | Y |
| dbo.Patient | State | varchar(30) | Y |
| dbo.Patient | Zip | varchar(50) | Y |
| dbo.Patient | Zip4 | varchar(50) | Y |
| dbo.Patient | HomePhone | varchar(50) | Y |
| dbo.Patient | WorkPhone | varchar(50) | Y |
| dbo.Patient | CellPhone | varchar(50) | Y |
| dbo.Patient | MothersMaidenName | varchar(50) | Y |
| dbo.Patient | DateofDeath | date | Y |
| dbo.Patient | EmailAddress | varchar(50) | Y |
| dbo.Patient | Race | smallint | Y |
| dbo.Patient | Gender | char(1) | Y |
| dbo.Patient | PatientICN | varchar(50) | Y |
| dbo.Patient | MaritalStatus | smallint | Y |
| dbo.Patient | DOB | date | Y |
| dbo.Patient | RiskScore | decimal(11,10) | Y |
| dbo.Patient | RiskLevel | smallint | Y |
| dbo.Patient | DateIdentifiedAsAtRisk | date | Y |
| dbo.Patient | MilitaryBranch | smallint | Y |
| dbo.Patient | OutreachStatus | smallint | Y |
| dbo.Patient | ScoringStatus | smallint | Y |
| dbo.Patient | MilitaryEra | smallint | Y |
| dbo.Patient | ScrSSN | varchar(50) | Y |
| dbo.Patient | WidgetDataPulled | bit | Y |
| dbo.PatientDiagnosis | ReachID | int | N |
| dbo.PatientDiagnosis | ICD\_Code | varchar(50) | N |
| dbo.PatientDiagnosis | ICD\_Desc | varchar(255) | Y |
| dbo.PatientDiagnosis | DiagnosisDate | date | Y |
| dbo.PatientMedications | ReachID | int | N |
| dbo.PatientMedications | MedicationName | varchar(100) | N |
| dbo.PatientMedications | Active | bit | Y |
| dbo.PatientOutReachStatus | ReachID | int | N |
| dbo.PatientOutReachStatus | IdentifiedPrimaryProvider | bit | Y |
| dbo.PatientOutReachStatus | IdentifiedPrimaryProvider\_Date | datetime | Y |
| dbo.PatientOutReachStatus | NotifiedProvider | bit | Y |
| dbo.PatientOutReachStatus | NotifiedProvider\_Date | datetime | Y |
| dbo.PatientOutReachStatus | AskedProviderReview | bit | Y |
| dbo.PatientOutReachStatus | AskedProviderReview\_Date | datetime | Y |
| dbo.PatientOutReachStatus | ReceivedNotification | bit | Y |
| dbo.PatientOutReachStatus | ReceivedNotification\_Date | datetime | Y |
| dbo.PatientOutReachStatus | ReviewedCurrentDiagnosis | bit | Y |
| dbo.PatientOutReachStatus | ReviewedCurrentDiagnosis\_Date | datetime | Y |
| dbo.PatientOutReachStatus | EstablishedContact | bit | Y |
| dbo.PatientOutReachStatus | EstablishedContact\_Date | datetime | Y |
| dbo.PatientOutReachStatus | UpdatedPlan | bit | Y |
| dbo.PatientOutReachStatus | UpdatedPlan\_Date | datetime | Y |
| dbo.PatientOutReachStatus | EvaluateCaring | bit | Y |
| dbo.PatientOutReachStatus | EvaluateCaring\_Date | datetime | Y |
| dbo.PatientOutReachStatus | EvaluateSafetyPlan | bit | Y |
| dbo.PatientOutReachStatus | EvaluateSafetyPlan\_Date | datetime | Y |
| dbo.PatientOutReachStatus | Deceased | bit | Y |
| dbo.PatientOutReachStatus | Deceased\_date | datetime | Y |
| dbo.PatientOutReachStatus | CannotContact | bit | Y |
| dbo.PatientOutReachStatus | CannotContact\_Date | datetime | Y |
| dbo.PatientOutReachStatus | RefusedServices | bit | Y |
| dbo.PatientOutReachStatus | RefusedServices\_Date | datetime | Y |
| dbo.PatientOutReachStatus | CareFromCommunity | bit | Y |
| dbo.PatientOutReachStatus | CareFromCommunity\_Date | datetime | Y |
| dbo.PatientOutReachStatus | ClinicallyNotAtRisk | bit | Y |
| dbo.PatientOutReachStatus | ClinicallyNotAtRisk\_Date | datetime | Y |
| dbo.PatientOutReachStatus | Other | bit | Y |
| dbo.PatientOutReachStatus | Other\_date | datetime | Y |
| dbo.PatientOutReachStatus | CurrentStatus | varchar(83) | N |
| dbo.PatientStation | ReachID | int | N |
| dbo.PatientStation | sta3N | smallint | N |
| dbo.PatientStation | PatientSID | int | Y |
| dbo.PatientStation | PatientIEN | varchar(50) | Y |
| dbo.PatientStation | Active | bit | Y |
| dbo.Ref\_CDSConditions | Condition | varchar(255) | Y |
| dbo.Ref\_CDSConditions | Condition\_ID | int | N |
| dbo.Ref\_CDSConditions | Condition\_SubQuestion | varchar(200) | Y |
| dbo.Ref\_CDSQuestions | Question | varchar(255) | Y |
| dbo.Ref\_CDSQuestions | Condition\_ID | int | Y |
| dbo.Ref\_CDSQuestions | Question\_ID | int | N |
| dbo.Ref\_CDSTreatments | Treatment\_ID | int | N |
| dbo.Ref\_CDSTreatments | Treatment | varchar(250) | N |
| dbo.Ref\_CDSTreatments | Response\_ID | smallint | N |
| dbo.Ref\_CDSTreatments | Question\_ID | int | N |
| dbo.Ref\_ClinicalDecisionSupportGuideline | CDSG\_ID | int | N |
| dbo.Ref\_ClinicalDecisionSupportGuideline | Features | text | Y |
| dbo.Ref\_ClinicalDecisionSupportGuideline | Action | text | Y |
| dbo.Ref\_ClinicalDecisionSupportGuideline | GuidelineType | varchar(50) | Y |
| dbo.Ref\_ClinicalDecisionSupportGuideline | RiskLevel | smallint | Y |
| dbo.Ref\_GuidelineRiskFactors | RiskFactorCode | varchar(10) | Y |
| dbo.Ref\_GuidelineRiskFactors | RiskFactorName | varchar(50) | Y |
| dbo.Ref\_GuidelineRiskFactors | RiskfactorDescription | varchar(255) | Y |
| dbo.Ref\_GuidelineRiskFactors | GuidelineURL | varchar(255) | Y |
| dbo.Ref\_GuidelineRiskFactors | ToolkitURL | varchar(50) | Y |
| dbo.Ref\_MaritalStatus | MaritalStatusID | smallint | N |
| dbo.Ref\_MaritalStatus | MaritalStatusDesc | varchar(20) | Y |
| dbo.Ref\_MilitaryBranch | BranchID | smallint | N |
| dbo.Ref\_MilitaryBranch | BranchDesc | varchar(50) | Y |
| dbo.Ref\_MilitaryEra | EraID | smallint | N |
| dbo.Ref\_MilitaryEra | EraDesc | varchar(50) | N |
| dbo.Ref\_OutreachStatus | OutReachStatusID | smallint | N |
| dbo.Ref\_OutreachStatus | StatusDesc | varchar(50) | Y |
| dbo.Ref\_Race | RaceID | smallint | N |
| dbo.Ref\_Race | RaceDesc | varchar(50) | Y |
| dbo.Ref\_Region | RegionID | int | N |
| dbo.Ref\_Region | RegionName | varchar(50) | Y |
| dbo.Ref\_RiskLevel | RiskLevelID | smallint | N |
| dbo.Ref\_RiskLevel | RiskLevelDesc | varchar(20) | Y |
| dbo.Ref\_RiskLevel | RiskLevelFullDesc | varchar(255) | Y |
| dbo.Ref\_RiskLevel | Threshold | decimal(11,10) | Y |
| dbo.Ref\_State | StateAbbr | char(2) | N |
| dbo.Ref\_State | StateName | varchar(50) | Y |
| dbo.Ref\_State | RegionID | int | Y |
| dbo.Ref\_VAMC | STA3N | smallint | N |
| dbo.Ref\_VAMC | VISN | smallint | Y |
| dbo.Ref\_VAMC | VAMC\_Name | varchar(100) | Y |
| dbo.Ref\_VAMC | StateAbbr | char(2) | Y |
| dbo.Ref\_VISN | VISN | int | N |
| dbo.Ref\_VISN | NetworkName | varchar(100) | Y |
| dbo.Ref\_VISN | RegionServed | varchar(500) | Y |
| dbo.Ref\_VISN | RegionID | int | Y |
| dbo.Ref\_VistACancelNoShowCode | CancelNoShowCodeID | varchar(5) | N |
| dbo.Ref\_VistACancelNoShowCode | CancelNoShowCodeDesc | varchar(100) | Y |
| dbo.RiskFactorCoefficient | RiskFactor | varchar(100) | N |
| dbo.RiskFactorCoefficient | Coefficient | decimal(22,20) | Y |
| dbo.RiskLevelHistory | ReachID | int | N |
| dbo.RiskLevelHistory | DateIdentified | date | N |
| dbo.RiskLevelHistory | RiskLevel | smallint | Y |
| dbo.RiskScoreHistory | ReachID | int | N |
| dbo.RiskScoreHistory | ScoreDate | date | N |
| dbo.RiskScoreHistory | RiskScore | decimal(11,10) | Y |

### PatientRiskFactor Table Column Description

|  |  |
| --- | --- |
| **Column** | **Description** |
| agegroup | Age Group |
| alprazolam12 | Alprazolam tx in prior 12 months |
| alprazolam24 | Alprazolam tx in prior 24 months |
| ami12 | Acute myocardial infarction in prior 12 months |
| ami24 | Acute myocardial infarction in prior 24 months |
| amp12 | Amputation in prior 12 months |
| amp24 | Amputation in prior 24 months |
| analgesic12 | Analgesic tx in prior 12 months |
| analgesic24 | Analgesic tx in prior 24 months |
| anticonvulsant12 | Anticonvulsant tx in prior 12 months |
| anticonvulsant24 | Anticonvulsant tx in prior 24 months |
| antidep12 | antidep tx in prior 12 months |
| antidep24 | antidep tx in prior 24 months |
| antipsy12 | antipsy tx in prior 12 months |
| antipsy24 | antipsy tx in prior 24 months |
| anyattempt1 | Any suicide attempt in prior 1 months |
| anyattempt12 | Any suicide attempt in prior 12 months |
| anyattempt18 | Any suicide attempt in prior 18 months |
| anyattempt2 | Any suicide attempt in prior 2 months |
| anyattempt24 | Any suicide attempt in prior 24 months |
| anyattempt3 | Any suicide attempt in prior 3 months |
| anyattempt6 | Any suicide attempt in prior 6 months |
| AnyEDvisits\_prior1 | Any Emergency Dept visit in past 1 month |
| AnyEDvisits\_prior12 | Any Emergency Dept visit in past 12 months |
| AnyEDvisits\_prior18 | Any Emergency Dept visit in past 18 months |
| AnyEDvisits\_prior2 | Any Emergency Dept visit in past 2 months |
| AnyEDvisits\_prior24 | Any Emergency Dept visit in past 24 months |
| AnyEDvisits\_prior3 | Any Emergency Dept visit in past 3 months |
| AnyEDvisits\_prior6 | Any Emergency Dept visit in past 6 months |
| anyipsub\_prior12 | Any IP Substance Abuse Stays in the Prior 12 Months |
| anyipsub\_prior24 | Any IP Substance Abuse Stays in the Prior 24 Months |
| anymhdisprior12mos | Any IP Psychiatric Discharge in Prior 12 Months |
| anymhdisprior1mos | Any IP Psychiatric Discharge in Prior 1 Month |
| anymhdisprior24mos | Any IP Psychiatric Discharge in Prior 24 Months |
| anymhdisprior3mos | Any IP Psychiatric Discharge in Prior 3 Months |
| anymhdisprior6mos | Any IP Psychiatric Discharge in Prior 6 Months |
| anymhdx12 | Any mental health dx in prior 12 months |
| anymhdx24 | Any mental health dx in prior 24 months |
| anymhtx12 | Any mental health treatment in prior 12 months |
| anymhtx24 | Any mental health treatment in prior 24 months |
| anypain12 | Any pain in prior 12 months |
| anypain24 | Any pain in prior 24 months |
| anyresbed\_prior12 | Any Residential Stays in Prior 12 Months |
| anyresbed\_prior24 | Any Residential Stays in Prior 24 Months |
| anyressub\_prior12 | Any Residential Substance Abuse Stays in Prior 12 Months |
| anyressub\_prior24 | Any Residential Substance Abuse Stays in Prior 24 Months |
| AnyUCvisits\_prior1 | Any Urgent Care visit in past 1 month |
| AnyUCvisits\_prior12 | Any Urgent Care visit in past 12 months |
| AnyUCvisits\_prior18 | Any Urgent Care visit in past 18 months |
| AnyUCvisits\_prior2 | Any Urgent Care visit in past 2 months |
| AnyUCvisits\_prior24 | Any Urgent Care visit in past 24 months |
| AnyUCvisits\_prior3 | Any Urgent Care visit in past 3 months |
| AnyUCvisits\_prior6 | Any Urgent Care visit in past 6 months |
| anyusein12moprior | Any VHA use in Prior 12 Months |
| anyusein18moprior | Any VHA use in Prior 18 Months |
| anyusein2moprior | Any VHA use in Prior 2 Months |
| anyusein3moprior | Any VHA use in Prior 3 Months |
| anyusein6moprior | Any VHA use in Prior 6 Months |
| apnea12 | Apnea in prior 12 months |
| apnea24 | Apnea in prior 24 months |
| arb12 | ARB tx in prior 12 months |
| arb24 | ARB tx in prior 24 months |
| arth12 | Arthritis in prior 12 months |
| arth24 | Arthritis in prior 24 months |
| attempt1 | Number of suicide attempts in prior 1 months |
| attempt12 | Number of suicide attempts in prior 12 months |
| attempt18 | Number of suicide attempts in prior 18 months |
| attempt2 | Number of suicide attempts in prior 2 months |
| attempt24 | Number of suicide attempts in prior 24 months |
| attempt3 | Number of suicide attempts in prior 3 months |
| attempt6 | Number of suicide attempts in prior 6 months |
| auto12 | Autoimmune dx in prior 24 months |
| auto24 | Autoimmune dx in prior 24 months |
| backpain12 | Back pain in prior 12 months |
| backpain24 | Back pain in prior 24 months |
| bipoli12 | Bipolar disorder I dx in prior 12 months |
| bipoli24 | Bipolar disorder I dx in prior 24 months |
| bipolii12 | Bipolar disorder II dx in prior 12 months |
| bipolii24 | Bipolar disorder II dx in prior 24 months |
| ca\_head12 | Head and neck cancer dx in prior 12 months |
| ca\_head24 | Head and neck cancer dx in prior 24 months |
| ca\_prost12 | Prostate cancer dx in prior 12 months |
| ca\_prost24 | Prostate cancer dx in prior 24 months |
| ca12 | Cancer dx in prior 12 months |
| ca24 | Cancer dx in prior 24 months |
| cad12 | Heart disease in prior 12 months |
| cad24 | Heart disease in prior 24 months |
| cess12 | Tobacco cessation treatment in prior 12 months |
| cess24 | Tobacco cessation treatment in prior 24 months |
| change\_Sq | Change Score Squared |
| change\_subtract | (# of days of VHA use 0-3 months prior)-(# of days of VHA use 4-6 months prior) |
| chronic12 | Chronic non-cancer pain in prior 12 months |
| chronic24 | Chronic non-cancer pain in prior 24 months |
| clonazepam12 | Clonazepam tx in prior 12 months |
| clonazepam24 | Clonazepam tx in prior 24 months |
| conc12 | Concussion in prior 12 months |
| conc24 | Concussion in prior 24 months |
| copd12 | COPD in prior 12 months |
| copd24 | COPD in prior 24 months |
| CumDaysUsein12MoPrior | Cumulative Days of VHA Use in Prior 12 Months |
| CumDaysUsein18MoPrior | Cumulative Days of VHA Use in Prior 18 Months |
| CumDaysUsein1MoPrior | Cumulative Days of VHA Use in Prior 1 Months |
| CumDaysUsein24MoPrior | Cumulative Days of VHA Use in Prior 24 Months |
| CumDaysUsein2MoPrior | Cumulative Days of VHA Use in Prior 2 Months |
| CumDaysUsein3MoPrior | Cumulative Days of VHA Use in Prior 3 Months |
| CumDaysUsein6MoPrior | Cumulative Days of VHA Use in Prior 6 Months |
| cva12 | Cerebrovascular disease in prior 12 months |
| cva24 | Cerebrovascular disease in prior 24 months |
| cvd12 | Cardiovascular disease in prior 12 months |
| cvd24 | Cardiovascular disease in prior 24 months |
| DaysUsein10MoPrior | Days with VHA use in Prior 10 Month |
| DaysUsein11MoPrior | Days with VHA use in Prior 11 Month |
| DaysUsein12MoPrior | Days with VHA use in Prior 12 Month |
| DaysUsein13MoPrior | Days with VHA use in Prior 13 Month |
| DaysUsein14MoPrior | Days with VHA use in Prior 14 Month |
| DaysUsein15MoPrior | Days with VHA use in Prior 15 Month |
| DaysUsein16MoPrior | Days with VHA use in Prior 16 Month |
| DaysUsein17MoPrior | Days with VHA use in Prior 17 Month |
| DaysUsein18MoPrior | Days with VHA use in Prior 18 Month |
| DaysUsein19MoPrior | Days with VHA use in Prior 19 Month |
| DaysUsein1MoPrior | Days with VHA use in Prior 1 Month |
| DaysUsein20MoPrior | Days with VHA use in Prior 20 Month |
| DaysUsein21MoPrior | Days with VHA use in Prior 21 Month |
| DaysUsein22MoPrior | Days with VHA use in Prior 22 Month |
| DaysUsein23MoPrior | Days with VHA use in Prior 23 Month |
| DaysUsein24MoPrior | Days with VHA use in Prior 24 Month |
| DaysUsein2MoPrior | Days with VHA use in Prior 2 Month |
| DaysUsein3MoPrior | Days with VHA use in Prior 3 Month |
| DaysUsein4MoPrior | Days with VHA use in Prior 4 Month |
| DaysUsein5MoPrior | Days with VHA use in Prior 5 Month |
| DaysUsein6MoPrior | Days with VHA use in Prior 6 Month |
| DaysUsein7MoPrior | Days with VHA use in Prior 7 Month |
| DaysUsein8MoPrior | Days with VHA use in Prior 8 Month |
| DaysUsein9MoPrior | Days with VHA use in Prior 9 Month |
| dementia12 | Dementia dx in prior 12 months |
| dementia24 | Dementia dx in prior 24 months |
| depr12 | Depression dx in prior 12 months |
| depr24 | Depression dx in prior 24 months |
| dm12 | Diabetes mellitus dx in prior 12 months |
| dm24 | Diabetes mellitus dx in prior 24 months |
| dt12 | Delerium tremens in prior 12 months |
| dt24 | Delerium tremens in prior 24 months |
| dysthymia12 | Dysthymia in prior 12 months |
| dysthymia24 | Dysthymia in prior 24 months |
| EDvisits\_prior1 | Number Emergency Dept visits in past 1 months |
| EDvisits\_prior12 | Number Emergency Dept visits in past 12 months |
| EDvisits\_prior18 | Number Emergency Dept visits in past 18 months |
| EDvisits\_prior2 | Number Emergency Dept visits in past 2 months |
| EDvisits\_prior24 | Number Emergency Dept visits in past 24 months |
| EDvisits\_prior3 | Number Emergency Dept visits in past 3 months |
| EDvisits\_prior6 | Number Emergency Dept visits in past 6 months |
| ep12 | Epilepsy in prior 12 months |
| ep24 | Epilepsy in prior 24 months |
| fib12 | Fibrosis in prior 12 months |
| fib24 | Fibrosis in prior 24 months |
| FirstUse1Yr | First Use in Prior 5 Years Happened wi Prior 1 Years |
| FirstUse2Yr | First Use in Prior 5 Years Happened wi Prior 2 Years |
| FirstUse3Yr | First Use in Prior 5 Years Happened wi Prior 3 Years |
| FirstUse4Yr | First Use in Prior 5 Years Happened wi Prior 4 Years |
| gu12 | Gastric ulcer in prior 12 months |
| gu24 | Gastric ulcer in prior 24 months |
| ha24 | Headache in prior 24 months |
| hear12 | Hearing impairment dx in prior 12 months |
| hear24 | Hearing impairment dx in prior 24 months |
| hemi12 | Hemiplagia dx in prior 12 months |
| hemi24 | Hemiplagia dx in prior 24 months |
| hiv24 | HIV dx in prior 24 months |
| homeless12 | Homelessness indicated in prior 12 months |
| homeless24 | Homelessness indicated in prior 24 months |
| hyp12 | Hypertension in prior 12 months |
| hyp24 | Hypertension in prior 24 months |
| IPDaysUsein10MoPrior | Days with IP VHA use in Prior 10 Month |
| IPDaysUsein11MoPrior | Days with IP VHA use in Prior 11 Month |
| IPDaysUsein12MoPrior | Days with IP VHA use in Prior 12 Month |
| IPDaysUsein13MoPrior | Days with IP VHA use in Prior 13 Month |
| IPDaysUsein14MoPrior | Days with IP VHA use in Prior 14 Month |
| IPDaysUsein15MoPrior | Days with IP VHA use in Prior 15 Month |
| IPDaysUsein16MoPrior | Days with IP VHA use in Prior 16 Month |
| IPDaysUsein17MoPrior | Days with IP VHA use in Prior 17 Month |
| IPDaysUsein18MoPrior | Days with IP VHA use in Prior 18 Month |
| IPDaysUsein19MoPrior | Days with IP VHA use in Prior 19 Month |
| IPDaysUsein1MoPrior | Days with IP VHA use in Prior 1 Month |
| IPDaysUsein20MoPrior | Days with IP VHA use in Prior 20 Month |
| IPDaysUsein21MoPrior | Days with IP VHA use in Prior 21 Month |
| IPDaysUsein22MoPrior | Days with IP VHA use in Prior 22 Month |
| IPDaysUsein23MoPrior | Days with IP VHA use in Prior 23 Month |
| IPDaysUsein24MoPrior | Days with IP VHA use in Prior 24 Month |
| IPDaysUsein2MoPrior | Days with IP VHA use in Prior 2 Month |
| IPDaysUsein3MoPrior | Days with IP VHA use in Prior 3 Month |
| IPDaysUsein4MoPrior | Days with IP VHA use in Prior 4 Month |
| IPDaysUsein5MoPrior | Days with IP VHA use in Prior 5 Month |
| IPDaysUsein6MoPrior | Days with IP VHA use in Prior 6 Month |
| IPDaysUsein7MoPrior | Days with IP VHA use in Prior 7 Month |
| IPDaysUsein8MoPrior | Days with IP VHA use in Prior 8 Month |
| IPDaysUsein9MoPrior | Days with IP VHA use in Prior 9 Month |
| IPMHDaysUsein10MoPrior | Days with IP MH VHA use in Prior 10 Month |
| IPMHDaysUsein11MoPrior | Days with IP MH VHA use in Prior 11 Month |
| IPMHDaysUsein12MoPrior | Days with IP MH VHA use in Prior 12 Month |
| IPMHDaysUsein13MoPrior | Days with IP MH VHA use in Prior 13 Month |
| IPMHDaysUsein14MoPrior | Days with IP MH VHA use in Prior 14 Month |
| IPMHDaysUsein15MoPrior | Days with IP MH VHA use in Prior 15 Month |
| IPMHDaysUsein16MoPrior | Days with IP MH VHA use in Prior 16 Month |
| IPMHDaysUsein17MoPrior | Days with IP MH VHA use in Prior 17 Month |
| IPMHDaysUsein18MoPrior | Days with IP MH VHA use in Prior 18 Month |
| IPMHDaysUsein19MoPrior | Days with IP MH VHA use in Prior 19 Month |
| IPMHDaysUsein1MoPrior | Days with IP MH VHA use in Prior 1 Month |
| IPMHDaysUsein20MoPrior | Days with IP MH VHA use in Prior 20 Month |
| IPMHDaysUsein21MoPrior | Days with IP MH VHA use in Prior 21 Month |
| IPMHDaysUsein22MoPrior | Days with IP MH VHA use in Prior 22 Month |
| IPMHDaysUsein23MoPrior | Days with IP MH VHA use in Prior 23 Month |
| IPMHDaysUsein24MoPrior | Days with IP MH VHA use in Prior 24 Month |
| IPMHDaysUsein2MoPrior | Days with IP MH VHA use in Prior 2 Month |
| IPMHDaysUsein3MoPrior | Days with IP MH VHA use in Prior 3 Month |
| IPMHDaysUsein4MoPrior | Days with IP MH VHA use in Prior 4 Month |
| IPMHDaysUsein5MoPrior | Days with IP MH VHA use in Prior 5 Month |
| IPMHDaysUsein6MoPrior | Days with IP MH VHA use in Prior 6 Month |
| IPMHDaysUsein7MoPrior | Days with IP MH VHA use in Prior 7 Month |
| IPMHDaysUsein8MoPrior | Days with IP MH VHA use in Prior 8 Month |
| IPMHDaysUsein9MoPrior | Days with IP MH VHA use in Prior 9 Month |
| lagca12 | First onset of cancer in 12 months prior |
| lagca24 | First onset of cancer in 24 months prior |
| lorazepam12 | Lorazepam tx in prior 12 months |
| lorazepam24 | Lorazepam tx in prior 24 months |
| marital | Marital Status |
| mig12 | Migraines dx in prior 12 months |
| mig24 | Migraines dx in prior 24 months |
| mirtazepam12 | Mirtazepam tx in prior 12 months |
| mirtazepam24 | Mirtazepam tx in prior 24 months |
| moodst12 | moodst tx in prior 12 months |
| moodst24 | moodst tx in prior 24 months |
| ms12 | Multiple sclerosis dx in prior 12 months |
| ms24 | Multiple sclerosis dx in prior 24 months |
| mst | MST status (yes, no, declined) |
| neuro12 | Neuropathy pain in prior 12 months |
| neuro24 | Neuropathy pain in prior 24 months |
| OPDaysUsein10MoPrior | Days with OP VHA use in Prior 10 Month |
| OPDaysUsein11MoPrior | Days with OP VHA use in Prior 11 Month |
| OPDaysUsein12MoPrior | Days with OP VHA use in Prior 12 Month |
| OPDaysUsein13MoPrior | Days with OP VHA use in Prior 13 Month |
| OPDaysUsein14MoPrior | Days with OP VHA use in Prior 14 Month |
| OPDaysUsein15MoPrior | Days with OP VHA use in Prior 15 Month |
| OPDaysUsein16MoPrior | Days with OP VHA use in Prior 16 Month |
| OPDaysUsein17MoPrior | Days with OP VHA use in Prior 17 Month |
| OPDaysUsein18MoPrior | Days with OP VHA use in Prior 18 Month |
| OPDaysUsein19MoPrior | Days with OP VHA use in Prior 19 Month |
| OPDaysUsein1MoPrior | Days with OP VHA use in Prior 1 Month |
| OPDaysUsein20MoPrior | Days with OP VHA use in Prior 20 Month |
| OPDaysUsein21MoPrior | Days with OP VHA use in Prior 21 Month |
| OPDaysUsein22MoPrior | Days with OP VHA use in Prior 22 Month |
| OPDaysUsein23MoPrior | Days with OP VHA use in Prior 23 Month |
| OPDaysUsein24MoPrior | Days with OP VHA use in Prior 24 Month |
| OPDaysUsein2MoPrior | Days with OP VHA use in Prior 2 Month |
| OPDaysUsein3MoPrior | Days with OP VHA use in Prior 3 Month |
| OPDaysUsein4MoPrior | Days with OP VHA use in Prior 4 Month |
| OPDaysUsein5MoPrior | Days with OP VHA use in Prior 5 Month |
| OPDaysUsein6MoPrior | Days with OP VHA use in Prior 6 Month |
| OPDaysUsein7MoPrior | Days with OP VHA use in Prior 7 Month |
| OPDaysUsein8MoPrior | Days with OP VHA use in Prior 8 Month |
| OPDaysUsein9MoPrior | Days with OP VHA use in Prior 9 Month |
| opioid12 | Opioid tx in prior 12 months |
| opioid24 | Opioid tx in prior 24 months |
| OPMHDaysUsein10MoPrior | Days with OP MH VHA use in Prior 10 Month |
| OPMHDaysUsein11MoPrior | Days with OP MH VHA use in Prior 11 Month |
| OPMHDaysUsein12MoPrior | Days with OP MH VHA use in Prior 12 Month |
| OPMHDaysUsein13MoPrior | Days with OP MH VHA use in Prior 13 Month |
| OPMHDaysUsein14MoPrior | Days with OP MH VHA use in Prior 14 Month |
| OPMHDaysUsein15MoPrior | Days with OP MH VHA use in Prior 15 Month |
| OPMHDaysUsein16MoPrior | Days with OP MH VHA use in Prior 16 Month |
| OPMHDaysUsein17MoPrior | Days with OP MH VHA use in Prior 17 Month |
| OPMHDaysUsein18MoPrior | Days with OP MH VHA use in Prior 18 Month |
| OPMHDaysUsein19MoPrior | Days with OP MH VHA use in Prior 19 Month |
| OPMHDaysUsein1MoPrior | Days with OP MH VHA use in Prior 1 Month |
| OPMHDaysUsein20MoPrior | Days with OP MH VHA use in Prior 20 Month |
| OPMHDaysUsein21MoPrior | Days with OP MH VHA use in Prior 21 Month |
| OPMHDaysUsein22MoPrior | Days with OP MH VHA use in Prior 22 Month |
| OPMHDaysUsein23MoPrior | Days with OP MH VHA use in Prior 23 Month |
| OPMHDaysUsein24MoPrior | Days with OP MH VHA use in Prior 24 Month |
| OPMHDaysUsein2MoPrior | Days with OP MH VHA use in Prior 2 Month |
| OPMHDaysUsein3MoPrior | Days with OP MH VHA use in Prior 3 Month |
| OPMHDaysUsein4MoPrior | Days with OP MH VHA use in Prior 4 Month |
| OPMHDaysUsein5MoPrior | Days with OP MH VHA use in Prior 5 Month |
| OPMHDaysUsein6MoPrior | Days with OP MH VHA use in Prior 6 Month |
| OPMHDaysUsein7MoPrior | Days with OP MH VHA use in Prior 7 Month |
| OPMHDaysUsein8MoPrior | Days with OP MH VHA use in Prior 8 Month |
| OPMHDaysUsein9MoPrior | Days with OP MH VHA use in Prior 9 Month |
| orh | Urban/Rural |
| OthAnxDis12 | Other anxiety disorder in prior 12 months |
| othanxdis24 | Other anxiety disorder in prior 24 months |
| OthPsych12 | Other psych disorder in prior 12 months |
| othpsych24 | Other psych disorder in prior 24 months |
| par12 | Parkinsons disease in prior 12 months |
| par24 | Parkinson's disease in prior 24 months |
| Persond12 | Personality disorder in prior 12 months |
| persond24 | Personality disorder in prior 24 months |
| psy12 | Psychogenic pain in prior 12 months |
| psy24 | Psychogenic pain in prior 24 months |
| ptsd12 | PTSD in prior 12 months |
| ptsd24 | PTSD in prior 24 months |
| ra12 | Rheumetoid arthritis in prior 12 months |
| ra24 | Rheumetoid arthritis in prior 24 months |
| rd12 | Renal disease in prior 12 months |
| rd24 | Renal disease in prior 24 months |
| region | Region of country of residence |
| relax12 | Relaxant tx in prior 12 months |
| relax24 | Relaxant tx in prior 24 months |
| schizo12 | Schizophrenia dx in prior 12 months |
| schizo24 | Schizophrenia dx in prior 24 months |
| sci12 | Spinal cord injury in prior 12 months |
| sci24 | Spinal cord injury in prior 24 months |
| sedative\_anxiolytic12 | sedative\_anxiolytic tx in prior 12 months |
| sedative\_anxiolytic24 | sedative\_anxiolytic tx in prior 24 months |
| serviceconnectedgroup | Percent Service Connected, Grouped |
| sex | Sex |
| sildenafil12 | Sildenafil tx in prior 12 months |
| sildenafil24 | Sildenafil tx in prior 24 months |
| sle12 | Systemic lupus in prior 12 months |
| sle24 | Systemic lupus in prior 24 months |
| sleep12 | Sleep disorder in prior 12 months |
| sleep24 | Sleep disorder in prior 24 months |
| statin12 | Statin tx in prior 12 months |
| statin24 | Statin tx in prior 24 months |
| sud12 | Substance use disorder dx in prior 12 months |
| sud24 | Substance use disorder dx in prior 24 months |
| symptom24 | Headache symptom pain in prior 24 months |
| tbi12 | Traumatic brain injury in prior 12 months |
| tbi24 | Traumatic brain injury in prior 24 months |
| tca12 | Tricyclic antidepressant (TCA) pain tx in prior 12 months |
| tca24 | Tricyclic antidepressant (TCA) pain tx in prior 24 months |
| thy12 | Thyroid disorder dx in prior 12 months |
| thy24 | Thyroid disorder dx in prior 24 months |
| tobacco12 | Tobacco use in prior 12 months |
| tobacco24 | Tobacco use in prior 24 months |
| topical12 | Topical pain tx in prior 12 months |
| topical24 | Topical pain tx in prior 24 months |
| trazodone12 | Trazodone tx in prior 12 months |
| trazodone24 | Trazodone tx in prior 24 months |
| UCvisits\_prior1 | Number Urgent Care visits in past 1 months |
| UCvisits\_prior12 | Number EUrgent Care visits in past 12 months |
| UCvisits\_prior18 | Number Urgent Care visits in past 18 months |
| UCvisits\_prior2 | Number Urgent Care visits in past 2 months |
| UCvisits\_prior24 | Number Urgent Care visits in past 24 months |
| UCvisits\_prior3 | Number Urgent Care visits in past 3 months |
| UCvisits\_prior6 | Number Urgent Care visits in past 6 months |
| vet12 | Veteran Status in prior 12 months |
| vet24 | Veteran Status in prior 24 months |
| vision12 | vision impairment in prior 12 months |
| vision24 | vision impairment in prior 24 months |
| white | Race: White, non-white or unknown |
| zolpidem12 | Zolpidem tx in prior 12 months |
| zolpidem24 | Zolpidem tx in prior 24 months |

### Veteran De-Duping Process

The Reach data model will contain one master list of all Veterans imported into the IRDS system. As each Veteran is imported into the database through one of the data sources, a record will be created for that Veteran in the Veteran table and a unique ID will be assigned. It is possible that an Individual might be imported into the system through multiple sources. When this occurs, the multiple Veteran records created for the individual will be merged and all case level data will be linked to that one merged Veteran record. To achieve this, a de-duping process will be run after each data import is run.[[1]](#footnote-1)

This de-duping process will be contained in an SSIS package, which does the following:

1. Reviews the Veteran table for possible duplicates
2. Duplicate groups are determined (2 or more records that could be duplicates)
3. For each duplicate group a text file is created containing the pertinent demographic information (Name, SSN, DOB, Gender) for all records in that group
4. A python program processes these files and evaluates all the records in a group via a record de-duping algorithm
5. The python program returns the results to the SSIS process via another set of text files
6. The results from these files are placed in a temporary SQL table and the Veteran table is reconciled accordingly, by merging any records that were determined to be duplicates



**Figure 4: Veteran De-duping Overview**

### Stored Procedures

dbo.sp\_AssessPatients (no inputs): The procedure checks which patients Assessments scores are not up to date based on the ScoringStatus fields, are re-scores any Patient that is not current by applying coefficients from the RiskFactorCoefficients table against the associated indicator values from the PatientRiskFactor table.

Dbo.sp\_SaveOutReachStatus(inputs: ReachID, Status, User): Stored procedure to be called by the dashboard. When a user selects a value from the Outreach Status dropdown in the dashboard, the JavaScript code will pass the procedure the User ID, the Reach ID of the Patient being reviewed and the value selected by the user. The procedure will update the OutreachStatus field for that Patient in the Patient table and add an entry into the OutreachStatusHistory table. The whole process is managed within a SQL transaction.

### Performance Views

To improve dashboard performance, SQL views will be created. The Dashboard Application Programming Interfaces (API) will call these views directly from the Node JS code. The views will contain the select statement that would otherwise be hardcoded/parameterized in the Node JS Code. The Current inventory of performance views is:

vw\_PatientRoster – Queries the patient demographic data. The dashboard can filter this view by VAMC.

### Data Entry Widget Back End Support

The Data Entry widget on the IRDS dashboard introduces an informal reporting component to the IRDS Dashboard allowing users to enter and save patient-related information in the IRDS Database. This widget displays data imported from SPAN and provides details on whether or not a VHA patient is considered to be at a High Risk for suicide and the current status of the patient’s safety plan. A Dashboard user can enter notes into the widget related to High Risk Flags, Safety Plans, or Principal Mental Health Providers. The system of record data is updated in the widget on a regular basis. If a patient’s suicide risk status or Safety Plan status changes in the system of record, those changes will be reflected in this widget on the IRDS Dashboard. Historical entries from both the system of record and user notes fields are recorded and maintained in the IRDS database. Users have the opportunity to view historical entries by selecting the left or right arrows adjacent to the information they wish to view. To support this functionality, the Reach has:

6 Tables to store SPAN data and user notes

* ClinOutreach\_GeneralComments
* ClinOutreach\_HighRisk\_SPANImport
* ClinOutreach\_HighRisk\_UserNotes
* ClinOutreach\_PrimaryHealthProvider\_UserNotes
* ClinOutreach\_SafetyPlan\_SPANImport
* ClinOutreach\_SafetyPlan\_UserNotes

4 triggers that assign an auto incremented revision number to each note per patient as these notes are edited by the user

* PopRevision\_CO\_GeneralComments
* PopRevision\_CO\_HighRiskUserNotes
* PopRevision\_CO\_PrimaryHealthProviderUserNotes
* PopRevision\_CO\_SafetyPlanUserNotes

### CDW Project Database Objects

The IRDS project has been given a database (VACI\_IRDS) on the server to be used as part of the automated processes for pushing data from the CDW database to Reach database on the IRDS system. All objects are maintained in the ETL schema.

Below is an inventory of database objects on the VACI\_IRDS database.

Tables

Work tables for the CDW Import SSIS package:

* ETL.Patient
* ETL.PatientQueue
* ETL.PatientStation
* ETL.PatientSubset
* ETL.ReachIDs
* ETL.RiskFactors
* ETL.VHAPatientsRanked
* ssis.VHA\_1DaysUse
* ETL.ICD10Codes

Work tables for the Patient assessment SSIS package:

* ETL.PatientsInDashboard

Views

Views to improve performance:

* ETL.vw\_RaceCodes
* ETL.vw\_MaritalCodes
* ETL.vwCPT\_vProcedure
* ETL.vwCPT\_Visit
* ETL.vwCSC\_Visit
* ETL.vwPrescription\_MedLog
* ETL.vwPrescription\_RxOupatFill
* ETL.vwDaysUse\_Visit
* ETL.vwFirstUse
* ETL.vwICD9\_Visit
* ETL.vwLagca\_Vdiagnosis
* ETL.Attempts\_Vdiagnosis
* ETL.Attempts\_InpatientDiagnosis
* ETL.VetInd\_Visit
* ETL.vw\_MilitaryBranchCodes
* ETL.vw\_MilitaryBranch
* ETL.vw\_MedicationsNewAtRisk
* ETL.vw\_MedicationsAlreadyAtRisk
* ETL.vw\_DiagnosisNewAtRisk
* ETL.vw\_DiagnosisAlreadyAtRisk
* ETL.vwLagca\_VdiagnosisICD10
* ETL.vwMiscUse
* ETL.vw\_PeriodOfServiceCodes
* ETL.vw\_PeriodOfService

Work tables for the CDW Import SSIS package:

* vw\_RaceCodes
* vw\_MaritalCodes
* vw\_MilitaryBranchCodes
* vw\_MilitaryBranch
* vw\_MedicationsNewAtRisk
* vw\_MedicationsAlreadyAtRisk
* vw\_DiagnosisNewAtRisk
* vw\_DiagnosisAlreadyAtRisk

Stored Procedures

Stored procedures run during CDW Import:

* GetDaysUse
* Run\_ICD9factors

## Denormalization

No denormalization requirements have been identified.

## Performance Improvement

As an IT pilot project, performance improvement requirements will be identified on an ongoing basis as the application is deployed to end users in the field.

## Storage

Storage requirements are recorded in detail in the application’s System Design Document (SDD).

## Recovery

Recover specifications are recorded in detail in the application’s System Design Document (SDD).

# Database Interfaces

## Suicide Data Repository (SDR)

**Table 6: SDR Interface Details**

|  |  |
| --- | --- |
| Interface | Details |
| Purpose | Data Repository for VA Suicide and Mortality data which will be imported into the Reach database |
| Characteristics | The SDR system runs on a Windows 2008 R2 machine with a SQL Server data store |
| Interface Architecture | Import solution will developed using SSIS |
| API and Error Conditions | Data will be imported using T-SQL to pull data directly from the SDR tables to the tables in the IRDS staging area |
| Security | A SQL connection will be made to the SDR server using Windows Authentication |

## Perceptive Reach Dashboard

**Table 7: Perceptive Reach Interface Details**

|  |  |
| --- | --- |
| Interface | Details |
| Purpose | IRDS users will access data via the dashboard which manages their access and presentation of that data |
| Characteristics | The Dashboard can be run on a compliant web browser |
| Interface Architecture | Client Side is developed in Angular JS, the Server side is developed with Node JS which leverages Express JS |
| API and Error Conditions | The Browser will send requests to Server, which will query the database and return the query results to the browser in Java Script Object Notation (JSON) format |
| Security | Users login to the dashboard. The dashboard queries settings for that user stored in the Reach database to manage data access |

NOTE: Details for CDW, EDW, VistA and the Analytics sandbox are still being gathered.

# Data Access

1. System users: System users will be given a Login (Server level) or User (Database level) account in SQL Server and granted the appropriate set of rights. System users will connect to the IRDS databases via a SQL Server connection with Windows Authentication, using a tool such as SQL Server Management Studio (SSMS), R or BIRT.
2. Dashboard users: Dashboard users will connect to the Reach database indirectly by logging in via the Perceptive Reach dashboard. The dashboard will manage their data access via a set of SQL tables in the ‘System’ schema.

* User Roles – List of roles in the system
* Preferences – List of dashboard preferences
* User – Contains general information about dashboard users, as well as their user role and location
* User Preferences – Contains preferences for each user

When a user logs into the dashboard their presentation of/ and access to data is dictated by the user role and preferences.

## Role Definitions (System)

**Table 8: System Role Definitions**

|  |  |  |
| --- | --- | --- |
| Role-name | Account Type | Rights |
| Database Administrator | Login | sys\_admin |
| Tester | Login | db\_creator |
| Analytics | User | db\_datareader, db\_datawriter |
| Ad-Hoc Reporting | User | db\_datareader |

## Role Definitions (Dashboard)

**Table 9: Dashboard Role Definitions**

|  |  |
| --- | --- |
| User name | Description |
| VAMC level | Clinical Care Team Member (CCTM) |
| VISN Level | Clinical Care Supervisor (CCS) |
| Region Level | CCS |
| National Level | Supervisor |

## Node JS Data APIs

Data access for dashboard users will be managed by the IRDS system. When the user has a request for data, the browser will make a request to the IRDS server for that data by calling a specific Node JS data API.

Upon startup, the server will have a Node JS program running that constantly listens for these browser requests. Upon receiving a request, the program will run the API, which queries data from the Reach database and returns the query output to the browser to be displayed appropriately in a browser page.



**Figure 5:** **Dashboard Data Request Process**

# Implementation Considerations

## Large Objects

Free form text data will be stored in fields with a data type of varchar(max). In SQL Server 2012, a field of type varchar(max) will allow up to 8000 characters. Any data elements that require larger capacity will be stored in fields of type Text.

## Partitioning

At this time there is no partitioning planned.

## Error Processing

After each data import is run, a completion report will be created, any errors incurred will be listed in the report. A database administrator will review the report and take the appropriate action which could include troubleshooting and/or data restoration.

1. Note at this time, only one data source is being pulled into IRDS - data from the CDW database - so there is no need to add a De-duping mechanism to the system. Some data elements for patients are pulled into IRDS from SPAN data, via the Suicide Data Repository. That data is being linked via the Patients SSN. If additional import sources are added to IRDS in the future the de-duping functionality can be re-visited. [↑](#footnote-ref-1)