External Gateway Help Center

Contents

Chapter 1. Hillrom Smart Device Connectivity R1.2 Help Center

Select one of the following sub-topics for more information:

Printable Smart Device Connectivity User Guide

Click the link below for a printable version of the information in this Help Center.

Digital Health Gateway Printable External Help Center

About

Product Description:

Hillrom Smart Device Connectivity facilitates communication between input and output devices and systems connected to a hospital network. It also relays EMR configured information to mobile devices using the Enterprise Gateway solution.

Guidelines for Use

1. All patient medical care is to be performed by a licensed health care professional, practicing within the bounds and scope defined in their licensure.
2. The Smart Device Connectivity solution is for use within a healthcare environment only.
3. The Smart Device Connectivity solution, including, but not limited to all integrated components, is not intended to provide patient treatment or safety decisions or serve as a substitute for professional healthcare judgement.
4. The Smart Device Connectivity solution is not a replacement (or substitute) for vital signs monitoring and is not intended to be used as the primary notification system for alert equipment.

5. The Smart Device Connectivity solution is indicated for use with specific integrated medical devices that have been verified and validated with the Digital Health Gateway solution only and is not intended to provide patient status information from non-verified and non-validated services.

Intended Use Statement

The Smart Device Connectivity solution is intended for the collection and transmission of patient data to and from information systems. It will communicate compatible device data, associated alerts, and configured notifications in near real-time to the clinical team. The clinical team can access the data provided and determine applicable actions according to hospital-defined protocols.

Documentation

Select one of the following sub-topics for more information:

LAB01457 Smart Device Connectivity HL7 Interface Specification

LAB01488 Hillrom Smart Device Connectivity Allscripts Interface Summary

LAB01420 Digital Health Platform Product Compatibility Matrix

Technical Specifications

Smart Device Connectivity NNC Server Specifications

NNC Server Specifications

Voalte Server Specifications

Welch Allyn Network Best Practices

Welch Allyn CSM Spec

Welch Allyn CVSM Spec

Centrella Specifications

Accella Specifications

A printable version of the Help Center is available in the following languages:

Dutch

French

German

Italian

Spanish

Swedish

Before You Begin

Select one of the following sub-topics for more information about the Digital Health Gateway.

Supported Systems and Versions (Compatibility Matrix) *(on page 3)*

Features *(on page 6)*

How Does Smart Device Connectivity Work? *(on page 14)*

Supported Systems and Versions (Compatibility Matrix)

Smart Device Connectivity currently supports the following systems, devices and versions.

Device to Host Compatibility

Feature	Release Status	Date / Time Sync			Patient ID Query			Vitals Record Push			Clinician ID Query			Clinician Authentication			Clinician Authentication			Custom Modifiers & Parameters			Custom Scores			NRS			Remote Service			Alarms via ACM to AM			Patient List Query		
Zimith Version		*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*	*1.0*	*1.1*	*1.2*
CVSM 1.71.0x	Released	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP										WACP	WACP	WACP	WACP	WACP	WACP												
CVSM 2.10.00	Released	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP										WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CVSM 2.20.0x	Released	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP										WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CVSM 2.30.0x	Released	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP										WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CVSM 2.40.0x	Released	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP										WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CVSM 2.41.00	Released	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP										WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CVSM 2.42.00	Released	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP										WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CVSM 2.43.00	Released	WACP	NTP	NTP	WACP	HL7	HL7	WACP	HL7	HL7					AD	AD				WACP	HL7	HL7	WACP	HL7	HL7	Y	Y	Y	WACP	WACP	WACP						
CSM 1.1x.00	Released	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP										WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CSM 1.2x.00	Released	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP	WACP										WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CSM 1.3x.xx	Released	NTP	NTP	NTP	WACP	WACP	WACP	WACP	WACP	WACP				AD	AD	AD				WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CSM 1.4x.00	Released	NTP	NTP	NTP	WACP	WACP	WACP	WACP	WACP	WACP				AD	AD	AD				WACP	WACP	WACP	WACP	WACP	WACP	Y	Y	Y	WACP	WACP	WACP						
CSM 1.5x.00	Released	NTP	NTP	NTP	WACP	HL7	HL7	WACP	HL7	HL7				AD	AD	AD				WACP	HL7	HL7	WACP	HL7	HL7	Y	Y	Y	WACP	WACP	WACP						

Note:

''-’: Not Supported

WACP: WACP is the only protocol available to NCE in the cloud.

HL7: HL7 direct from device to Enterprise Gateway (EG) in the cloud.

NTP: Using NTP to do date and time synchronization to the customer's NTP server.

Date/Time Sync: When using WACP, devices must be in the same time zone rules (DST Start, DST End, and DST offset <not time one offset>) as the server to which they connect.

Browser Compatibility

The Enterprise Configuration Portal shall be compatible with the following browsers:

- Google Chrome version 76 or higher.
- Microsoft Internet Explorer version 11 or higher.
- Microsoft Edge version 84 or higher (excluding the Dashboard).

Server Software Compatibility

The following matrix outlines the operating systems and SQL server versions compatible with Smart Device Connectivity server components:

Smart Device Connectivity version	Database Server
1.0	Azure SQL Database (PaaS 14.0 Compatibility)

Note: SQL Server 2014 must be configured in SQL Server 2014 compatibility mode; SQL Server 2016 must be configured in SQL Server 2016 compatibility mode.

Third Party Integrations

Smart Device Connectivity version 1.2 can be integrated to work with various third party systems. The following matrices outlines the third party systems that are compatible with Smart Device Connectivity 1.1, 1.2 and Patient Risk Surveillance version 1.0.

Product	Compatible Versions	Smart Device Connectivity Supported Version	Patient Risk Surveillance Supported Version
Connex Spot Monitor (CSM)	>=1.30 (via Connex CS to Enterprise Gateway) >=1.52 (to Enterprise Gateway)	GW 1.1, GW 1.2	CV 1.0
Connex Vital Signs Monitor (CVSM)	>=2.43 (to Enterprise Gateway)	GW 1.1, GW 1.2	CV 1.0
EarlySense (Embedded)	03.13.030 or above	GW 1.1, GW 1.2	CV 1.0
Centrella Bed (with or without embedded EarlySense)	Wired: Version 1.30 or later (wired only) Wireless: Version 1.34.000 or later (wireless)	GW 1.1 (wired only), GW 1.2	CV 1.0
Accela Bed (wireless)	Bed >=CS900B41xxx with an HRP (serial number) > HRP004026834 HIB 2.x or later and ICB 2.x or later WAM >=1.05.000	GW 1.2	CV 1.0

Product	Compatible Versions	Smart Device Connectivity Supported Version	Patient Risk Surveillance Supported Version
Allscripts[1]	Sunrise: 17.3, 18.4 + Unity: BOD 9/18/2019 Versions via standard HL7 interface	GW 1.0, GW 1.1, GW 1.2	CV 1.0
Epic	Versions via standard HL7 interface	GW 1.0, GW 1.1, GW 1.2	CV 1.0
Meditech	Versions via standard HL7 interface	GW 1.0, GW 1.1, GW 1.2	CV 1.0
NaviCare (including Nurse Call and Status Board)	3.9.500 (GW 1.1 only) and above	GW 1.1, GW 1.2	CV 1.0
Voalte Server	3.6.3, 3.7.10 and above	GW 1.0, GW 1.1, GW 1.2	CV 1.0
Connex CS	1.8.4 or above	GW 1.0, GW 1.1, GW 1.2	N/A
Patient Risk Surveillance	1.0 or above	GW 1.1, GW 1.2	N/A
Symedical	2.2.7.10 or above	GW 1.1, GW 1.2	CV 1.0
Mirth	3.6.1, 3.8, 3.10	GW 1.1, GW 1.2	CV 1.0

[1]Allscripts Sunrise integration notes:

Includes (one of the following):

- ADT inbound via HL7, OR
- ADT inbound and Vitals outbound via Unity API

Excludes (when using the Unity interface):

- Receiving data from the EMR (for example, Orders, Medications, Labs, Results) (Patient Risk Surveillance)
- ADT to Voalte
- Notifications to Voalte
- Data to Voalte
- ADT to NaviCare

Features

Select one of the following sub-topics for more information:

Customer Organizational Hierarchies

Hillrom Smart Device Connectivity supports integration through the creation of a hierarchy configuration that represents the customer's organizational structure and location layout. Smart Device Connectivity requires a minimum of five (5) levels to be configured in order to provide a workflow for data from Hillrom devices to flow through to the EMR and/or out to third-party systems. Gateway connectivity also supports receiving EMR/ADT data from the Hospital Information System.

Customer hierarchy levels

Hierarchy	Description	Allowed
Enterprise	This is the highest level of a hierarchy, and should be considered the top-most level of a customer. Only **one** Enterprise level can exist for a customer.	One
Region	This is the logical (or physical) geographical information where a grouping of organizations may occur (for example, East region, West region, and so forth).	Many
Organization	This is a group of one or more Facilities within a Region.	Many
Facility	This is a **required** hierarchy level, and should consist of the actual *physical location* of a building. This level is used to ensure that data is received from Hillrom devices. **Note:** From a system perspective, this would be the "Tenant" level of the hierarchy.	Many
Unit	This is a **required** hierarchy level, and should consist of nursing units (or groups of locations) *within* a Facility. This level is used in performing unit level mapping that matches the EMR logical location. It is also instrumental in ensuring that data is received from Hillrom devices. **Note:** Connections are ***not*** supported at this level; therefore, connection inheritance does not apply.	Many

Multiple hierarchy levels within a given Enterprise

A typical organizational hierarchy consists of ***one*** Enterprise and *at least* one of each of the following items: Region, Organization, Facility, and Unit. Multiple-level hierarchies are supported under the Enterprise level. The last two hierarchy levels (for example, Facility and Unit) of any hierarchy configuration are required in order to receive device data from Hillrom devices.

EMR location mapping

Creating unit location mapping acts as a bridge between the EMR system location and the physical location where patients may be located. Facility devices, such as wired Centrella beds, are registered to known locations within the Gateway. In order to perform unit location mapping, a Facility and Unit must be configured in the Enterprise Configuration Portal. This mapping of EMR locations is an integral part of allowing data to flow between Hillrom devices, Smart Device Connectivity, the EMR, and third party systems and interfaces.

Device and System Connections

Smart Device Connectivity provides integration between Hillrom devices and software, Hospital Information Systems, and various third-party systems. The connectivity is established through the

setup of inbound and outbound connections at any level of the hierarchy. Connections configured at an upper hierarchy level will be inherited downward until a connection of the same type has been configured at a lower hierarchy level.

The creation of inbound and outbound connections allows data to flow from the Hospital Information System (for example, EMR/ADT) into the Gateway, and for supported device data to flow into the Gateway to configured outbound connections.

The Gateway supports secure transmission methods such as Virtual Private Network (VPN), Certificates, Transport Layer Security (TSL), and Secure Socket Layer (SSL) HTTPS endpoints.

Supported Inbound Connection types

- EMR/ADT systems using Health Level 7 (HL7) and utilizing a VPN or TLS with Certificates connection or Allscripts URL endpoints for receiving patient information.
- IHE Alarms utilizing a VPN or TLS with certificates connection for receiving alert notifications from third-party alert managers.
- Welch Allyn Connex Spot Monitor and Connect Vitals Signs Monitor utilizing a VPN or TLS with certificates connection using HL7 or WACP for receiving patient vitals and custom data.
- Wired and wireless Hillrom beds to enable transmission of bed data/alerts/events and contact-free continuous monitoring device data/alerts received via the MQTT SSL connection to Smart Device Connectivity.

Supported Outbound Connection types

- ADT – For sending HL7 utilizing a VPN or TLS with Certificates connection to HIT (Health Information Technology) systems.
- Clinical Data Repository – Receives clinical data inputs. and via configured algorithms, generates risk scores. It outputs calculated risk scores and clinical data to clinical interfaces, and also instantiates notifications to be sent to clinical interfaces.
- Patient Risk Surveillance – For sending patient data for scoring and receiving risk scores, risk stratifications, risk context, notifications, and clinical tasks to be communicated to supported clinical interfaces.
- Confirmed Data Interfaces – For Sending data received from patient vital monitoring devices CSM/CVSM in either an HL7 or Allscripts format, to the configured endpoint utilizing a VPN or TLS with Certificates connection. Data sent out the confirmed data interface is required to be associated with both a positively identified patient and clinician.
- IHE Alarms – For sending Clinical Vector risk-based notifications and bed alerts (including Contact-Free Continuous Monitoring devices) as HL7 formatted PCD-04 alerts utilizing a VPN or TLS with Certificates connection. Note: PCD-04 alerts sent to NaviCare Nurse Call are a modified HL7 json-like format and do not use this interface. Alerts sent to NaviCare Nurse Call are over a federated message bus.
- Reporting – Provides connectivity between the Gateway and the Reporting data warehouse over an Https TLS connection and configurable permissions options to authorize the extraction of data for reporting and long-term storage of reporting data.

- Terminology Provider – Provides a tool for terminology mapping of both local and standardized codes, and rolls trigger logic up to internal Hillrom codes via value sets build by a clinical content team.
- Unconfirmed Data – For sending data received from beds and vitals devices (CSM/CVSM) in an HL7 format to the configured endpoint, where the data being sent does not have both a positively identified patient and clinician.
- Voalte – Sends ADT/EMR and patient-related data.

Next up:

ADT (Admit/Discharge/Transfer) Integration *(on page 9)*

ADT (Admit/Discharge/Transfer) Integration

The Smart Device Connectivity can receive ADT messages from configured hospital HIT (Health Information Technology) inbound connections, and process the ADT messages to configured outbound connections, such as NaviCare and Voalte. ADT information can include patient admits/discharge/transfers, records, and patient demographics. The supported formats for ADT Interfaces are HL7 and Allscripts Unity.

EMR (Electronic Medical Record) Integration

Smart Device Connectivity can be configured to receive data from and send data to a hospital HIT (Health Information Technology) system. The data received from the HIT system, such as vitals, labs, medications, or diagnoses, can be provided to configured outbound interfaces including Patient Risk Surveillance, NaviCare Status Board, Voalte, or third-party HL7 interfaces.

Vitals monitoring data received by Smart Device Connectivity can be sent to the EMR. Vitals can be configured to send with a confirmed timestamp or captured timestamp. The use of the confirmed timestamp would allow vitals to be viewed in a single column within the EMR for charting ease.

Standard medical codes and terminology are used by the Smart Device Connectivity when processing received data or preparing data to send to outbound interfaces. Such supported standards include LOINC, SNOMED-CT, MDC, RxNorm, Allscripts Sunrise Coding, ICD-10, and CPT.

Receiving Data from Vitals Devices

Smart Device Connectivity provides support for CSM/CVSM and bed-integrated contact-free continuous monitoring devices.

CSM/CVSM devices

1. Provide support for positively identifying a patient, using device barcode scanning of a patient's wrist band and querying the data received from the EMR for patient confirmation. Additional demographics can be returned to the device.
2. Support the hospital local Active Directory for role-based authentication on the device

3. Receive clinician ID, patient ID, patient vitals data and custom data from supported CSM and CVSM monitoring devices
4. Have the ability to accept custom data from vitals devices
5. Send vitals and custom data to the following:
    a. EMR
    b. Configured outbound connections, such as Patient Risk Surveillance, Voalte, Digital Health Gateway Dashboard, and Status Board

Contact-free vitals monitoring via Centrella Smart+ Bed

1. Receives HR/RR data from contact-free vitals devices such as EarlySense
2. Receives Contact-Free alerts such as High/Low HR and RR
3. Sends contact-free vitals data (for example, HR/RR) to configured outbound connections such as Patient Risk Surveillance, Voalte, Smart Device Connectivity Dashboard and Status Board
4. Sends contact-free alerts (for example, High/Low HR/RR) to IHE Alert Managers and NaviCare Nurse Call.
5. Performs alert reporting activities

Smart Device Connectivity can operate as an alert reporter, sending alerts to IHE-compliant alert managers. Alerts currently supported include vitals and technical alerts from bed-integrated contact-free continuous vitals monitors and Patient Risk Surveillance risk-based notifications. The alerts are received by Smart Device Connectivity and sent to IHE-compatible alert managers as PCD-04 messages.

About Dashboard

The Dashboard is a web-based application that can be accessed via the Digital Health Portal. The Dashboard provides caregivers with the ability to monitor a facility’s patients within the units that are configured to view.

The Dashboard loads the default view when rendered for the first time. It can be configured to display a different view, according to user preferences. The default view cannot be edited.

Authorized Dashboard users have the ability to:

- Configure the facility that the Dashboard is servicing.
- Configure the nursing units within the facility that will be displayed on the Dashboard.
- Configure the columns that will be displayed, as well as the names of the columns.
- Configure the options for scrolling, row count, and paging.
- Configure patient name masking.
- Remove data after an elapsed time period.
- Change the column size and order.
- Save the configuration as a view (the Dashboard supports multiple saved views).
- Utilize the same view across several dashboards within the facility.
- Edit, delete, and rename views.

The Dashboard display shows each room location with an associated wired or wireless bed, along with the following information:

- The patient name (with masking options applied).
- Patient-related data received, such as heart rate and respiratory rate.
- Bed status data, such as rails up/down, patient detect, and so forth.
- Risk scores and stratifications.
- Contact-free Continuous Monitoring data and vitals alert status.

The Dashboard supports interactive and non-interactive user sessions with a timeout counter displayed when the session is nearing an end. A non-interactive user session supports the need to display the Dashboard for an extended period, up to 90 days, with little to no user interaction, such as in a hallway or above a nursing unit. An interactive user session, on the other hand, expires in one hour.

Dashboard access is configured in the User Roles section of the Enterprise Configuration Portal (ECP). Users can be provided the following access rights:

- Read-only users can access, view, and configure only the local browser Dashboard view.
- Configuration Admin users can access, view, and configure local and global Dashboard views. Global Dashboard views can be seen by every Dashboard within the Facility.
- Administrators can access, view, and configure the Dashboard for the local browser view and can also globally publish their edited views to Dashboard instances within the same facility, displaying the same view.

About Reporting

The Reporting application within the Digital Health Platform (DHP) provides you with the ability to generate reports based on patient and device data. You can use this data to analyze your patient population and help identify areas for staff and facility improvements. Users can generate reports that cover patient deterioration, sepsis, and contact-free continuous monitoring. These reports can also assist with patient monitoring, caregiver protocol adherence, investigation into patient deterioration. Additionally, they can be used to gain insights into improving patient management and care.

Use the Reporting system to generate a standard set of reports. These reports can contain protected health information (PHI) and access to them is configured via the Enterprise Configuration Portal User Roles sections. Users who have permissions to generate reports containing PHI can view all available reports (both those that contain PHI and those that do not). Users without PHI permission will only be able to generate reports that do not contain PHI.

Standard reports that do contain PHI include:

Early Warning Scores – Patient View

Includes patient demographics, admission details, location history, patient scores, and clinical parameters used in score calculations, as well as a time line of events during the patient's stay and severe sepsis details, if the patient was identified as having severe sepsis.

Early Warning Score Insights

Provides insights which include patient deterioration metrics, score statistics and comparisons, and regression analysis between sepsis risk factors and average scores.

Contact Free Continuous Monitoring – Patient View

Includes patient demographics, admission details, location history, vitals averages (both daily and hourly) and standard deviations, observed vitals, and alerts.

Contact Free Continuous Monitoring – Insights

Includes devices metrics by device type for heart rate and respiratory rate, including the number of observations, minimum and maximum observation values, and the number of minutes between observed values.

Contact Free Continuous Monitoring – Sensor Expiration and Alerts

Includes sensors that expired between a selected start and end date, or sensors that expire within 30 days of the current date.

Standard reports that do not contain PHI, include:

Sepsis Insights

For tracking compliance with a facility's severe sepsis prevention protocol. This report includes patient demographics, patients treated with antibiotics, severity of sepsis, outcome (discharge or death), patients having pathogens, outcome trends (mortality vs. discharge), and the overall length of stay.

Sepsis Bundle Compliance

For tracking compliance with a facility's severe sepsis prevention protocol. This report includes the percentage of sepsis bundle tasks completed, the percentage completed on time, 3-hour bundles completed on time, and 6-hour bundles completed on time. This data is delivered across locations within a customer's hierarchy over time periods. The average number of minutes from sepsis onset to 3 and 6-hour bundle completion times is also included.

The **Reporting** system uses defined criteria to determine Sepsis Onset Time, Septic Shock Onset Time, and Sepsis Bundle Compliance. Refer to the following sections for additional details:

- Sepsis Onset Time Criteria *(on page 62)*
- Septic Shock Onset Time Criteria *(on page 63)*
- Sepsis Bundle Compliance Criteria *(on page 64)*

Bedside Association Enabled by Smart Device Connectivity

Smart Device Connectivity supports wireless bed association. Wireless bedside association is the process by which a caregiver assigns a wireless bed to a Gateway location so that data can flow from the bed through the Gateway, and out to interfaces, such as the electronic medical record (EMR) application, Dashboard, NaviCare, Status Board, and Patient Risk Surveillance. Bedside Association

is only supported for wireless beds. Wired beds are plugged into a connector, provided their location by the Navicare system, and do not require bedside association.

To support bedside association, customers must provide the Gateway with a list of the EMR locations to which beds can be associated. The location list is loaded into the Enterprise Configuration Portal, either manually or by importing the list from a file. Once the location list is loaded, it can be sent to the wireless beds.

Only wireless beds connected to the Gateway receive the location list. The wireless beds use the location list to display location in a hierarchical form on the bed. The caregiver navigates through the menus and location list hierarchy and assigns the bed to a location. The bed to location association is provided back to the Gateway and saved in the system. This becomes the bridge between the bed and the Gateway for passing bed data to other clinical interfaces.

Only one wireless bed can occupy a location at any time. A wireless bed can be associated with an already-occupied location by another wireless bed when the wireless bed provides a force override indication. This will result in a disassociation of the previously located wireless bed. A wireless bed will be denied the location when a wired bed already occupies the location, regardless of whether the wireless bed indicated a forced override scenario.

For beds that support dual mode (wired and wireless), the bed can maintain a connection to the Gateway via both methods, but only to the same location. If a dual mode bed is connected and associated to a location in wireless mode, and gets plugged into a different location, the Gateway will disassociate the wireless connection and the bed will reassociate to the wired connection based on the Gateways location update response.

Wireless beds associated to locations receive information related to the admission, discharge, and transfer of patients in that location. This provides the caregiver with additional information to assist in ensuring that the patient in the bed is the actual patient the ADT system has admitted. The Gateway supports three patient verification statuses: Unverified (default), Verified (the caregiver indicated that patient was correct), and Incorrect (the caregiver indicated that the patient was incorrect). The caregiver sets this patient status at the bedside only on wireless devices. When a caregiver indicates that the patient is incorrect, data received from the location is not provided to external clinical interfaces and is used only for display on the Gateway Dashboard with an indication the patient is incorrect.

Scalable and Reliable Architecture

Smart Device Connectivity is a cloud-hosted solution providing 99.9% uptime and scaling on demand to meet the business needs. The multi-tenant architecture ensures customers are uniquely identified and have a dedicated repository.

Ability to manually re-play data messages to downstream systems

In the event a downstream system or device is offline or transmission of data is unsuccessful, the replay of data messages to downstream systems and devices will allow for the systems to remain in sync with Smart Device Connectivity.

System Messages to Site Contacts

Smart Device Connectivity sends system messages to configured site contacts for certain events, such as expiring certificates, data received in an unexpected format, failure to deliver messages to an outbound connection, and scheduled downtime.

How Does Smart Device Connectivity Work?

Overview

Smart Device Connectivity is a cloud-based solution that facilitates communication between supported hospital devices, hospital information systems, and supported clinical interfaces. Smart Device Connectivity is comprised of various software components, each performing a specific set of functions that allow Smart Device Connectivity to control access to, accept, store, process, and send data, as it is configured within the system.

Smart Device Connectivity is deployed in Azure Cloud, Microsoft's public cloud platform that provides services that include, but are not limited to, the following:

- Azure SQL Database
- Azure Cosmos DB
- Azure Key Vault
- Azure Event Hubs
- Azure IoT Hub
- Azure Synapse
- Microsoft Power BI
- Many other core Azure services

Smart Device Connectivity provides the ability to create connections to various endpoints, thereby leveraging Mirth NextGen Connect middleware for bi-directional communication between disparate systems that support various protocols (such as HTTPS, TCP, WTCP) and data formats (such as HL7 and JSON).

Data received by Smart Device Connectivity from devices and customer information systems is stored in a Clinical Data Repository and is provided to various interfaces for display, alert management, clinical decision support, and charting (in an EMR) so caregivers can stay informed of the status of each patient.

Related information

Production and Sandbox Environments *(on page 14)*

Production and Sandbox Environments

The Digital Health Platform offers a Sandbox environment in addition to a Production environment. The Sandbox environment gives you the ability to interact with the system in a testing/verification capacity. When possible, you should use the Sandbox environment to integrate your own test environments with the Digital Heath Platform and to fully test and validate all components that you

intend to use in Production, using software configurations that are as close to what will be used in Production as possible.

Related information

How Does Smart Device Connectivity Work? *(on page 14)*

Smart Device Connectivity Regions Globally

Smart Device Connectivity is available in the United States and in the following 11 European countries:

- Austria
- Belgium
- France
- Germany
- Ireland
- Italy
- Netherlands
- Spain
- Sweden
- Switzerland
- United Kingdom

The U.S. infrastructure is supported by a primary datacenter in the East region and a backup datacenter in the West region. The European infrastructure is supported by a primary datacenter in West-Central Germany and a backup datacenter in North Germany.

Supported languages

The following languages (and applicable alphabetic characters) are supported for use in Bedside Association (that is, bed connectivity without the use of NaviCare/SmartSync) through Smart Device Connectivity.

- English - Default
- Dutch - Netherlands, Belgium
- French - France, Belgium, Switzerland
- German - Germany, Austria, Belgium, Switzerland
- Italian - Italy, Switzerland
- Spanish - Spain
- Swedish - Sweden

Characters from the following sets are also supported:

- UTF-8
- ISO-8859-1

- ISO-8859-2
- ISO-8859-3
- ISO-8859-4
- ISO-8859-15
- Windows 1252

Available Features by Region

Although the core Smart Device Connectivity offering is available in both the United States and supported European countries to enable connection of bed and vitals devices to hospital information systems and supported clinical interfaces, certain features supported in the U.S. are not currently supported in Europe. The features currently supported in each region are as follows:

United States:

- ADT/EMR notifications via Voalte Mobile
- Wireless bed connectivity (with manual bedside association)
- Outbound bed data/alerts to EMR and supported clinical interfaces
- Outbound integrated EarlySense vitals data and alerts to EMR and supported clinical interfaces
- Connex(R) Spot Monitor (CSM) and Connex(R) Vital Signs Monitor (CVSM) connectivity
- Outbound CSM/CVSM vitals data to EMR and supported clinical interfaces
- Outbound de-identified data to authorized third party interfaces
- Smart Device Connectivity Dashboard for display of bed and patient status
- Smart Device Connectivity Reporting for customer-facing display and analysis of patient data
- Patient Risk Surveillance integration for clinical decision support

Europe:

- Wireless bed connectivity (with manual bedside association)
- Outbound bed data/alerts to EMR and supported clinical interfaces
- Outbound integrated EarlySense vitals data/alerts to EMR and supported clinical interfaces
- Connex(R) Spot Monitor (CSM) and Connex(R) Vital Signs Monitor (CVSM) connectivity
- Outbound CSM/CVSM vitals data to EMR and supported clinical interfaces
- Outbound de-identified data to authorized third party interfaces
- Smart Device Connectivity Dashboard for display of bed and patient status

The European region does not currently support the following features:

- ADT/EMR notifications to Voalte Mobile
- Smart Device Connectivity Reporting for customer-facing display and analysis
- Patient Risk Surveillance integration

In addition to the unsupported features listed above, the following third party (non-Smart Device Connectivity) software and systems are not supported in the European region:

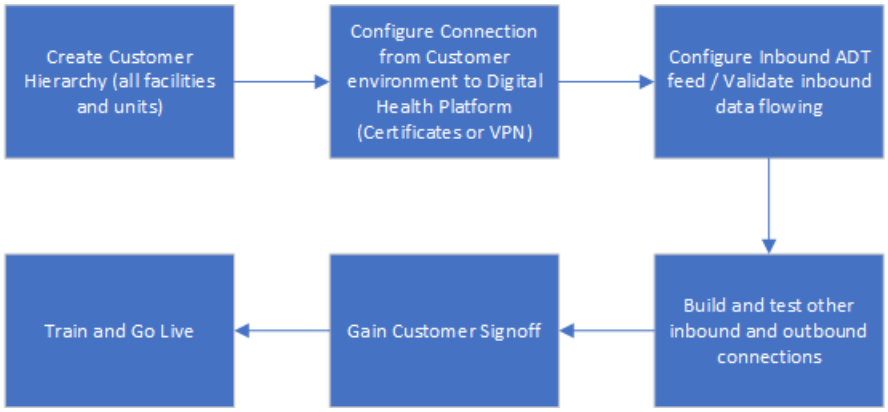
- NaviCare (including Nurse Call)
- Status Board
- Voalte Mobile
- Symedical Clinical Term Mapping

In the U.S. region, the Accella bed is not supported.

Onboarding Instructions

The term “onboarding” refers to the creation of a connection from a facility’s electronic medical record (EMR) system to Hillrom Smart Device Connectivity. This process cannot be completed unless a virtual private network (VPN) connection has been configured or Certificates have been shared between Hillrom and the customer.

See Building a Customer Connection to the Gateway *(on page 17)* for more details, or proceed to Steps to Complete Onboarding *(on page 21)*.



Building a Customer Connection to the Gateway

The preferred method of connecting customer environments to the Digital Health Gateway is via TLS Certificates, which can be generated by Hillrom or uploaded, if the customer prefers to provide them. VPN connectivity is another option to connect these environments.

VPN Connectivity to the Enterprise Gateway

Hillrom offers a variety of methods to communicate data into the Digital Health Platform. For customers who require a site-to-site VPN in order to transmit or receive data, the following process may be used to collect the appropriate information to create a successful VPN deployment.

1. Identify Network Address Translation (NAT) Pools

Inbound NAT (Customer → Hillrom)

Hillrom uses the **172.25.128.0/17** subnet to allocate NAT pools to customers. All customer connections into the Digital Health Platform (DHP) that come over a VPN will NAT to a portion of this IP address pool.

Note: In some cases, there may be configurations which do not support the Hillrom-provided NAT block. These must be reviewed on a case-by-case basis, so please reach out to your Hillrom representative to discuss.

In order to allocate an appropriately sized IP address block, Hillrom must know the number of server(s) that will VPN require connectivity into the Digital Health Platform. This may include test or sandbox server(s). Typically, this does not include clinical devices (such as beds, vitals devices).

Once the number of servers is identified, Hillrom will allocate a subnet to be used for NAT during the site-to-site VPN communication.

Outbound NAT (Hillrom → Customer)

Hillrom uses the following RFC1918 address space for its Digital Health Platform gateway servers:

- 172.27.192.0/24
- 172.27.195.0/24
- 172.27.208.0/24
- 172.27.211.0/24

If any of these subnets overlap with existing customer subnets, Hillrom can provide NAT mapping in the VPN tunnel to prevent IP address space conflicts. The customer must provide appropriate IP address(es) for the NAT mapping. Typically, only a few addresses are required.

2. Collect Information

Hillrom and the customer must jointly complete the Site to Site VPN Request form (QS19296). In the Tunnel Information section, Hillrom's preferred parameters are listed. However, Hillrom can support a variety of deployment parameters to ensure compatibility with a broad array of tunnels. The customer should select values which support its own internal security and configuration policies.

Note: The "preferred" parameters are the maximum hashing, encryption and Diffie-Hellman parameters that Hillrom can support in an IKEv1 tunnel. If different parameters are requested, an IKEv2 tunnel will be used.

3. Tunnel Deployment

Once all parameters and configurations have been agreed to, it is recommended that a working session of one hour be scheduled to deploy the VPN tunnel. During this time, the Hillrom engineer and the customer engineer can collaborate to deploy the tunnel in real-time, ensuring the best outcome with a minimum of wasted time.

It is recommended that a Pre-Shared Key be selected communicated in real-time during this meeting. Hillrom recommends a minimum of 24 randomly-generated letters and numbers.

On the Hillrom side, a configuration may look similar to the following:

```
object network springfield-hospital-vpn-subnet
 subnet 172.25.128.0 255.255.255.224
!
object network hillrom-prod-east-vm-subnet
 subnet 172.27.195.16 255.255.255.240
!
access-list cryptomap_springfield-hospital extended permit ip object
 hillrom-prod-east-vm-subnet object springfield-hospital-vpn-subnet
!
crypto map outside_map 2 match address cryptomap_springfield-hospital
crypto map outside_map 2 set pfs
crypto map outside_map 2 set peer 8.8.8.8
crypto map outside_map 2 set ikev1 transform-set ESP-AES-256-SHA
!
group-policy policy-8.8.8.8 internal
group-policy policy-8.8.8.8 attributes
 vpn-tunnel-protocol ikev1
!
tunnel-group 8.8.8.8 type ipsec-l2l
tunnel-group 8.8.8.8 general-attributes
 default-group-policy policy-8.8.8.8
tunnel-group 8.8.8.8 ipsec-attributes
 ikev1 pre-shared-key 9ShnUPML5TMDaMUv5rUCkj2Z24BHyNyf
```

Configurations will vary depending on the parameters selected.

4. Testing

VPN tunnels can be initiated from either end. Therefore, it is important to test connectivity that is initiated from both sides. In order to accomplish this, it is recommended that the engineers test (using ICMP, or TCP connections, or whatever method is deemed appropriate) from one side (e.g. a Hillrom server reaching a customer server), then reset the VPN tunnel and test the reverse direction (e.g. a customer server reaching a Hillrom server).

Using Certificates to Connect to the Digital Health Platform

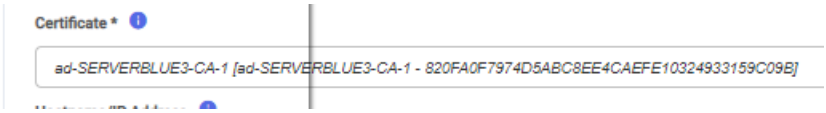
The Enterprise Configuration Portal enables users to manage X.509 certificates that can be used to secure **Inbound** and **Outbound Connections**. The Enterprise Configuration portal also enables users to communicate how they intend to use certificates within their integration software, but is not responsible for performing that configuration.

Note: All direction provided in this topic is related to a user configuring their software and is meant to be presented at a high level, as there is no way to cover each type of specific integration software that is in use by a given customer.

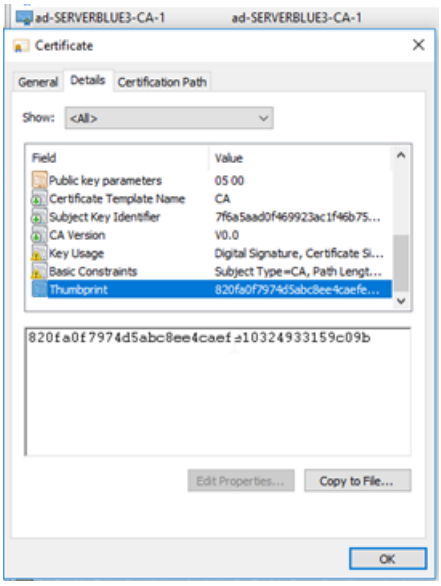
General

First, the user must have the **Certificate and Private Key** that was used to create the **Inbound** or **Outbound Connection** within the Enterprise Configuration Portal. The user must import that Certificate and Private Key into the **Key Store** that is used by their software in order to establish TLSv1.2 (or better) connections.

The most effective way to uniquely identify a certificate is by its SHA-1 thumbprint. The Enterprise Configuration Portal displays certificate thumbprints within Certificate Management, and when assigned to Inbound and Outbound connections.



Any certificate can be inspected to determine its thumbprint.



When a user configures their software, it must be configured to use the certificate that was assigned to the **Inbound** or **Outbound Connection** within the Enterprise Configuration Portal.

Inbound Connections using Certificates

The user's integration software is acting as a **Client** and the Digital Health Platform is acting as a **Server**. As such, the user must configure their software to present the appropriate client or client/server certificate when initiating a connection with the Digital Health Platform.

When configuring client connections, the user should enable the following configuration items to improve security:

1. Server Certificate Validation - The user's software will validate the chain of trust associated with the Server Certificate that is presented by Smart Device Connectivity. The public portion of Smart Device Connectivity's server certificate chain can be pulled down and configured as the Trusted Server Certificates associated with the client connection.
2. Hostname Verification - Validation fails if the hostname presented in the server certificate does not match the actual endpoint that the user's software is connecting to.

Outbound Connections using Certificates

The Digital Health Platform is acting as a **Client** and the user's software is acting as a **Server**. As such, the user must configure their software to present the appropriate server or client/server certificate when the Digital Health Platform initiates a connection with their software. Smart Device Connectivity performs Server Certificate and Hostname Verification.

Certificate Expiration

By design, certificates expire after a given amount of time. If a certificate expires while it is currently in use by an **Inbound or Outbound Connection**, that connection will no longer function. The Digital Health Platform will notify the applicable users when any given certificate is nearing expiration at the following intervals:

1. 30 days from the expiration date
2. 14 days from the expiration date
3. 7 days from the expiration date

Additionally, the Digital Health Platform will notify the applicable users when a certificate has expired.

When a certificate expires, action must be taken by the user to replace the certificate associated with the Inbound or Outbound Connection to avoid down time.

Steps to Complete Onboarding

The steps necessary to complete the onboarding of a customer are documented below. Some of these sections are covered in more detail in subsequent pages.

1. Configure VPN - Connect with VPN.

2. To enable secure communications between a customer’s network and Hillrom Enterprise Gateway (EG), a Virtual Private Network (VPN) must be configured. This configuration requires direct collaboration between both the customer and Hillrom network representatives.
3. Customer to provide Hillrom with the following information:
    - Endpoint host names and IP addresses for the following:
        - EMR Source
        - Voalte server(s)*
        - Welch Allyn server(s)
    - VPN Tunnel Parameters: IKE/ISAKMP
        - VPN Tunnel Encryption Method
        - VPN Tunnel Hash Algorithm
        - VPN Tunnel Diffie-Hellman Group
        - VPN Tunnel Lifetime
    - VPN Tunnel Parameters: IPSEC
        - Peer IP Address
        - ESP Tunnel Mode
        - ESP Encryption
        - ESP Authentication
        - SA Lifetime (Time)
        - SA Lifetime (Traffic)

    Hillrom will provide the customer with the following information:
    - Hillrom Gateway Network IP address
    - Hillrom Gateway Network Subnet
4. **Define the Clinical Mapping required for the customer's EMR.**

    Note: Clinical Mapping provides a means to provide data to a customer's EMR using a known nomenclature.

    a. Work with the customer to define the type of clinical code mappings, such as LOINC, MDC, SNOMED.
    b. Create the mappings in the terminology provider.
5. **Define the customer's hierarchy structure at each level (as listed below)—including the time zone, address, and admin contact information for each level**.
    a. Enterprise
    b. Region
    c. Organization
    d. Facility
    e. Unit
6. **Perform Unit Location Mapping** - Performing unit location mapping provides a bridge between the customer's ADT/EMR locations and the Smart Device Connectivity location.
7. **Inbound Connections** - Gather the required information for the connection being configured. Connection configurations require a combination of the following types of information:
    - Connection type (for example, inbound/outbound)
    - Communication type (for example, WACP, HL7, Allscripts)
    - Security method (for example, VPN)
    - URL

- Username
- Password
- Port number (Range 1000 - 65535)
- Define inbound connections, protocols, ports:
    a. **ADT/EMR** - Set up one of the following ADT/EMR connection types: Allscripts Unity or HL7.
    b. **Welch Allyn Vitals Devices** - Set up as many as are needed to support the IP addresses from which vitals devices will be sending data.
    c. **Hillrom Wired Bed Device** - Only required if connecting bed devices via MQTT.
    d. **IHE Alarms Interfaces** - supports only one.

8. **Inbound Connections** - Gather the required information for the connection being configured. Connection configurations require a combination of the following types of information:
    - Connection type (for example, inbound/outbound)
    - Communication type (for example, WACP, HL7, Allscripts)
    - Security method (for example, VPN)
    - Hostnames/IP addresses for connections
    - URL
    - Username
    - Password
    - Port number (Range 1000 - 65535)
    - Vitals data outbound
        - Unit of measure for temperature, height, weight
        - Standardized code mapping
    - Data retention period
    - ADT/EMR data path - confirmed or unconfirmed
    - Define outbound connections, protocols, ports, as follows:
        a. **CDR** - For storing data in the Clinical Data Repository (CDR); required for all
        b. **Terminology Provider**
        c. **Vitals** - For sending vitals to outbound interfaces
        d. **ADT** - When integrating with NaviCare, enter the IP address/port of the NaviCare endpoint
        e. **Voalte** - For sending ADT to Voalte
        f. **IHE Alarms** - For sending alerts to an interface, such as NaviCare
        g. **Patient Risk Surveillance (optional)** - For sending vitals to the Patient Risk Surveillance product for patient scoring
9. **Create Credentials** - Required only for a device connection when an inbound connection type of Hillrom Bed Device is set up. The credentials provide the means necessary to authenticate connecting bed devices. Credentials must be assigned to the correct Facility and provided to the Facility to configure the devices, such as the BMS proxy on-premises.
10. **Define Customer Roles** - Gather the customers Active Directory (AD) domain and authentication type information in order to map the roles in the AD to Smart Device Connectivity supported roles.
11. **Configure NaviCare BMS proxy to communicate with Smart Device Connectivity** - The technicians will use the hierarchy Facility ID and credentials created for the Facility to configure the BMS proxy. This information can be gathered from the ECP.

12. **Configure Rabbit MQ federation between the NaviCare on-premises Rabbit MQ broker and the Smart Device Connectivity Rabbit MQ broker** - The federated is handled through a set of scripts that NaviCare and/or Voalte must execute to federate to Smart Device Connectivity in order to receive messages from the Rabbit MQ bus
13. **Validation** - Perform the validation of data to and from the customer's ADT/EMR and connected devices. Ensure that data is sent to the configured outbound interfaces. All validations are based on the configured inbound/outbound interfaces and can vary between customers.

    Note: Voalte validation versions 3.6.3 direct connect to Smart Device Connectivity and 3.7.10 over Rabbit.

    Configuration paths to test include, but are not limited to the following:

    - **ADT Events** - ADT events can include, but are not limited to, Admitting, Transfers, Moves, and Discharges.
        - ADT received and sent to NaviCare
        - ADT received and sent to Voalte
    - **EMR Data** - EMR data can include, but is not limited to, heart rate, respiratory rate, and custom data.
        - EMR charted vitals and custom data:
            - Received and sent to NaviCare Status Board
            - Received and sent to Voalte
    - **CSM/CVSM** - Vitals data can include, but is not limited to, heart rate, respiratory rate, and custom data.
        - **Patient Query** - Results provided to the vitals monitor from the Enterprise Gateway.
        - **Vitals monitor data**
            - Sent to the customer's EMR (confirmed)
            - Sent to the customer's EMR (unconfirmed)
            - Sent to the NaviCare Status Board
            - Sent to Voalte
            - Sent to Patient Risk Surveillance
        - **Vitals monitor alerts** - Received and stored in CDR only; nothing is sent outbound.
    - **Contact-free Monitoring (for example, EarlySense integrated with Centrella bed)** - Vitals data can include, but is not limited to, heart rate, respiratory rate, and alerts (high heart rate, low respiratory rate, and so forth).
        - **Vitals data (HR/RR)**
            - Sent to Voalte
            - Sent to NaviCare Status Board
        - **Vitals alerts** - Received and stored in CDR only; nothing is sent outbound.
    - **Patient Risk Surveillance** - Risk scores and risk-based notifications can include, but are not limited to, medium/high MEWS and high SIRS.
        - **Risk scores**
            - Sent to NaviCare Status Board
            - Sent to Voalte

- **Risk-based notifications**
  - Sent as an alert to NaviCare Status Board
  - Sent as an alert to Voalte via NaviCare
- **Bed data (for example, Centrella wired bed)** - Bed data can include, but is not limited to: Brakes on, rails status, and HOB angle.
  - Centrella bed data is received into the Bed Device Gateway.
  - **Note**: No validation is required for the Gateway 1.1 release.

Troubleshooting Guide

Select one of the options below for more detailed information.

Basic Troubleshooting *(on page 25)*

Troubleshooting Technical Issues *(on page 26)*

Basic Troubleshooting

If a Smart Device Connectivity connection issue arises that is not covered in the troubleshooting guide below, please contact Hillrom's technical support team at 1-800-445-3720 for assistance. For more technical issues, please see Troubleshooting Technical Issues *(on page 26)*.

Choose a topic from the list below:

I am having an issue with the:

- ADT Connection *(on page 25)*
- Vitals Connection *(on page 26)*
- Alarm Manager *(on page 26)*

ADT Connection

1. Check that the hostname for the outbound HL7 connection is correct:
   a. For Production: **gateway.dhp.hillrom.com**
   b. For Sandbox: **sbx-gw.zen.hillrom.com**
2. Check that the port is correct and unchanged.

   Tip: This information should be available within your Customer copy of the Digital Health Platform Pre-Deployment Workbook. If, after consulting the pre-deployment workbook, you are still unsure of the proper port, please contact Hillrom Technical Support at 1-800-445-3720.
3. Check that there are no issues with the VPN connection to Smart Device Connectivity.
4. Confirm that the HL7 messages being sent conform to the Interface Specification Guide found in Hillrom Smart Device Connectivity HL7 Interface Specification.

   Remember: Smart Device Connectivity only processes messages for known and configured units.

5. Confirm the Unit ID of any units that may have issues, before calling Technical Support.
6. If you are still having issues with the ADT connection after following the steps above, please contact Hillrom Technical Support at 1-800-445-3720.

Vitals Connection

1. Check that patient admissions and transfers have processed successfully before attempting to send and receive vitals information.
2. Check that the vitals devices have been configured to send to the appropriate hostname.
3. Confirm that the vitals devices have been configured to send to the correct port.

   Tip: This information should be available within your Customer copy of the Digital Health Platform Pre-Deployment Workbook. If, after consulting the pre-deployment workbook, you are still unsure of the proper port, please contact Hillrom Technical Support at 1-800-445-3720.
4. Check that there are no issues with the VPN connection to Smart Device Connectivity.

   Remember: Smart Device Connectivity only processes messages for known and configured units.
5. Confirm the Unit ID of any units that may have issues before calling Technical Support.
6. If you are still having issues with the vitals connection after following the steps above, please contact Hillrom Technical Support at 1-800-445-3720.

Alarm Manager

1. Check that patient admissions and transfers have processed successfully before attempting to send and receive vitals information.
2. Check that the Alarm Manager is configured to send to the appropriate hostname.
3. Confirm that the Alarm Manager is configured to send to the correct port.

   Tip: This information should be available within your Customer copy of the Digital Health Platform Pre-Deployment Workbook. If, after consulting the pre-deployment workbook, you are still unsure of the proper port, please contact Hillrom Technical Support at 1-800-445-3720.
4. Check that there are no issues with the VPN connection to Smart Device Connectivity.
5. Confirm that the HL7 messages being sent conform to the Interface Specification Guide found in LAB01457 Digital Health Gateway HL7 Interface Specification.

   Remember: Smart Device Connectivity only processes messages for known and configured units.
6. Confirm the Unit ID of any units that may have issues before calling Technical Support.
7. If you are still having issues with the Alarm Manager after following the steps above, please contact Hillrom Technical Support at 1-800-445-3720.

Troubleshooting Technical Issues

I am having trouble with:

I am having trouble with:

ADT/EMR

Patient data from vitals monitors is not properly being processed by the system.

- Failed communication will generate a visual indication on CSM/CVSM, indicating that data was not successfully transferred and providing suggested troubleshooting actions.
- Patient vitals and risk scores may still be available if manually charted in EMR.
- Caregivers will still be able to assess a patient's condition based on other EMR data, and respond per the facility's protocol.

If you are still having issues with patient data from vitals monitors not being processed by the system, please call Hillrom Technical Support at 1-800-445-3720.

Data from the hospital's ADT system that is not being processed by the system.

- CSM/CVSM will indicate failed patient queries and provide suggested troubleshooting actions.
- Status Board will indicate if an ADT admit/discharge for a patient wasn't received.
- Voalte mobile will indicate if an ADT admit/discharge for a patient wasn't received.
- Alternative interfaces and the charge nurse may be available for tracking admits, discharges, and transfers.
- Caregivers will still be able to assess a patient's condition based on vital signs and EMR data, and respond per the facility's protocol.

If you are still having issues with data from the hospital's ADT system not being processed by the system, please call Hillrom Technical Support at 1-800-445-3720.

A system fault due to loss of power.

- CSM/CVSM will indicate loss of network connectivity and provide suggested troubleshooting actions.
- Status Board will indicate a power outage via lack of data displayed for a patient and/or bed.
- Voalte mobile will indicate a power outage via lack of data displayed for a patient and/or bed.
- Hospitals should use backup generators to restore power in the event of an outage.

Once power is restored, contact Hillrom Technical Support at 1-800-445-3720 in the event of any further issues.

Patient data is corrupted.

- CSM/CVSM will indicate when data transmission to EMR fails and provide suggested troubleshooting actions.
- Assess patient's condition based on vital signs and EMR data, and respond per the facility's protocol.
- If you are still having issues with corrupted patient data, contact Hillrom Technical Support at 1-800-445-3720.

Association of patient data to the wrong tenant.

The system deployment is certified prior to clinical use. If there have been changes to the system and you require assistance, contact Hillrom Technical Support at 1-800-445-3720.

- Only patient data from vital signs monitor will be impacted; notifications based on orders/lab values/meds will not be affected.
- Erroneous data may be detected by comparing displayed data on vitals monitor to data in hospital ADT and EMR systems.

System failure due to software update.

If you experience a system failure after a planned Hillrom software upgrade, please contact Hillrom Technical Support at 1-800-445-3720.

- Single, clustered servers will be taken offline for software updates without affecting other servers.
- The system deployment is certified prior to clinical use.
- System may be rolled back to a prior software release in the event of a system failure.
- Software updates are validated at the system level prior to deployment.

System failure due to network outage.

Suggested workarounds:

- Status Board will indicate a network outage via lack of data displayed for a patient and/or bed.
- Voalte mobile will indicate a network outage via lack of data displayed for a patient and/or bed.
- CSM/CVSM will indicate loss of network connectivity and provide suggested troubleshooting actions.

Action: If the problem persists, contact Hillrom Technical Support at 1-800-445-3720.

System failure due to configuration change during system operation.

The system deployment is recertified after configuration changes. If there have been changes to the system and you require assistance, contact Hillrom Technical Support at 1-800-445-3720.

System failure due to incompatible software versions.

Confirm software version is listed in the system compatibility matrix.

- Software updates are validated at the system level prior to deployment.
- Failed communication will generate a visual indication on CSM/CVSM, indicating that data was not successfully transferred.
- Status Board will indicate failed communication via lack of data displayed for a patient and/or bed.
- Voalte mobile will indicate failed communication via lack of data displayed for a patient and/or bed.
- System may be rolled back to a prior software release in the event of a system failure.
- Patient vitals and risk scores will still be available if manually charted in EMR.

If you are still experiencing system failures and you require assistance, contact Hillrom Technical Support at 1-800-445-3720.

ADT/EMR data is not being properly processed by the system.

Troubleshoot the ADT connection.

- Caregivers will still be able to assess a patient's condition based on vital signs data and respond per facility protocol.
- Caregivers will still have access to ADT to view patient admissions/discharges/transfers, and EMR to view charted data.

If the ADT/EMR data are still not being properly processed by the system, contact Hillrom Technical Support at 1-800-445-3720.

ADT/EMR-based notifications not transmitted to Voalte mobile devices.

Troubleshoot ADT connections.

- Caregivers will still be able to assess a patient's condition based on vital signs data and respond per facility protocol.
- Caregivers will still have access to ADT to view patient admissions/discharges/transfers, and EMR to view charted data.

If ADT or EMR-based notifications are still not being transmitted to Voalte mobile devices, contact Hillrom Technical Support at 1-800-445-3720.

Bed/integrated contact-free continuous monitoring device

Bed/integrated contact-free continuous monitoring because it is unavailable.

Troubleshoot contact free continuous monitoring vitals displaying on Status Board or Voalte.

- Status Board and Voalte mobile will visually indicate when bed/integrated contact-free continuous monitoring data is unavailable.
- Patient weight, vitals, and bed status will still be available if manually charted in the EMR.
- Caregivers may still assess a patient's condition based on vital signs and EMR data, and respond per facility protocol.

If you are still having trouble with contact free continuous monitoring, please contact Hillrom Technical Support at 1-800-445-3720.

Incorrect/incomplete mapping of clinical data elements to codes (value sets) has occurred.

If you feel you have an incorrect or incomplete clinical mapping of clinical data elements, contact Hillrom Technical Support at 1-800-445-3720.

- The system is not intended to diagnose patients or replace clinical judgment.

Status Board is unable to display patient/bed data.

Refer to Navicare Status Board troubleshooting.

- Status Board will visually indicate when data is not available.
- Patient vitals/risk score data will still be displayed on supported vital signs monitors, the EMR, and other supported clinical interfaces, such as Voalte mobile.

Troubleshoot contact-free continuous monitoring vitals displaying on Status Board or Voalte.

If you are still unable to display patient/bed data on Status Board, contact Hillrom Technical Support at 1-800-445-3720.

Voalte mobile is unable to display patient/bed data.

Suggested workarounds:Refer to the Voalte troubleshooting guide.

- Voalte mobile will visually indicate when data is not available.
- Patient vitals/risk score data will still be displayed on supported vital signs monitors, the EMR, and other supported clinical interfaces, such as Status Board.

  Troubleshoot the contact-free continuous monitoring vitals displaying on Status Board or Voalte.

  If you are still unable to display patient/bed data on Voalte, contact Hillrom Technical Support at 1-800-445-3720.

Notifications were not sent to alert the communication manager

Suggested workarounds:

- Vital signs, risk scores, risk stratifications, and risk context will still be viewable on supported clinical interfaces.
- Caregivers will still be able to assess a patient's condition based on vital signs/ risk score data, and respond per facility protocol.
- Caregivers will still have access to the EMR to view charted data.

Action: If the problem persists, contact Hillrom Technical Support at 1-800-445-3720.

Caregivers

Caregiver alert fatigue.

- Vitals alert thresholds may be configured per patient to minimize false alerts.
- CSM/CVSM vitals alerts may be filtered and/or delayed, as necessary.
- Escalation procedures configured in alert communication manager will ensure ignored notifications are sent to multiple back-up caregivers.
- Alert manager settings can be configured to minimize vitals alert fatigue, as desired.

Contact assigned Clinical Specialist for assistance in configuring risk-based notification settings, as necessary.

Notification not created or processed correctly

Suggested workarounds:

- Caregivers will still be able to assess a patient's condition based on bed, vital signs, and EMR data, and respond per facility protocol.

Action: If the problem persists, contact Hillrom Technical Support at 1-800-445-3720.

Risk monitoring does not respond to resume command, which prevents system notifications

Suggested workarounds:

- Caregivers will still be able to assess a patient's condition based on bed, vital signs, and EMR data, and respond per facility protocol.

Action: If the problem persists, contact Hillrom Technical Support at 1-800-445-3720.

Patient Data

Miscalculation of incoming data causes erroneous risk monitoring, clinical decision support, and data transmission to clinical interfaces

Suggested workarounds:

- Erroneous data may be detected by comparing displayed data on connected clinical interfaces with data on supported vital signs monitors (e.g., vital signs, risk scores), beds (e.g., patient weight, vitals, and bed safety status), and in the EMR.

Action: If the problem persists, contact Hillrom Technical Support at 1-800-445-3720.

Risk-Based Notifications

No display of bed/integrated contact-free continuous monitoring data on supported clinical interfaces due to a late ADT admission.

1. Admit patient via the ADT system.
2. Troubleshoot the ADT connection.
    - Late ADT admission is indicated on Status Board as a row without any patient identifier in the default "Patient" column, but with the patient icon colored green in the default "Rails" column of the Bed Status indicators.
    - Late ADT admission is indicated on Voalte mobile as a patient not being available to a given room, and no patient data being available.
    - Supported wireless beds will indicate that no patient is assigned to bed (patient-centric)(guidance provided in Help Center).
    - Proper nursing practice includes assessment and charting of patient vitals upon placing a patient in the bed.

If the ADT is still not properly processed by the system, contact Hillrom Technical Support at 1-800-445-3720.

Incorrect display of bed/integrated contact-free continuous monitoring device data on supported clinical interfaces because the previous patient is still assigned to the bed.

1. Admit patient via ADT system.
2. Troubleshoot the ADT connection.
    - Smart Device Connectivity Dashboard will display the previous patient assigned to the bed in that room.
    - Status Board will display the previous patient assigned to the bed in that room.
    - Voalte mobile will display the previous patient assigned to the bed in that room.

- Proper nursing practice includes assessment and charting of patient vitals upon placing a patient in the bed.
- Incorrect data display for a patient should prompt caregiver to contact appropriate hospital personnel to rectify the admit record.

If the ADT is still not properly processed by the system, contact Hillrom Technical Support at 1-800-445-3720.

Incorrect display of bed/integrated contact-free continuous monitoring data on supported clinical interfaces because another person has gotten into a patient's bed.

Remove other person from bed and ensure correct patient is returned to bed.

- Bed exit alarm will trigger, when set, due to a patient bed exit or sufficient weight change.
- The bed displays a message that only the patient should be placed in the bed, after a patient reset is performed on the bed.

No display of bed/integrated contact-free continuous monitoring device data on supported clinical interfaces because another person has gotten into bed with the patient.

Remove the other person from the bed.

- Bed exit alarm will trigger, when set, due to a sufficient weight change.
- The bed displays a message that only the patient should be placed in the bed, after a patient reset is performed on the bed.
- EarlySense will generate an "Unstable Signal" alert if EarlySense vitals cannot be measured/interpreted.

Notifications are not being sent to Alarm Manager.

1. Troubleshoot Alarm Manager connection.
    - Vital signs, risk scores, risk stratifications, and risk context will still be viewable on supported clinical interfaces.
    - Caregivers will still be able to assess a patient's condition based on vital signs/risk score data and respond per facility protocol.
    - Caregivers will still have access to the EMR to view charted data.
2. If notifications are still not being sent to Alarm Manager, contact Hillrom Technical Support at 1-800-445-3720.

Misconfiguration of measurement units and/or time zone causes erroneous data transmission to the EMR.

Contact Hillrom Technical Support at 1-800-445-3720.

- Data sent to EMR must still be confirmed by a caregiver before being charted in EMR.

- Erroneous data may be detected by comparing data in EMR to data displayed on connected clinical interfaces.

Measurement units of incoming data result in erroneous data display and/or ADT/EMR-based notifications on clinical interfaces.

Contact Hillrom Technical Support at 1-800-445-3720.

- The system is not intended to diagnose patients or replace clinical judgment

CFCM vitals from the bed displaying on Status Board or Voalte.

For Status Board:

If the columns are visible:

1. Scroll to the right (if available, they may be off screen).
    a. Click **Configure** and **Select Display** to customize this view.
2. Click **Configure** and select **Columns**.
    a. Scroll to the bottom of the list and select the columns to be added.
    b. If there are no options (for example, **MEWS**, **SIRS**, **HR**, **RR**), Hillrom Technical Support can provide further assistance.

For Voalte:

Hillrom Technical Support will need to assist with troubleshooting. Before calling, work with hospital IT to ensure that messages provided by the EMR system are successfully flowing into the Gateway. If there is no backlog/queue of messages, contact Hillrom Technical support at 1-800-445-3720.

Bed data and alerts no associated to a location.

1. For wired beds, plug the bed into the wall connector (ASBC) to associate it to the correct location. For wireless beds, use the bed user interface to assign the bed to the correct location.
    - Local alerting from bed and bed-integrated vitals (for example, EarlySense) will still be active.
    - Patient vitals data should still be displayed on supported beds, vital signs monitors, and in the EMR.
    - Data from sources other than beds would still be available for display on supported clinical interfaces.
2. In the event of any issues, contact Hillrom Technical support at 1-800-445-3720.

Bed data and alerts associated to incorrect location

1. For wired beds, plug the bed into the wall connector (ASBC) to associate it to the correct location. For wireless beds, use the bed user interface to assign the bed to the correct location.
    - Local alerting from bed and bed-integrated vitals (for example, EarlySense) will still be active.
    - Supported clinical interfaces would display bed location associations so that any beds associated to an incorrect location can be identified and correctly associated.
    - Incorrect location display for a bed should prompt caregiver to override its assigned location or correct the patient admit record.
2. In the event of any issues, contact Hillrom Technical Support at 1-800-445-3720.

Bed data not available for charting in EMR because of late ADT admission

1. Admit patient via ADT system.
2. Troubleshoot ADT connection.
    - Late ADT admission is indicated on NaviCare Status Board and Smart Device Connectivity Dashboard as a row without any patient identifier in the default "Patient" column, but with the patient icon colored green in the default "Rails" column of the Bed Status indicators.
    - Late ADT admission is indicated on Voalte mobile as a patient not being available to a given room, and no patient data being available.
    - Supported wireless beds will indicate that no patient is assigned to the bed.
    - Bed data may be manually charted in the EMR.
    - Proper nursing practice includes assessment and charting of patient vitals upon placing a patient in the bed.
3. If the ADT is still not properly processed by the system, contact Hillrom Technical Support at 1-800-445-3720.

Corrective Action: Admit patient via the ADT system.

Bed data not charted (for new patient) in EMR because previous patient is still assigned to bed.

1. Correct patient admit record via the ADT system.
2. Troubleshoot ADT connection.
    - NaviCare Status Board will display previous patient assigned to the bed in that room
    - Voalte mobile will display previous patient assigned to the bed in that room
    - Smart Device Connectivity Dashboard will display previous patient assigned to the bed in that room
    - Bed data may be manually charted in the EMR

- Proper nursing practice includes assessment and charting of patient vitals upon placing a patient in the bed
- Incorrect data display for a patient should prompt caregiver to contact appropriate hospital personnel to rectify the admit record

3. If the ADT is still not properly processed by the system, contact Hillrom Technical Support at 1-800-445-3720.

Incorrect bed data charted (for previous patient) in EMR because previous patient is still assigned to bed

1. Correct patient admit record via ADT system.
2. Troubleshoot ADT connection.
    - Smart Device Connectivity Dashboard will display previous patient assigned to the bed in that room.
    - NaviCare Status Board will display previous patient assigned to the bed in that room.
    - Voalte mobile will display previous patient assigned to the bed in that room.
    - Incorrect data display for a patient should prompt caregiver to contact appropriate hospital personnel to rectify the admit record.
3. If the ADT is still not properly processed by the system, contact Hillrom Technical Support at 1-800-445-3720.

Incorrect bed data charted in EMR because another person gets in bed.

1. Remove other person from bed and ensure correct patient is returned to bed.
    - Bed exit alarm will trigger, when set, due to a patient bed exit or sufficient weight change.
    - The bed displays a message that only the patient should be placed in the bed after a patient reset is performed on the bed.
    - Local device alert settings may trigger an alert when a different person is in the bed and prompt caregiver attention.
    - Vitals displayed on NaviCare Status Board, Digital Health Gateway Dashboard, and/or Voalte mobile for person in bed may be different enough from those of assigned patient to draw caregiver attention.

Bed data not charted in EMR because another person gets in bed with patient

1. Remove other person from the bed.
    - NaviCare Status Board, Smart Device Connectivity Dashboard, and Voalte mobile will visually indicate when patient data is not available, which may prompt caregiver to check on the patient.
    - Bed exit alarm will trigger, when set, due to a sufficient weight change.
    - The bed displays a message that only the patient should be placed in the bed after a patient reset is performed on the bed.

- EarlySense will generate an "Unstable Signal" alert if EarlySense vitals cannot be measured/interpreted.

Caregivers not aware of stale or outdated data

1. Contact assigned Clinical Specialist for assistance in configuring stale data settings as necessary.
    - Stale vitals data may be removed from display on NaviCare Status Board and Smart Device Connectivity as configured.
    - Voalte mobile devices display a visual indication of staleness and time stamp indicating when the data was received.
    - Alerts and notifications will still be sent to communicate patients' current clinical status based on the data available.
    - Time stamped patient vitals data should still be displayed on supported vital signs monitors and in the EMR.

Smart Device Connectivity Dashboard unable to access or display patient/bed data

1. Troubleshoot data displaying on Dashboard.
    - Smart Device Connectivity Dashboard will display an indication of connection status so that clinicians are aware of when it has become disconnected and is not receiving updates.
    - Patient vitals data should still be displayed on supported beds, vital signs monitors, and in the EMR.
    - Patient data will still be available for display on other supported clinical interfaces.
2. If you are still unable to display patient/bed data on the Dashboard, contact Hillrom Technical Support at 1-800-445-3720.

Unable to Access Smart Device Connectivity Dashboard

1. Troubleshoot Dashboard access.
    - Patient vitals data should still be displayed on supported beds, vital signs monitors, and in the EMR.
    - Patient data will still be available for display on other supported clinical interfaces.
2. If you are still unable to access the Dashboard, contact Hillrom Technical Support at 1-800-445-3720.

Reporting feature unable to access or display patient/bed data

1. Contact Hillrom Technical support at 1-800-445-3720.
    - Patient vitals data should still be displayed in the EMR.

Unable to access the Reporting feature

1. Troubleshoot Reporting access.
    - Patient vitals data should still be displayed in the EMR.
2. If you are still unable to access Reporting, contact Hillrom Technical Support at 1-800-445-3720.

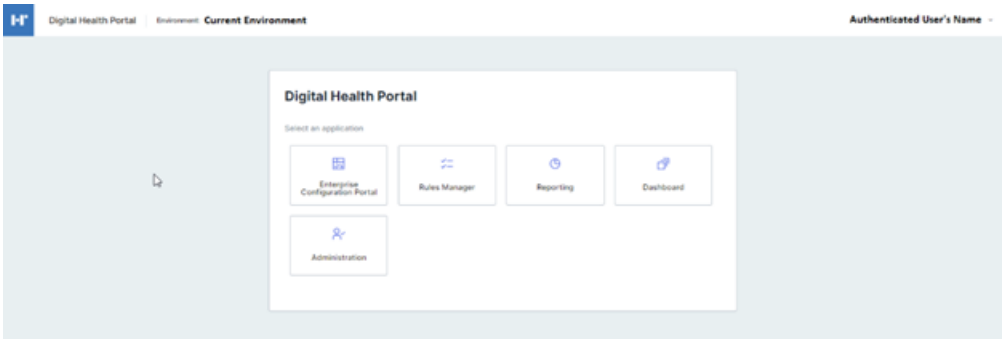
Chapter 2. Customer Digital Health Portal User Guide

The sections below outline the various applications and tools available to users of the Digital Health Platform.

The Digital Health Portal

The **Digital Health Portal** page enables you to launch all Digital Health Platform applications that you are authorized to access. If you are not authorized to access an application, you cannot launch it from this page.

If an application requires an *entity context*, you can only launch that application within the context of an entity that you have access to. Additionally, you must select a specific entity (or bring it into context) when launching the application.



Environment

This is the Digital Health Platform environment you are interacting with. The Digital Health Platform offers a Sandbox environment, in addition to a Production environment. The Sandbox environment offers you the ability to interact with the system in a testing/verification capacity. When possible, you should use the Sandbox environment to integrate your own test environments with the Digital Heath Platform

and to fully test and validate all components that you intend to use in Production, using software configurations that are as close to what will be used in Production as possible.

Authenticated User's Name

The Digital Health Portal displays the name of the current authenticated user in the top right corner. Clicking the user's name displays a menu a **Logout** option. Clicking **Logout** closes all launched applications, logs you out of the Digital Health Portal, and redirects you to the Digital Health Portal login page.

Enterprise Configuration Portal

The Digital Health Portal displays this icon, which enables you to launch the Enterprise Configuration Portal application. The Enterprise Configuration Portal does not require an entity context and enables you to perform the following:

- Entity Management - Manage Enterprise hierarchies
- Role Management - Manage Single Sign On (SSO) access to the Digital Health Platform
- Connection Management - Manage Inbound Connections (the data flowing from an external software system into the Digital Health Platform) and Outbound Connections (the data flowing from the Digital Health Platform to an external software system)
- Troubleshooting - View transactions (messages and connection logs) associated with Inbound and Outbound connections in order to validate integrations with the Digital Health Platform
- Credential Management - Manage credentials used to authenticate components within the Digital Health Platform
- Certificate Management - Manage certificates used to secure Inbound and Outbound Connections

Rules Manager

Click the **Rules Manager** button to access the Rules Manager application. This application must be launched within the context of an **Enterprise** that has a **Patient Risk Surveillance outbound connection**. When you click **Rules Manager**, you will be presented with a list of Enterprises that have this type of connection. Select one of these Enterprises to launch the Rules Manager application.

Reporting

Click the **Reporting** button to launch the Reporting application. The Reporting application requires an Entity context and can be launched within the context of any given entity.

Dashboard

Click **Dashboard** to launch the Dashboard application. The Dashboard application does not require an entity context.

Administration

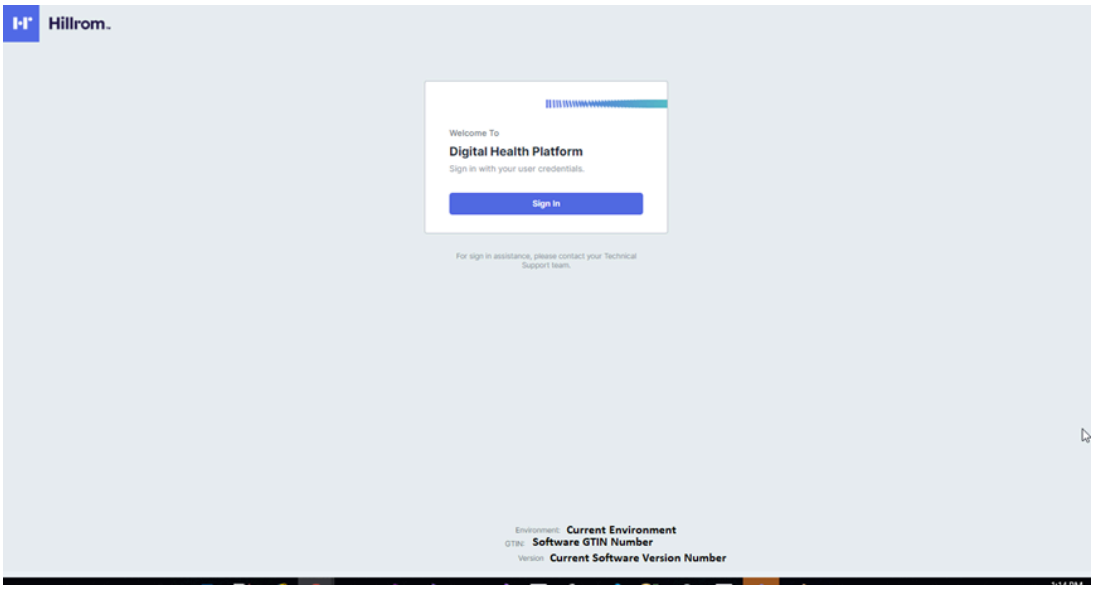
Click **Administration** to launch the Administration application. The Administration application does not require an entity context.

You can use the Administration application to:

- Export a given patient's data from the Digital Health Platform
- Delete a given patient's data from the Digital Health Platform
- Export a given entity's contacts from the Digital Health Platform

Logging into the Digital Health Portal

The Digital Health Platform enables you to authenticate using your organization's Single Sign On (SSO) provider.



Sign In

Clicking the **Sign In** button launches a **Microsoft Single Sign On (SSO)** pop-up window that enables you to authenticate with the Digital Health Platform using your organization's SSO provider. This will function *only* if your SSO provider has been configured within the Enterprise Configuration Portal.

Environment

This is the Digital Health Platform environment that you are interacting with. The Digital Health Platform offers a Sandbox in addition to a Production environment. The Sandbox environment offers you the ability to interact with the system in a testing/verification capacity. When possible, you should use the Sandbox environment to integrate your own test environments with the Digital Health

Platform to fully test and validate all components that you intend to use in Production, using software configurations that are as close to what you will use in Production as possible.

GTIN

The current Global Trade Identification Number associated with the software.

Version

The current version associated with the software.

Entity Selection

An **Entity** is the Digital Health Platform representation of a physical location or a logical grouping of physical locations within a user's organizational infrastructure.

The following **Entity Levels** can be established within the Digital Health Platform:

Enterprise

The top-level entity that represents a user's organizational infrastructure.

Region

Entities that represent regional delineations within an **Enterprise**.

Organization

Entities that represent organizational delineations within a **Region**.

Facility

Entities that represent physical locations in which patients receive care within an **Organization**.

Unit

Entities that represent a physical location in which patients receive targeted care within a **Facility**.

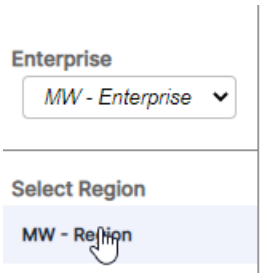
To execute tasks and perform workflows associated with a given entity, you must first bring an entity into context by selecting the entity that you want to interact with. The **Enterprise Configuration Portal** offers a navigational menu that enables you to select an entity to bring into context.

Enterprise Selection

If you have access to more than one Enterprise, you must first select the Enterprise that you want to bring into context to interact with. If you only have access to a single Enterprise, that Enterprise will be in context automatically.

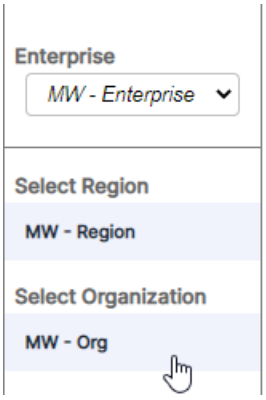
Region Selection

Once you bring an Enterprise into context, a list of Regions associated with that Enterprise are displayed within the navigational menu. Only Regions that you have access to are displayed. You can select the Region that you want to bring into context to interact with.



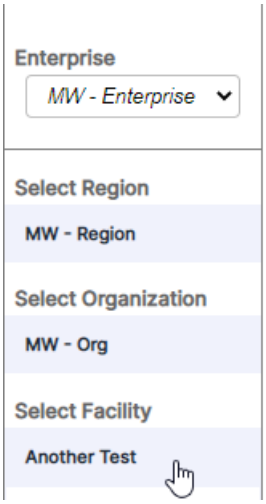
Organization Selection

Once you bring a Region into context, a list of Organizations associated with that Region is displayed within the navigational menu. Only Organizations that you have access to are displayed. You can select the Organization that you want to bring into context to interact with.



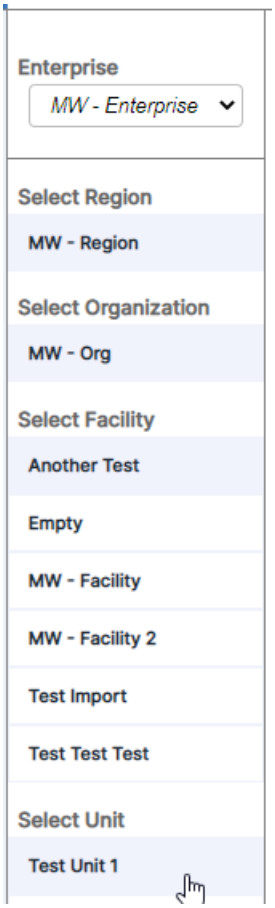
Facility Selection

Once you bring an Organization into context, a list of Facilities associated with that Organization is displayed within the navigational menu. Only Facilities that you have access to are displayed. You can then select a Facility to bring into context and interact with.



Unit Selection

After you bring a Facility into context, a list of Units associated with that Facility is displayed within the navigational menu. Only Units that you have access to are displayed. You can then select a Unit to bring into context and interact with.

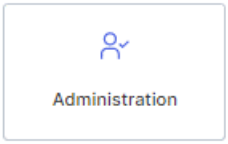


Breadcrumb Navigation

As you navigate through entity selection, a breadcrumb menu is displayed. This menu enables you to navigate to a selected entity's parent entities. Clicking on an entity link within the breadcrumb menu brings that entity into context.

About Administration

Users who have access to the Administration Portal will see the **Administration** tile within the Digital Health Platform Portal when they log in.



The Administration Portal within the Digital Health Platform enables you to:

1. Export every **Entity Contact** within the Digital Health Platform.
2. Export every **Entity Contact** associated with a given **Entity Context** within the Digital Health Platform
3. Search for patients within a **Facility Entity Context**
4. Export patient data from a **Facility Entity Context**
5. Delete patient data from a **Facility Entity Context**

Dashboard

About Dashboard

The Dashboard is a web-based application that can be accessed via the Digital Health Portal. The Dashboard provides caregivers with the ability to monitor a facility's patients within the units that are configured to view.

The Dashboard loads the default view when rendered for the first time. It can be configured to display a different view, according to user preferences. The default view cannot be edited.

Authorized Dashboard users have the ability to:

- Configure the facility that the Dashboard is servicing.
- Configure the nursing units within the facility that will be displayed on the Dashboard.
- Configure the columns that will be displayed, as well as the names of the columns.
- Configure the options for scrolling, row count, and paging.
- Configure patient name masking.
- Remove data after an elapsed time period.
- Change the column size and order.
- Save the configuration as a view (the Dashboard supports multiple saved views).
- Utilize the same view across several dashboards within the facility.
- Edit, delete, and rename views.

The Dashboard display shows each room location with an associated wired or wireless bed, along with the following information:

- The patient name (with masking options applied).

- Patient-related data received, such as heart rate and respiratory rate.
- Bed status data, such as rails up/down, patient detect, and so forth.
- Risk scores and stratifications.
- Contact-free Continuous Monitoring data and vitals alert status.

The Dashboard supports interactive and non-interactive user sessions with a timeout counter displayed when the session is nearing an end. A non-interactive user session supports the need to display the Dashboard for an extended period, up to 90 days, with little to no user interaction, such as in a hallway or above a nursing unit. An interactive user session, on the other hand, expires in one hour.

Dashboard access is configured in the User Roles section of the Enterprise Configuration Portal (ECP). Users can be provided the following access rights:

- Read-only users can access, view, and configure only the local browser Dashboard view.
- Configuration Admin users can access, view, and configure local and global Dashboard views. Global Dashboard views can be seen by every Dashboard within the Facility.
- Administrators can access, view, and configure the Dashboard for the local browser view and can also globally publish their edited views to Dashboard instances within the same facility, displaying the same view.

Dashboard Supported Data

Dashboard Data

The **Dashboard** displays the following types of supported data.

- Data from supported Hillrom beds (both wired and wireless) that are associated with a location. Supported bed data includes, but is not limited to:
    - Rail Positioning
    - Bed Low
    - Brake Status
    - Patient detected
    - Bed Service Required
    - Bed Connection Status
    - Head of Bed (HOB) Angle
    - Bed Patient Position Monitoring (Bed Exit Mode and Status combinations)
- Location-related data for a Facility's active bed locations, enabling users to view locations that their electronic medical record (EMR) application indicates as available for patient admissions. Location-related data includes:
    - Facility
    - Unit
    - Room
    - Bed
- Patient Name with several display and masking options. These options include:
    - HIPAA encoded (for example, **Ja..eD** for Jane Doe). This is the default option.

    - First Name Last Initial (**Jane D**)
    - Last Name First Initial (**Doe J**)
    - Last Name Only (**Doe**)
    - Last Name, First Name (**Doe, Jane**)
    - Full Name (**Jane Michelle Doe**)
- Contact-Free Continuous Monitoring active alert statuses including, but not limited to:
    - Low/high heart rate
    - Low/high respiratory rate
    - Alert statuses that indicate an active alert (active, alerting)

Note: Active alert statuses are displayed until the alert status is cleared or the device is disconnected from Smart Device Connectivity.

- Patient physiological data, including, but not limited to:
    - Heart rate (from the EMR, vitals monitors, and contact-free devices)
    - Respiratory rate (from the EMR, vitals monitors, and contact-free devices)
    - Temperature (from EMR, vitals monitors)
    - Blood pressure (from EMR, vitals monitors)
    - SpO2 (from EMR, vitals monitors)
    - Pain Score on a scale of 1-10 (from EMR, vitals monitors)
    - Weight (from EMR, vitals monitor, and beds)
- Risks (from the EMR) and Early Warning Risk Scores (from EMR or Clinical Vectors) including, but not limited to:
    - MEWS and stratification
    - SIRS and stratification
    - Falls risk
    - Pulmonary risk
    - Skin risk

The **Dashboard** displays patient deterioration risk stratifications, when available, that are color-coded (red for high risk, yellow for medium risk, and white for low risk).

Dashboard Display Behavior

Dashboard display

The **Dashboard** displays information for selected nursing units in the columns of the grid, sorted by nursing unit and room. The **Dashboard** refreshes often so that the most current data is always available. Data is presented as text and icons within the grid.

You can use the **Display** tab on **Settings** to configure settings for the **Dashboard** page display.

Unit Census

The **Dashboard** displays all rooms within the selected unit.

Patient Risks

The **Dashboard** displays risks that are assigned to a patient display in the **Risks** column. There are three risks icons: Falls ( ), Pulmonary ( ), and Skin ( ).

The **Dashboard** also displays Early Warning Risk Scores in the **MEWS** (Modified Early Warning Score) and **SIRS** (Systemic Inflammatory Response Syndrome) columns. High scores are displayed with a red background.

Bed Status

When a room contains multiple beds, **Dashboard** displays as many rows for the room as there are bed designators.

- **Bed Rails** -  indicates whether a patient is detected in the bed and the state of the bed rails. Rail positioning is only available when compatible Hillrom beds are connected.

  The four rounded rectangles around the icon represent head and foot rails on the left and right sides of the bed.

  - When a rail is in the UP position, the rail icon is green ( ).
  - When a rail is in the DOWN position, the rail icon is yellow with a downward arrow ( ).
  - Gray rails ( ) indicate that the state of the rails is unknown. Some beds can only indicate that one or more head or foot rail is down, which is indicated by a combination of a gray and yellow down rail icon.
- **Patient Detection** is available with compatible, connected Hillrom beds.
  - indicates that a patient is detected in the bed.
  - indicates that the patient is out of the bed.
  - indicates that patient detection is unknown.
- **Bed Exit** - When the bed exit alarm is set (armed), the icon is a solid green check. When the bed exit alarm is off or silenced (not armed), the icon is a yellow "X". When the bed exit alarm is going off, a red triangle alert icon is displayed.
- **Bed Low** - When the bed is set to the LOW position, the icon is a solid green check. When the bed is not set to the LOW position or is set to chair height, the icon is a yellow "X".
- **Brake On** - When the bed brake is ON, the icon is a solid green check. When the bed brake is OFF, the icon is a yellow "X".
- **Head of Bed (HOB)** - Displays the actual head of bed angle for connected, compatible Hill-Rom beds.

CAUTION: Bed data displayed on the **Dashboard** should not be used for critical patient decision-making.

Table 1. Bed Status Icons

	Bed Status Alerting
	Bed Status OK
	Bed Status Warning
	Bed Exit Alarming

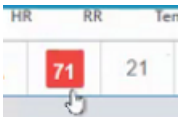
CAUTION: Bed data displayed on the **Dashboard** should not be used for critical patient decision-making.

Contact-Free Continuous Monitoring Data and Alerts

The Dashboard displays Contact-Free Continuous Monitoring active alarm statuses. Alarm statuses include, but are not limited to:

- Low/High Heart Rate
- Low/High Respiratory Rate

Low/high heart rates and low/high respiratory rates are indicated by a red background in the **HR** and **RR** columns of the **Dashboard**. For example:



Active alarm statuses are displayed on the **Dashboard** until either the alarm status is cleared or the device becomes disconnected from Smart Device Connectivity.

Patient Physiological Data

The **Dashboard** displays the following physiological data for each patient, including, but not limited to:

- Heart Rate (for example, from the Electronic Medical Record (EMR) application, vitals monitors, contact-free devices)
- Respiratory Rate (for example, from the EMR, vitals monitors, contact-free devices)
- Temperature (from the EMR and vitals monitors)
- Blood Pressure (from the EMR and vitals monitors)

- SpO2 (from the EMR and vitals monitors)
- Pain Score (1-10) (from the EMR and vitals monitors)
- Weight (from the EMR, vitals monitor, beds)

Dashboard Configuration Overview

Dashboard settings, including the configuration of nursing units, column display and filters are accessed from the **Settings** menu.

These settings are specific to each browser on a computer workstation. This means you can save different settings for **Dashboard** by opening it in a new browser on the same workstation. You can have two different **Dashboard** displays, for instance. One in Google Chrome and one in Microsoft Internet Explorer.

Dashboard Views

Dashboard views are defined as the full set of configuration settings used to display the **Dashboard**. These settings include the columns selected for display, column sizing, and all other display settings.

You can create, save, edit, and delete custom views for your hospital or units. Views are globally accessible to anyone who has access to **Dashboard**. Please note that views do not store the selected nursing units.

You may be required to log in to **Dashboard** when you make changes to nursing units or other configurations. If this is the case, you will be prompted to log in using your network username and password when you choose to save your changes.

Click  to select and edit a view. The exclamation mark next to this icon indicates that there are pending, unsaved changes to a view.

Custom Views

To help save time during configuration, **Dashboard** enables you to edit views that are being used by other dashboards. To modify an existing view, select a default or existing view to modify. Make your configuration changes, and click **Save As** to enter a new name for the view. **Save As** lets you keep the original view and create a new custom view using a new name.

Central Management of Dashboard Views

To customize settings for a view that is currently in use by other dashboards, select the view that you want to modify. Next, make your changes to the selected view and click **Save**. Users who are using the view while you are making changes will see the unsaved changes view icon () on their **Dashboard**. The next time they load the **Dashboard**, they will see the updated view.

Default Views

When a new instance of **Dashboard** is selected (that does not have any local settings saved), the Hillrom default view is displayed. These default views are read-only and cannot be deleted. You can, however, edit a default view locally and save it as a new view.

Saved Views

When you click **Save** for a view, all of the current configuration settings are saved, except for the unit, as part of that view. If you click **Save** but are not using the latest version of the view, an error message is displayed. This message notifies you that the application is unable to save the view because you are not using the latest version. You can either click **Save As** to create a new view with the settings you selected, or revert your changes to discard your edits and begin again using the latest version of the view.

You must enter a unique name when you use **Save As** to save a new view.

In the rare instance where more than one user is concurrently editing the same view, upon save, the other users currently editing the same view are notified that the view has been changed. Those users can then reload the view to modify the latest version, or save their changes as a new view.

Dashboard Settings

Clicking  in the top right of the **Dashboard** displays the **Settings** menu.

Settings menu

The **Settings** menu is used to do the following:

- Click **Adjust Columns** to adjust the columns on **Dashboard**.
- Click **Configuration** to configure settings such as nursing units, which columns to display, and the overall display of the **Dashboard**.
- Click **Help Center** to access the Help Center, where you can view the Smart Device Connectivity Dashboard documentation, as well as other documentation on other topics.
- Launch the non-interactive **Dashboard**
- Configure dynamic columns

Clicking **Configuration**, displays the **Configuration Settings** page. This page can be used to configure the following items:

Nursing Unit Settings

The **Nursing Units** tab is used to select or change the units displayed on **Dashboard**. These settings are retained for each browser on a workstation (Google Chrome or Internet Explorer). This ensures that users will see only information that is relevant to them each time they view the **Dashboard**.

Column Settings

The **Columns** tab is used to choose the columns that are displayed on **Dashboard**. A list of all possible columns that can be displayed on **Dashboard** can be found in the *Dashboard columns* section of this document.

Users can add up to eight custom staff columns to the **Dashboard**. Custom staff columns include the custom column heading, which is required, and up to two roles. Optionally, users can add the located icon, title, and wireless extension for the staff member. Custom staff columns can be deleted, or the user can clear the check box next to them so that they do not display on the **Dashboard**.

Staff members and their roles and assignments can be interfaced from the electronic medical record (EMR) application. Contact Hillrom Technical Support for assistance.

Display Settings

The **Display** tab is used to configure settings for the **Dashboard** display. These settings can include the following.

Text Size

Used to select the text size for the main grid. Available options are **Regular**, **Large**, and **Extra Large**.

Page Display

Used to select the **Scrolling list** option to add a scrollbar to the right side of the **Dashboard** when there are too many rooms to display on the page at once.

The **Auto-rotate every** option automatically switches between "pages" of the **Dashboard** locations when a user has more locations selected than can be displayed on a single page. This option should only be used when a user has no more than three pages of locations.

Patient Name Display

Used to select the type of patient name display format to use. Users should be sure to use their hospital's policies regarding where and how to show patient names and other information.

Dashboard Columns

The following columns can be configured to display on the **Dashboard**.

Nursing Unit

Displays the name of the selected unit.

Room

Displays the room number and bed designator. If there is more than one bed in the room, the bed designator is displayed.

The **Bed Service Required** icon () can also be displayed in this column.

Patient

Displays the patient name. You can change the format of the patient name display in **Settings**.

Risks Icons

Displays the assigned safety risk icons. There are three risk icons.

- Falls: 
- Pulmonary: 
- Skin: 

Bed Rails/Bed Exit/Bed Low/Brake On/Head of Bed (HOB)

These columns display icons that indicate bed status information for compatible, connected Hillrom beds. A green check mark indicates optimal condition, a yellow X indicates a warning, a yellow triangle indicates a patient safety alert, and a red-filled triangle indicates a bed exit alarm. Click anywhere in the row to view the patient details window for more information about the bed state for a patient.

Dashboard Dynamic Columns

Dynamic column data is only displayed if the Digital Health Platform sends vitals data for the patient.

HR/RR

Displays the values for patient's heart rate and respiratory rate, captured by the EMR, vitals monitors, or contact-free continuous monitoring devices. High/low heart rate and respiratory rate values are displayed with a red background.

Temperature/Blood Pressure/SpO2/Pain Score

Displays the patient's vitals data, captured from the EMR or vitals monitors.

Weight

Displays the patient weight based on a weigh capture initiated either from the EMR, vitals monitor, or the bed.

MEWS/SIRS

Displays the (Modified Early Warning Score (**MEWS**) and Systemic Inflammatory Response Syndrome (**SIRS**) score for the patient. High scores are displayed with a red background.

Dashboard dynamic columns

Dynamic columns consist of patient vitals and risk score data. Vitals data may be provided by supported vitals devices or the EMR. Risk scores may be provided by the EMR or calculated within the Digital Health Platform by the Patient Risk Surveillance product.

Users can configure dynamic columns by clicking  and selecting **Dynamic Column Configuration**. The user can then select the radio button next to the column they want to configure and click **Edit** to open the **Edit Dynamic Column** page. This page contains the following fields:

Column Name

The column heading as it is displayed on **Dashboard**.

Description

Describes the data element displayed within the Dynamic Column Configuration.

CDR Description

The Clinical Data Repository code and description. CDR Description options include, but are not limited to:

- Heart Rate
- Respiratory Rate
- Temp
- SpO2
- Blood Pressure
- Pain Score
- Weight
- MEWS score
- SIRS score

Data Source URL

The API endpoint that provides the dynamic column data. The information entered for **Data Source URL** should not contain a suffix (for example, `.com` or `.net`), or a `www.` prefix. However, it should contain a protocol string, such as `http://` or `https://`.

Value Map Math

The JSON path that contains the value of each element.

Interpretation Map Path

The JSON path that contains the risk stratification/status of each data element, when it is defined.

Visible to Dashboard users

Determines whether the column is visible to **Dashboard** users.

Data Type

The data type for the dynamic column. The **Data Type** can be one of the following:

- **Data Field**: Displays a raw value, if applicable.
- **Early Warning Score**: Displays a value with a background color for the associated risk stratification, or without a background color if the risk stratification is low or unavailable.
- **Score with Total**: Displays a numerical value, including a denominator provided by CDR, with a background color for the associated risk status, or without a background color if the risk status is low or unavailable.

Data Remove After

Determines the length of time after which the data in the dynamic column will be removed. Users can select a minutes interval (for example, **5**, **15**, **30**) or an hours interval (for example, **1**, **8**, **24**).

Reporting

About Reporting

The Reporting application within the Digital Health Platform provides you with the ability to generate reports based on patient and device data. You can use this data to analyze your patient population and help identify areas for staff and facility improvements. Users can generate reports that cover patient deterioration, sepsis, and contact-free continuous monitoring. These reports can also assist with patient monitoring, caregiver protocol adherence, investigation into patient deterioration. Additionally, they can be used to gain insights into improving patient management and care.

Note: The Smart Device Connectivity Reporting feature is currently only available in the US.

Use the Reporting system to generate a standard set of reports. These reports can contain protected health information (PHI) and access to them is configured via the Enterprise Configuration Portal User Roles sections. Users who have permissions to generate reports containing PHI can view all available reports (both those that contain PHI and those that do not). Users without PHI permission will only be able to generate reports that do not contain PHI.

Standard reports that do contain PHI include:

Early Warning Scores – Patient View

Includes patient demographics, admission details, location history, patient scores, and clinical parameters used in score calculations, as well as a time line of events during the patient's stay and severe sepsis details, if the patient was identified as having severe sepsis.

Early Warning Scores

Provides insights which include patient deterioration metrics, score statistics and comparisons, and regression analysis between sepsis risk factors and average scores.

Contact Free Continuous Monitoring – Patient View

Includes patient demographics, admission details, location history, vitals averages (both daily and hourly) and standard deviations, observed vitals, and alerts.

Contact Free Continuous Monitoring – Insights

Includes devices metrics by device type for heart rate and respiratory rate, including the number of observations, minimum and maximum observation values, and the number of minutes between observed values.

Contact Free Continuous Monitoring – Sensor Expiration and Alerts

Includes sensors that expired between a selected start and end date, or sensors that expire within 30 days of the current date.

Standard reports that do not contain PHI, include:

Sepsis Insights

For tracking compliance with a facility's severe sepsis prevention protocol. This report includes patient demographics, patients treated with antibiotics, severity of sepsis, outcome (discharge or death), patients having pathogens, outcome trends (mortality vs. discharge), and the overall length of stay.

Sepsis Bundle Compliance

For tracking compliance with a facility's severe sepsis prevention protocol. This report includes the percentage of sepsis bundle tasks completed, the percentage completed on time, 3-hour bundles completed on time, and 6-hour bundles completed on time. This data is delivered across locations within a customer's hierarchy over time periods. The average number of minutes from sepsis onset to 3 and 6-hour bundle completion times is also included.

The **Reporting** system uses defined criteria to determine Sepsis Onset Time, Septic Shock Onset Time, and Sepsis Bundle Compliance. Refer to the following sections for additional details:

- Sepsis Onset Time Criteria *(on page 62)*
- Septic Shock Onset Time Criteria *(on page 63)*
- Sepsis Bundle Compliance Criteria *(on page 64)*

Important: Reporting times are displayed in Coordinated Universal Time (UTC), not local time.

Reporting Browser Recommendations

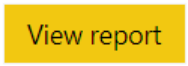
We recommend the following browsers for viewing reports:

- Google Chrome version 76 or higher
- Microsoft Internet Explorer version 11 or higher

- Microsoft Edge Browser version 84 or higher (excluding the Dashboard)

Note: The Smart Device Connectivity Reporting feature is currently only available in the US.

Reporting Controls



Generates the report using the selected parameters.

Shows or hides the **Parameters** controls for the selected report. These parameters can include the entity the user wants to use, the start and end dates for the report, and so forth.

Expands the filters for the selected report, if applicable.

File

Displays the **Print** option, which enables the user to print the current report.

View

Changes the report view and page settings for the report.

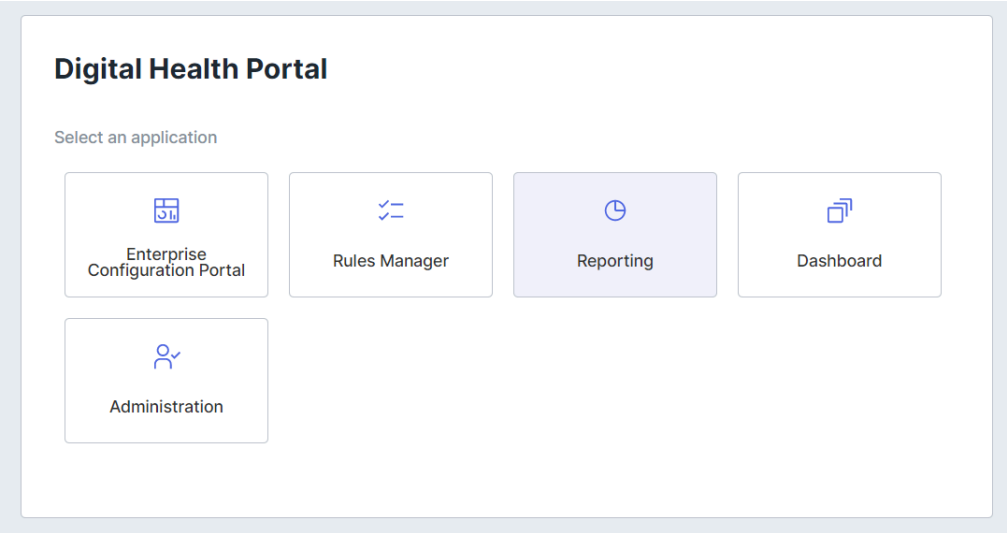
Export

Displays a list of formats and programs into which you can export the report. These options include, but are not limited to, **Microsoft Excel**, **PDF**, **Microsoft PowerPoint**, **Microsoft Word**. and **XML**

Generating and Printing Reports

Please note that the Smart Device Connectivity Reporting feature is currently only available to customers in the US.

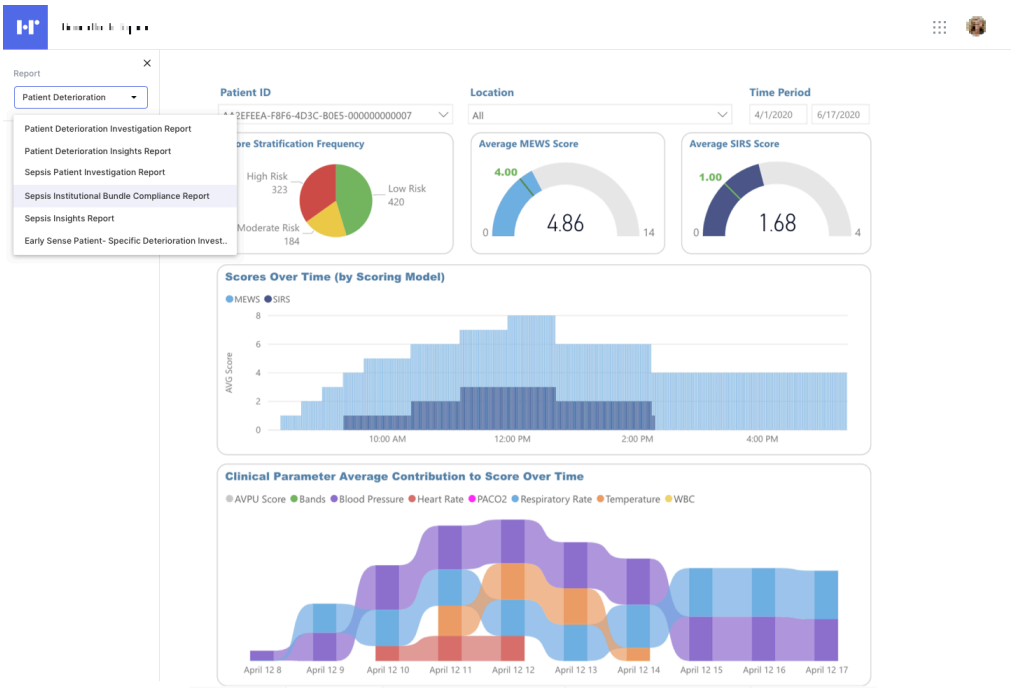
1. First, log into the Digital Health Portal.
2. Click the **Reporting** application tile.



3. Next, select the Enterprise, Region, Organization, Facility, and/or Unit for which you want to view reports, and then click **Launch**.
4. In the drop-down list on the left, select a report to view.

   Only reports that you have permissions to view are displayed in this list. The names of the reports that are displayed are defined in your Enterprise's software requirements.
5. Select the applicable report parameters in the **Parameters** section of the page, if applicable, and then click **View Report**.

   The report is displayed according to the parameters you select.



6. **Optional:** You can take several actions once you generate a report.
   - To print a report click **File > Print**.
   - To change the view or page settings for the report that is currently displayed, click **View**.
   - To export the report to a different format or program, click **Export** and choose one of the options from the list.

Understanding Report Parameters

Report parameters enable users to filter the data returned in the report to what is most relevant to their needs.

Cascading

Many of the parameters in the reports are *"cascading"*, meaning that the parameter is dependent on the selection of the previous parameter to filter the available list of values. For example, when a user opens the **Contact Free Continuous Monitoring – Sensor Expiration and Alerts** report, they must select an **Entity Type** before they can select an **Entity**. Only entities that match the entity type the user selects will be displayed.

Parameter Saving

The reports are semi-intelligent in that they will remember the parameters that the user last selected for a report the next time they open that report. This prevents the need to re-enter all of the parameters each time a user opens a report.

Reporting Data Retention: PHI vs. Non-PHI

Data retention and protected health information (PHI) inclusion vary by tenant based on the combination of the following two permissions:

- Reporting permission: Indicates that data can be stored and reported on with PHI intact until that data has reached its reporting retention period.

  Note that the reporting retention period is specified in the tenant catalog.

  - The default is 365 days for Patient Risk Surveillance customers granting reporting permission.
  - The default is 90 days for non-Patient Risk Surveillance customers granting reporting permission.
- Long Term Storage Permission: Indicates that the data can be stored and reported on for any duration of time, with the restriction that the data is de-identified.

Note: Written requests for a patient's data to be purged will result in the patient data being removed, regardless of any permissions or retention configuration.

Regardless of the permissions granted, patient contextual data will not be retained beyond 5 years of the context coming to a close (meaning, the Encounter discharge date or the Episode of Care end date). Patient contextual data includes, but is not limited to, the following Fast Healthcare Interoperability Resources (FHIR) entities that reference an Encounter or Episode of Care.

- Care Team
- Communication
- Condition
- MedicationRequest
- MedicationAdministration
- Observation
- Procedure
- ProcedureRequest
- Encounter
- EpisodeOfCare

Regardless of the permissions granted, patient non-contextual data will not be retained beyond 5 years of its last modified time. Patient non-contextual data includes, but is not limited to, the following FHIR entities:

- Device
- Patient
- Any of the FHIR entities listed under patient contextual data that reference the patient, but have no context when populated.

Sepsis Onset Time Criteria

The Reporting system uses the following criteria to define a time, referred to as Sepsis Onset Time (Time Zero), that shall denote when a patient is suspected of having become Septic. This supports the Sepsis Bundle Compliance report.

Sepsis Time Zero is identified as follows:

- Sepsis Diagnosed Condition onset date, if present
- If the Sepsis Diagnosed Condition onset date is not present, the earliest of the following dates is used:
    - Sepsis Diagnosed Condition first appearance of system last modified date
    - The latest date among the Sepsis Criteria that identified the condition
        - Suspicion of Infection indicated by any of the following:
            - A Suspicion of infection Diagnosed Condition (onset date when present, otherwise first appearance of system last modified date)
            - A Suspicion of infection Observation (effective start date when present, otherwise issued date)
            - Medication Request administered for an infection (authored date when present, otherwise system last modified date)
            - Medication Administration for an infection (effective start date when present, otherwise system last modified date)
        - Observation effective date (or issued date if effective date is not present) of the last Observation that identified Severe Sepsis presence

Context Sepsis Time Zero will be used in determining the time frame for both Sepsis and Severe Sepsis bundle compliance.

Sepsis Criteria, identified as follows:

- Sepsis Condition Diagnosed
- OR, all of the below documented within 6 hours of each other.
    - Suspicion of Infection indicated by any of the following:
        - A Suspicion of infection Diagnosed Condition (onset date when present, otherwise first appearance of system last modified date)
        - A Suspicion of infection Observation (effective start date when present, otherwise issued date)
        - Medication Request administered for an infection (authored date when present, otherwise system last modified date)
        - Medication Administration for an infection (effective start date when present, otherwise system last modified date)
    - Two SIRS criteria met within three hours of each other, where the later date falls within the 6 hour time period for identification (Observation effective date, or issued date if effective date is not present):
        - Temperature > 38 or < 36 degrees Celsius
        - Heart rate > 90 beats per minute
        - Respiratory Rate > 20 breaths per minute or PACO2 < 32 mmHg

        - White Blood Cell count > 12,000 or < 4000 mm3 or Bands > 10%
    - Organ dysfunction evidenced by any one of the following Observations (observation effective date, or issued date if effective date is not present):
        - Systolic blood pressure < 90 mmHg
        - NIBP_MAP < 65 mmHg
        - Creatinine > 2.0 mg/dL
        - Total bilirubin > 2mg/dL
        - Platelet count < 100,000 mm3
        - INR > 1.5
        - PTT > 60 seconds
        - Lactate > 2.0 mmol/L

Medication Requested or Administered for an infection could include, but is not limited to, broad-spectrum antibiotic or crystalloid fluid.

Note: The values above can be nested values within an observation such as a blood pressure panel containing a systolic or diastolic pressure, or an acid panel containing a lactate reading.

Septic Shock Onset Time Criteria

The Reporting system uses the following criteria to define a time, referred to as Septic Shock Onset Time (also known as Time Zero), that denotes when a patient is suspected of having Septic Shock, to support Sepsis bundle compliance reporting.

Septic Shock Time Zero is identified as follows:

- Septic Shock Diagnosed Condition onset date, if present.
- If the Septic Shock Diagnosed Condition onset date is not present, the earliest of the following dates is used:
    - Septic Shock Diagnosed Condition first appearance using the system last modified date.
    - The latest date among the Septic Shock Criteria that identified the condition (only identified when the Lactate occurred, up to 6 hours before Severe Sepsis Time Zero, or anytime afterward in the active encounter).
        - Severe Sepsis Time Zero (refer to the previous section, *Sepsis Onset Time Criteria*.
        - Lactate greater than or equal to 4.0 mmol/L (observation effective date, or issued date if effective date is not present).

Note: A patient without a Septic Shock diagnosis could have a lactate level greater than or equal to 4 every 4 hours for a 12 hour period without having satisfied the Severe Sepsis criteria. This patient would not be considered to be in Septic Shock. If the patient satisfies the Severe Sepsis Criteria at hour 10, then the lactate reading at hour 8 (the second reading) should be used to determine Septic Shock Time Zero.

Sepsis Bundle Compliance Criteria

The Reporting system uses the following Sepsis bundle tasks to determine Sepsis bundle compliance, in order to support Sepsis bundle compliance reporting.

Sepsis 3-Hour Bundle Compliance

- Initial lactate measured within 6 hours prior to Sepsis Onset time to 3 hours after the Sepsis Onset Time.
- Blood cultures obtained prior to antibiotic administration up to 48 hours prior or 3 hours after Sepsis Onset Time.
- Broad-spectrum antibiotic administration started up to 24 hours prior or 3 hours after Sepsis Onset Time.
- Initial crystalloid fluid administration started within 3 hours of Septic Shock Onset Time.

Sepsis 6-Hour Bundle Compliance

- Compliance with the 3-Hour bundle compliance activities.
- Repeated Lactate Acid measurement if initial lactate level was elevated (greater than 2.0 mmol/L) after initial measurement and within 6 hours of Sepsis Onset Time.
    - If the lactate acid measurement is not elevated, then re-evaluation is not required and is indicated as compliant.

Standard Reports

This section provides a description of all available reports.

Standard Reports with PHI

Standard reports that include protected health information (PHI) are described in this section.

The standard reports with PHI contain a very detailed level of data, often specific to a particular patient or device. While some data is aggregated within these reports, often the lowest level of detail is available (for example, every Alert sent, every Heart Rate observed). Many of the elements included within these reports (such as tables) need to auto-expand to accommodate a variable amount of data. To best meet these needs, the technology chosen for implementation of these reports is Power BI Paginated Reports.

Power BI Paginated Reports are designed to be *“pixel perfect”*, printing and exporting in a user-friendly and aesthetically pleasing manner. These reports use a live data connection to the underlying data source (Azure Synapse Analytics) to return the required information in real time when the report is run.

Contact Free Continuous Monitoring - Patient View Report

The **Contact Free Continuous Monitoring - Patient View** report includes metrics and alerts sent from Contact Free Continuous Monitoring devices. This report also contains an **Alert Summary Table** that displays the number of alerts for each alert type.

Report Details

Individual alerts are displayed in a tabular format, sorted by **Alert Start Date/Time** and include:

- Alert Start Date/Time
- Alert End Date/Time
- Alert Type

The following metrics for the selected time period within the selected encounter are displayed in this report:

- Daily average +/- standard deviation of patient heart rate and respiratory rate
- Hourly average +/- standard deviation of patient heart rate and respiratory rate

In addition, the **Contact Free Continuous Monitoring - Patient View** report includes patient demographic data, admission details, patient location history, and observed vital signs (including heart rate values and respiratory rate, with optional moving average matching configured using the **Moving Avg # Periods** parameter).

Report Parameters

The parameters for the **Contact Free Continuous Monitoring - Patient View** report are as follows:

Facility	Select the Facility to filter the report by.
Patient MRN	Select the patient MRN for whom you want to view the report.
Encounter	Select the encounter for which you want to view the report.
Report Start Time	Select the date and time for the beginning of the report. Please note that reporting times are displayed in Coordinated Universal Time (UTC), not local time.
Report End Time	Select the date and time for the end of the report. Note that reporting times are displayed in Coordinated Universal Time (UTC), not local time.

Moving Avg # Periods	Select one of the following values: **15**, **30**, **60**, **120**.

Navigating the Contact Free Continuous Monitoring - Patient View Report

After you select the report parameters and click **View Report**, the following data is displayed.

Patient Demographics

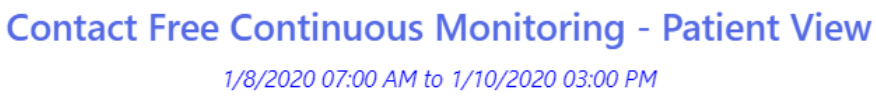
Displays all the details for the patient on which the report is based. This includes **Patient Name**, **MRN**, **Date of Birth**, **Age**, **Gender**, and so forth.

Admission Details

Displays the **Admission Date/Time** and the **Discharge Date/Time**.

The date and time at which the encounter started and ended are displayed under **Admission Details**, regardless of any selections the user makes for the **Report Start Time** and **Report End Time** parameters. In other words, modifying the default parameter dates affects the time frame for the report, but does not impact what is displayed in **Admission Details**.

The italic text under the report title indicates the time frame for the report content, such as vitals and alerts.



Location History

Displays the patient location history details for the selected encounter. These details are displayed in hierarchical format. For example **General Hospital → Main → Radiology → Room 101 → Bed A**.

The **Start Date/Time** (the time at which the patient was first brought to the location) and the **Location End Date/Time** (the time at which the patient left the location) are also displayed.

Daily and Hourly Averages ± Standard Deviations

This section of the report displays the daily and hourly average +/- standard deviation of the patient's heart rate and respiratory rate.

Daily and Hourly Averages ± Standard Deviations

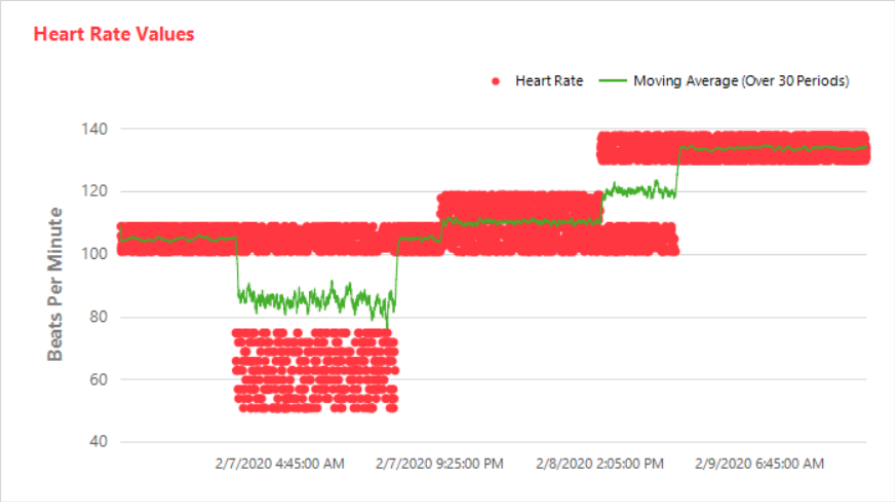
Date / Hour	RR [BR/min]	RR [BR/min]
⊞ 2020-01-03	98±26	11±7
⊞ 2020-01-04	80±25	10±6
⊞ 2020-01-05	79±22	14±7
⊞ 2020-01-06	82±24	11±6
⊞ 2020-01-07	83±26	11±7
⊞ 2020-01-08	83±25	14±8
⊞ 2020-01-09	84±25	11±6
⊞ 2020-01-10	73±21	13±7
⊞ 2020-01-11	83±28	11±7
⊞ 2020-01-12	82±26	15±9
⊞ 2020-01-13	74±27	12±6

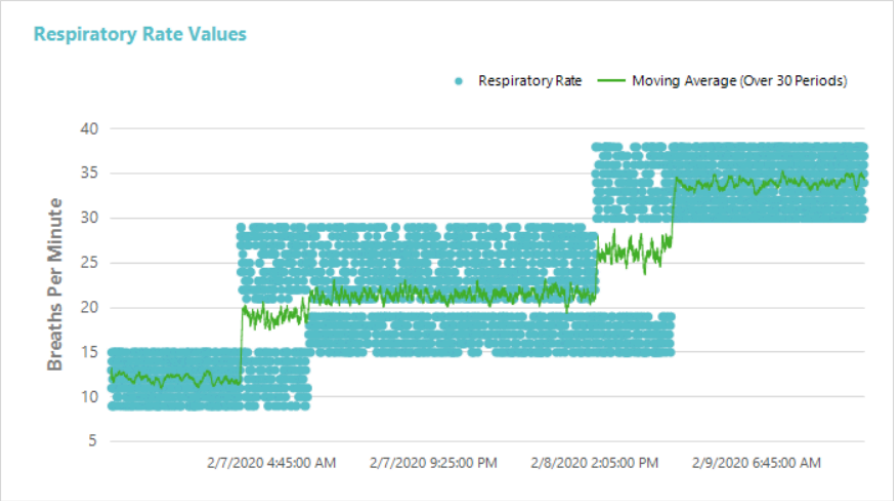
Expand one of the date rows to display details for each hour:

Date / Hour	RR [BR/min]	RR [BR/min]
⊞ **2020-01-03**	**87±31**	**11±6**
⊟ **2020-01-04**	**81±28**	**13±20**
2020-01-04 12 AM	85±35	9±2
2020-01-04 01 AM	84±47	6±1
2020-01-04 02 AM	65±6	10±
2020-01-04 03 AM	54±4	7±
2020-01-04 04 AM	109±	9±
2020-01-04 05 AM	84±33	6±
2020-01-04 06 AM	81±37	9±1
2020-01-04 07 AM	63±	9±1
2020-01-04 08 AM	81±42	8±4
2020-01-04 09 AM	69±4	14±11
2020-01-04 10 AM	115±8	5±
2020-01-04 11 AM	60±	12±7
2020-01-04 12 PM	86±39	49±70
2020-01-04 01 PM	118±4	16±15
2020-01-04 02 PM	62±11	16±11
2020-01-04 03 PM	120±1	7±
2020-01-04 04 PM	96±33	11±
2020-01-04 05 PM	66±13	7±3
2020-01-04 06 PM	60±	±
2020-01-04 07 PM	111±	13±4
2020-01-04 08 PM	53±2	17±13
2020-01-04 09 PM	63±17	5±
2020-01-04 10 PM	62±11	7±2
2020-01-04 11 PM	90±42	10±
⊞ **2020-01-05**	**80±23**	**14±8**
⊞ **2020-01-06**	**84±25**	**11±6**

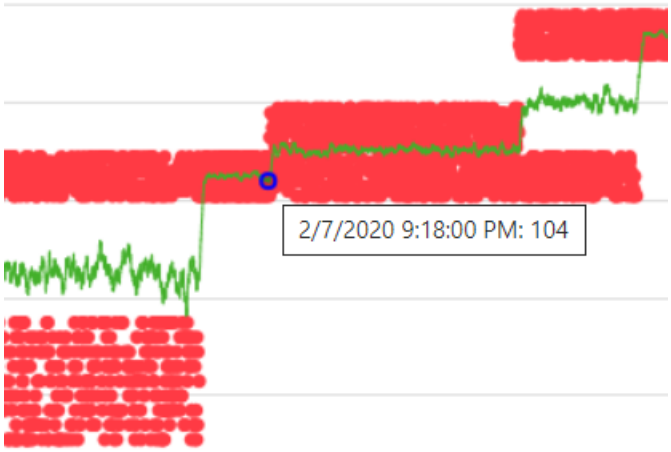
Heart / Respiratory Rate Values

Displays observed heart rate and respiratory rate values for the patient, with optional moving average matching configured using the **Moving Avg # Periods** report parameter.





Users can hover over individual data points on these charts to view the date, time, and numerical value for the heart/respiratory rate for that point.



Alert Summary

This table displays the number of occurrences for each alert type.

Alert Detail

This table displays individual alerts and includes the **Alert Start Date/Time**, the **Alert End Date/Time**, and the **Alert Type**.

Alert Summary

Alert Type	Occurences
BedBeforeSensorExpiration	2
BedSensorCharging	1
BedSensorExpired	2
HeartRateHigh	6
HeartRateLow	3
Null	1
RespiratoryRateHigh	3
RespiratoryRateLow	6
UnitMalfunction	1
Unknown	1
UnstableSignal	2
VitalsNoMotion	1

Alert Detail

Alert Start Date/Time	Alert End Date/Time	Alert Type
1/3/2020 8:02:00 PM		HeartRateHigh
1/3/2020 8:02:00 PM	1/3/2020 8:03:00 PM	HeartRateHigh
1/3/2020 8:03:00 PM		HeartRateHigh
1/3/2020 8:03:00 PM	1/3/2020 8:04:00 PM	HeartRateHigh
1/3/2020 8:04:00 PM		HeartRateHigh
1/3/2020 8:04:00 PM	1/3/2020 8:05:00 PM	HeartRateHigh
1/3/2020 8:05:00 PM		RespiratoryRateLow
1/3/2020 8:05:00 PM		HeartRateLow
1/3/2020 8:06:00 PM		HeartRateLow
1/3/2020 8:06:00 PM		RespiratoryRateLow

Contact Free Continuous Monitoring - Sensor Expiration and Alerts Report

The **Contact Free Continuous Monitoring - Sensor Expiration and Alerts** report displays information about each sensor, including the device model name, model number, and serial number, that has expired or will expire within the next 30 days. The report also includes alert occurrence information. This data is obtained in real-time when a user executes the report.

Note: The start and end date parameters for this report do not apply to sensor expiration, which is always displayed as of the last data refresh.

Report Parameters

Parameter	Description
Entity Type	Use to select the Entity type and Level for the report. For example, **Facility** and **4**.
Entity	Select the Entity on which to run the report.
Report Start Date	Select the start date for the report. Please note that reporting times are displayed in Coordinated Universal Time (UTC), not local time.
Report End Date	Select the end date for the report. Please note that reporting times are displayed in Coordinated Universal Time (UTC), not local time.
Alert Types	Select the types of alerts that occurred during the specified time period that you want to view in the report.
Alert Display	Use to show or hide the following reporting elements, including alerts: • **Summary** - A summary table of alerts that displays **Alert Type** and **Number of Occurrences**, sorted by **Alert Type**. • **Chart** - A line chart, showing the number of alerts, for each **Alert Type** over a year and month. • **Details** - An individual list of each alert, including the type, start date, and end date.

Navigating the Contact Free Continuous Monitoring - Sensor Expiration and Alerts report

The **Contact Free Continuous Monitoring - Sensor Expiration and Alerts** report includes the following data elements.

Expiring Sensors

Displays each sensor, including the device model name, model number, and serial number, that has expired, or will expire within the next 30 days. The sensors displayed in this table are grouped into the following categories: **Expired**, **Expiring Within 7 Days**, and **Expiring Within 30 Days**.

The **Hours Remaining** column displays the number of hours remaining until the sensor expires.

Alert Summary

This table displays a summary of alerts for the selected entity, including the **Alert Type** and **Number of Occurrences** for each alert.

Monthly Occurrences of Alerts by Type

Displays the number of alerts for each alert type over year and month.

Alert Detail

Displays a list of each alert, including the **Alert Type**, **Alert Start Date/Time** and the **Alert End Date/Time**.

Early Warning Scores Insights Report

Report Details

The **Early Warning Scores Insights** report includes deterioration metrics, score statistics, score comparisons, score influencers, and sepsis risk factors for the selected entity, location, and/or patient in the selected time period.

Report Filters

Use the following filters to control the information displayed for the **Early Warning Scores Insights** report.

Entity

Use to select the hierarchy for the report (Enterprise, Region, Organization, Facility).

Location

Select the customer location hierarchy where an event, such as a score or observation, occurred.

Patient

Select the MRN for a specific patient within the selected entity.

Time Period

Select a specific time period of information to display. Please note that reporting times are displayed in Coordinated Universal Time (UTC), not local time.

Scoring Model

Select **MEWS** or **SIRS** to display information for either scoring model.

Risk Level

Select to display the risk level associated with a given score (**Low Risk**, **Moderate Risk** or **High Risk**).

Parameter Status

Select to display the status of a clinical parameter within a score (**In Range**, **Out of Range**, **Not Available**). Note that **Not Available** is the same as missing. Anything with a contribution of 0 points is considered In Range. Anything with a contribution less than 0 points is considered Out of Range and adds points to the overall score.

Parameter Presence

Select to display the presence (or timeliness) of a clinical parameter within a score (**Timely**, **Stale**, or **Not Available**). Please note that **Timely** is the same as Normal and **Not Available** is the same as Missing.

Parameter Type

Select the parameter type to display for a score. For example, **Heart Rate**, **Temperature**, or **AVPU Score**.

Device Type

Select a specific device type associated with an event. For example, **Bed** or **Vital Signs Monitor**.

Deterioration

Select to display a specific indicator or event found within the report data. Available options include **Death**, **Discharge**, **Septic Shock**, **Severe Sepsis**, and **Transfer**.

Additional filters are available in the **Filters** pane on the right side of the page. Click **Filters** to expand this pane. You can then filter the report based on patient age group, gender, encounter status, and event status (for example, score status, observation status, or transfer status).

Navigating the Early Warning Scores Insights report

The **Early Warning Scores Insights** report has three separate pages of data. After you select the report parameters and click **View Report**, the following data is displayed.

Deterioration Metrics page

Single item cards are displayed for each of the following items on the **Deterioration Metrics** page:

#Admits

The number of encounter admission records.

#High Risk

The number of patients with one or more high risk scores.

#Sepsis

The number of patients with either a Severe Sepsis Time Zero or a Septic Shock Time Zero identified.

#Transfers

The number of patients with one or more transfers, indicated by a chance in location during their encounter.

#Deaths

The number of patients with a diagnosed condition of death.

The following data elements are also displayed on the **Deterioration Metrics** page:

- A gauge indicating the **Average Score**, with minimum and maximum values displayed.
- The **#Scores Over time with Average Score** clustered bar chart, which displays the number of scores over time, with a line indicating the average score over time.
- The **Clinical Parameter Average Contribution to Scores Over Time** ribbon chart, which indicates the average contribution of each clinical parameter to the score over time. Note that each clinical parameter can contribute a minimum of 0 points and maximum of 3 points to a given score.

Deterioration Trends page

The **Deterioration Trends** page displays a stacked chart that indicates the number of patients over time who experienced one or more of the included deterioration events (the deterioration events included in the chart are the ones the user selects using the **Deterioration** parameter and are displayed in the legend at the top of the chart).

Score Statistics page

The **Score Statistics** page includes the following data elements:

Clinical Parameter Status (#)

A stacked column chart displaying the number of observations for each clinical **Parameter Status**.

Clinical Parameter Status (%)

A 100% column chart displaying the percentage of observations for each clinical **Parameter Status**.

Clinical Parameter Presence (#)

A stacked column chart displaying the number of observations for each clinical **Parameter Type**.

Clinical Parameter Presence (%)

A 100% column chart displaying the percentage of each clinical **Parameter Presence**.

Score Comparisons page

The **Score Comparisons** page includes the following data elements:

#Scores and Average Score Per Location

A bar/line chart that displays the count of scores by **Risk Level** and the average score value (line) for different locations.

Clinical Parameter Timeliness Per Location

A bar/line chart that displays the count of clinical **Parameter Presence** and the number of patients (line) for locations.

Sepsis Risk Factors page

The **Sepsis Risk Factors** page includes the following data:

#Patients With Sepsis Risk Factors

A stacked bar chart that indicates the number of patients in which a score was observed with a given **Risk Level** with a given Sepsis Risk Factor.

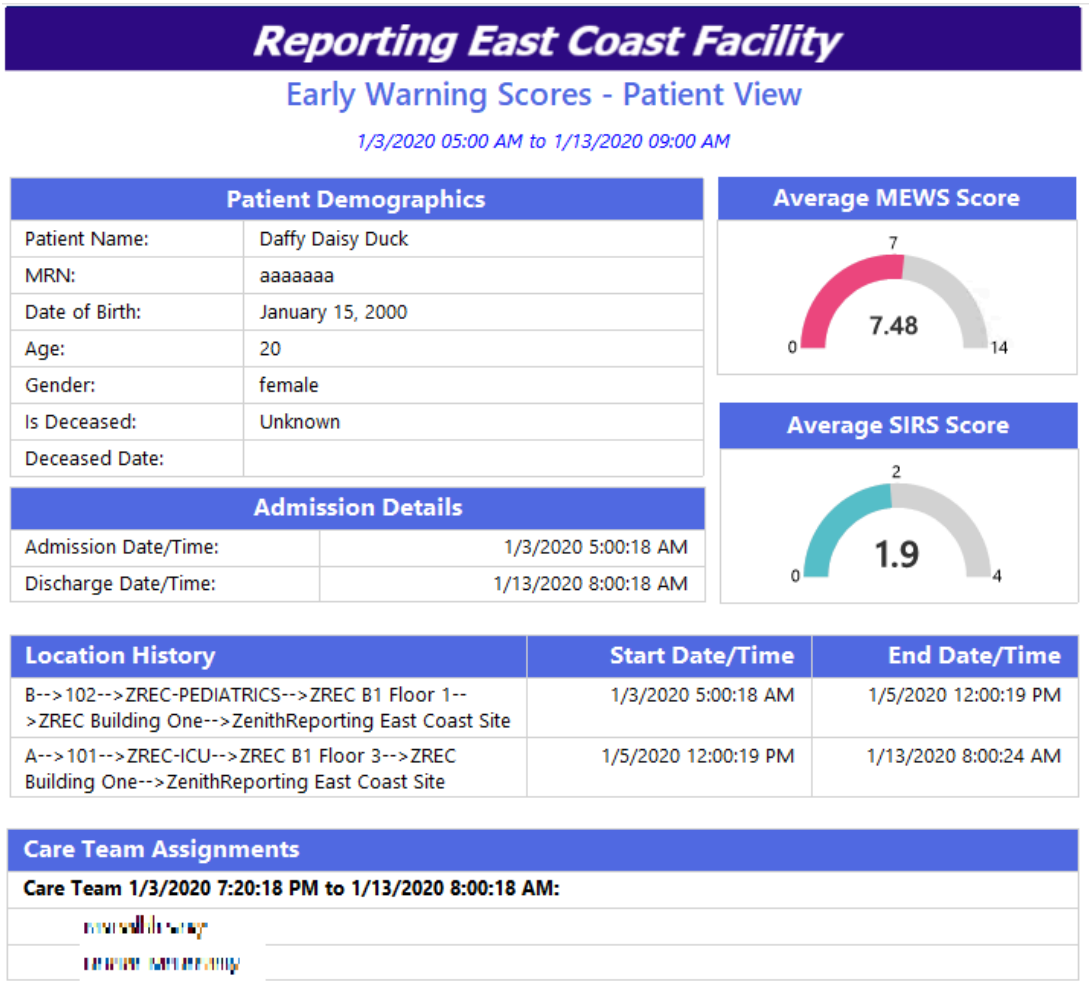
Score Influencers page

The **Score Influencers** page includes an analysis of different score influencers. Select an option from the **What influences Average Score to** drop-down list to understand how the selected factor drives early warning scores.

Early Warning Scores - Patient View Report

Report Details

The **Early Warning Scores - Patient View** report includes metrics related to a selected patient's early warning scores during a selected time period during a selected encounter. This report also includes Sepsis risk factors, Sepsis specific details, and the time line of events observed during the reporting period for the selected encounter associated with a patient's scores.



Reporting East Coast Facility

Early Warning Scores - Patient View

1/3/2020 05:00 AM to 1/13/2020 09:00 AM

Patient Demographics	
Patient Name:	Daffy Daisy Duck
MRN:	aaaaaaa
Date of Birth:	January 15, 2000
Age:	20
Gender:	female
Is Deceased:	Unknown
Deceased Date:	

Average MEWS Score

Average SIRS Score

Admission Details	
Admission Date/Time:	1/3/2020 5:00:18 AM
Discharge Date/Time:	1/13/2020 8:00:18 AM

Location History	Start Date/Time	End Date/Time
B-->102-->ZREC-PEDIATRICS-->ZREC B1 Floor 1-->ZREC Building One-->ZenithReporting East Coast Site	1/3/2020 5:00:18 AM	1/5/2020 12:00:19 PM
A-->101-->ZREC-ICU-->ZREC B1 Floor 3-->ZREC Building One-->ZenithReporting East Coast Site	1/5/2020 12:00:19 PM	1/13/2020 8:00:24 AM

Care Team Assignments
Care Team 1/3/2020 7:20:18 PM to 1/13/2020 8:00:18 AM:
[redacted]
[redacted]

The metrics included in the report are:

- Average Modified Early Warning Score (MEWS)
- Average Systemic Inflammatory Response Score (SIRS)
- Score trends for MEWS
- Clinical parameter average contribution to MEWS over time
- Clinical parameter average contribution to SIRS over time
- MEWS average score trends
- MEWS average clinical parameter value trends
- SIRS average score trends
- SIRS average clinical parameter value over time (month/day/hour) showing contribution to score

In addition, the **Early Warning Scores - Patient View** report includes patient demographic information, admission details, location history, and care team assignments.

Report Parameters

Facility	Select the Facility for the report.
Patient MRN	Select the MRN for the patient for whom you want to run the report.
Encounter	Select the patient encounter on which you want to run the report.
Report Start Time	Select the start date for the report. Please note that reporting times are displayed in Coordinated Universal Time (UTC), not local time.
Report End Time	Select the end date for the report. Please note that reporting times are displayed in Coordinated Universal Time (UTC), not local time.
Event Types	Select the types of events to include in the report.

Navigating the Early Warning Scores - Patient View report

After you select the report parameters and click **View Report**, the following data is displayed.

Patient Demographics

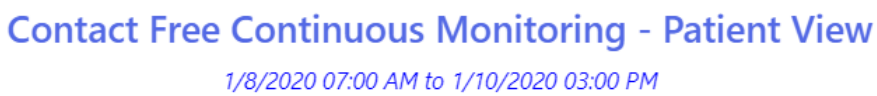
Displays all the details for the patient on which the report is based. This includes **Patient Name**, **MRN**, **Date of Birth**, **Age**, **Gender**, and so forth.

Admission Details

Displays the **Admission Date/Time** and the **Discharge Date/Time**.

The date and time at which the encounter started and ended are displayed under **Admission Details**, regardless of any selections the user makes for the **Report Start Time** and **Report End Time** parameters. In other words, modifying the default parameter dates affects the time frame for the report, but does not impact what is displayed in **Admission Details**.

The italic text under the report title indicates the time frame for the report content, such as vitals and alerts.



Average MEWS Score

Displays the patient's average Modified Early Warning Score (MEWS).

Average SIRS Score

Displays the patient's Systemic Inflammatory Response Score (SIRS).

Location History

Displays the patient location history details for the selected encounter. These details are displayed in hierarchical format. For example **General Hospital → Main → Radiology → Room 101 → Bed A**.

The **Start Date/Time** (the time at which the patient was first brought to the location) and the **Location End Date/Time** (the time at which the patient left the location) are also displayed.

Care Team Assignments

Displays the care team assignments associated with a patient during the selected encounter. The **Start Date**, **End Date**, and **Member(s)** of each care team are displayed. The full name of each care team member is displayed when available, otherwise the last name is displayed.

Score Trends

This chart displays the average MEWS and SIRS for the patient over time.

Clinical Parameter Average Contribution to MEWS Score Over Time

Displays the clinical parameters and their average contribution to the patient's MEWS score over time.

Clinical Parameter Average Contribution to SIRS Score Over Time

Displays the clinical parameters and their average contribution to the patient's SIRS score over time.

MEWS Average Score and Clinical Parameter Value Trends

Displays the patient's AVPU score, Systolic blood pressure, heart rate, respiratory rate, and temperature trends over time and illustrates how each of these parameters contributes to the patient's average MEWS score.

SIRS Average Score and Clinical Parameter Value Trends

Displays each of the patient's clinical parameter trends over time and illustrates how each of these parameters contributes to the patient's average SIRS score.

Sepsis-Specific Details

If the patient's encounter includes a Sepsis Time Zero, the **Sepsis-Specific Details** section is available. This section includes the following information.

Sepsis Identification Criteria and Time

This table displays the details of each event that contributed to Sepsis identification in the patient, as well as the event start date and time. The events are sorted by the date and time at which they occurred and include the **Severe Sepsis Time Zero** event.

Septic Shock Identification Criteria and Time

This table displays the details of each event that contributed to the identification of Septic Shock in the patient, including the start date and time of each. The events are sorted by the date and time at which they occurred and include the **Septic Shock Time Zero** event.

Sepsis Bundle Tasks

This table displays each task in the applicable bundle. Tasks are grouped by Sepsis severity (**Severe Sepsis** or **Septic Shock**) and by **Bundle** (**3hr** or **6hr**). The task name is displayed (for example, **3hr: Initial Lactate**), as well as the **Time Zero Offset** in hours, rounded to two digits, that passed between Time Zero and the task (for example, **1.33**). The task **Compliance** is also displayed and can be one of the following:

- **Compliant** when completed within the specified time for bundle compliance.
- **Non-Compliant: Absent** when the task was not completed within or after the specified time for bundle compliance.
- **Non-Compliant: Late** when the task was found after the specified time for bundle compliance.

Timeline of Events

Displays a timeline of events during the patient's encounter. This timeline includes the event details, the event start date and time, and the event actors (if present).

Contact Free Continuous Monitoring Insights Report

The **Contact Free Continuous Monitoring Insights** report displays information for contact free continuous monitoring devices within the selected entity.

Report Filters

Entity

Use to select the hierarchy for the report (Enterprise, Region, Organization, Facility).

Location

Select the customer location hierarchy where an event, such as a score or observation, occurred.

Time Period

Select a specific time period of observation information to display. Please note that reporting times are displayed in Coordinated Universal Time (UTC), not local time.

Observation

Select the type of observation to include in the report, either **Heart rate** or **Respiratory rate**.

Status

Select the status of the observations to include in the report.

Navigating the Contact Free Continuous Monitoring Insights report

The **Contact Free Continuous Monitoring Insights** report includes the following data elements.

Device Metrics page

The **Device Metrics** page includes a multiple-row card, which displays the following information for each device type (for example, **Bed** or **Vital Signs Monitor**).

- **Observations**: Displays the number of observations recorded by the device.
- **Average**: The average observed value.
- **Minimum**: The minimum observed value.
- **Maximum**: The maximum observed value.
- **Std Dev**: The standard deviation of the observed value.
- **Avg Minutes To Next Value**: The time between two observed values for the same patient and location.
- **Average Change**: [Needs info]

The **Device Metrics** page also includes:

Observation Boxplot

A box plot of observed values, categorized by device type.

Observation Distribution

The number of observations, organized by the value observed and categorized by device type.

Deltas and Timing page

The **Deltas and Timing** page of the **Contact Free Continuous Monitoring** report includes:

Boxplot for Average Minutes between Observations

Indicates the distribution of minutes between observations over time for each device type.

Boxplot for Average Change between Observations

Indicates the distribution of the delta value between observations over time for each device type.

Standard Reports without PHI

The standard reports that do not include protected health information (PHI) are described in this section.

The Standard Reports without PHI contain aggregate data that is summarized at the year/month level and is intended to provide insights into patterns, trends and outliers observed in the data. The aggregate data model does not contain PHI and for that reason users authorized with the Reporting 'Read' privilege are eligible to view these reports.

The technology chosen for these reports is Power BI Standard/Analytical Reports. This technology is intended to promote a highly interactive reporting experience with a relatively short authoring period. However, this tool is not as "pixel perfect" and customizable as the Power BI Paginated reports used for the standard reports with PHI. When printing and exporting for example, Power BI Standard/Analytical reports provide a "what you see is what you get" result. This means that if there is a scrollbar on a reporting element on the screen, the report will be printed and exported with the scrollbar rather than automatically expanding the element. With this in mind, the reports were designed to avoid the need to auto-grow.

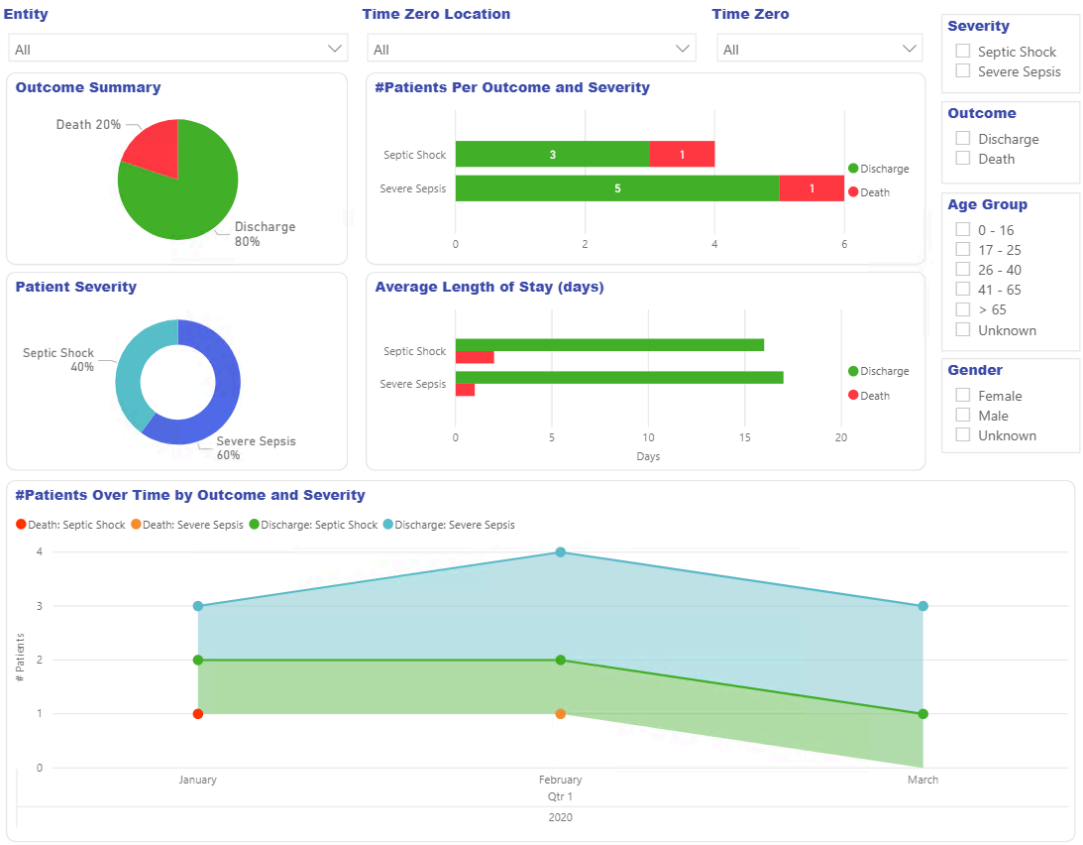
Reports in this category all utilize Power BI import mode, meaning that the reporting data is physically imported into Power BI on a scheduled basis. The data is de-identified and aggregated on import as it is extracted from the rpt and model schema database elements and it is subject to the data retention defined for each customer (for example, 365 days for Patient Risk Surveillance, 90 days otherwise).

Sepsis Insights Report

Report Details

The **Sepsis Insights** report displays sepsis severity and outcome trends for patients. This report also includes additional pages where you can view data about pathogens detected in patient blood cultures, antibiotics that were administered, and age and gender demographic information for sepsis patients.

Figure 1. Sepsis Insights reports Home page



Report Filters

Use the following filters to control the display of data on all pages of the **Sepsis Insights** report.

Entity

Select the entity level for which to view the report data (Enterprise, Region, Organization and/or Facility).

Time Zero Location

Select the location where the Time Zero, or time of sepsis presentation, occurred.

Time Zero

Select the Time Zero year, quarter, and/or month for which to display the report.

Severity

Select the level of sepsis severity to display (either **Severe Sepsis** or **Septic Shock**). If a patient had both levels, the higher severity level is displayed.

Severity

Select the outcome to display, either **Discharge** or **Death**.

Age Group

Select the age group for the report.

Gender

Select the patient gender for the report.

Navigating the Sepsis Insights Report

Home page

The **Home** page of the report includes:

Outcome Summary

Illustrates the percentage of each patient **Outcome** (discharge or death) for the selected entity.

#Patients Per Outcome and Severity

Displays the number of patients per outcome (discharge or death) and severity (septic shock or severe sepsis) within the selected entity.

Patient Severity

Displays the percentages of each type of patient severity (septic shock and severe sepsis) within the selected entity.

Average Length of Stay (days)

Displays the average length of stay, in days, for each outcome and each severity type.

#Patients Over Time by Outcome and Severity

Displays the number of patients over time for each severity and outcome type.

Gender Demographics page

The **Gender Demographics** page of the report includes:

Outcomes and Severity by Gender

This bar chart illustrates sepsis severity and outcome of both male and female patients.

Patient Gender

Displays the percentage of male and female patients within the selected entity.

Patient Age Group and Gender

Displays the number of male and female patients, separated by age group.

Avg Length of Stay by Gender (days)

Displays the average length of stay, in days, for male versus female patients.

Patients Over Time by Gender

Displays the number of patients of each gender over time.

Age Demographics page

The **Age Demographics** page of the report includes:

Outcomes and Severity by Age Group

Displays the number of patients in each age group that share the same sepsis severity and outcome.

Patient Age Group

Illustrates the percentage of patients within each age group for the selected entity.

Patient Gender and Age Group

Displays the number of male and female sepsis patients separated by their age group.

Avg Length of Stay by Age Group (days)

Displays the average length of stay for sepsis patients, separated by age group.

Patients Over Time by Age Group

Displays the number of sepsis patients within each age group over time.

Pathogens page

The **Pathogens** page displays two elements for reporting on pathogens detected in patient blood cultures.

The **Pathogens Detected** stacked bar chart illustrates the number of patients for whom each pathogen was detected.

The **Pathogens Detected** link chart displays pathogens detected over time for each type of pathogen. This metric is the number of patients where the pathogen was detected via a blood culture.

Antibiotics page

The **Antibiotics** page includes two data elements that report on the antibiotics that were administered to sepsis patients.

The **Antibiotics Administered** stacked bar chart displays the number of patients that were given each type of antibiotic, as well as the outcomes for those patients.

The **Antibiotics Administered** line chart displays each type of antibiotic administered over time. This metric is the number of patients who received the antibiotic.

Trends page

The **Trends** page includes:

Outcome Summary

This pie chart displays the percentages for each patient outcome.

#Patients Per Outcome and Severity

Displays the number of patients with each severity level and outcome.

Patient Severity

Displays the percentages for each patient outcome.

Average Length of Stay (days)

Displays the average number of days that each patient's encounter lasted, broken down by severity and outcome.

#Patients Over Time by Outcome and Severity

Displays the number of patients over time with each outcome and severity level.

Comparisons page

The **Comparisons** page includes:

Patient Outcomes and Severity by Unit

A clustered column chart that displays the number of patients per Facility/Unit, broken down by outcome and severity.

Patients Per Unit

A tree map that displays the number of sepsis patients per Unit.

Sepsis Bundle Compliance Report

Sepsis bundle elements must be implemented when there is a Time Zero instance (a case of Severe Sepsis or Septic Shock). These bundle elements are time-based and are considered complete when all the tasks associated with them are complete. Overall compliance is only achieved when all of the tasks are completed on time.

Report Details

The **Sepsis Bundle Compliance** report contains bundle compliance metrics to enable you to complete bundle elements on time. The elements of this report include graphic representations of the following:

- The percentage of each result category for all bundle tasks.
- The percentage of bundle tasks completed and the subset of those tasks that were completed on time (compliant).
- The percentage compliance for each task over time (based on Time Zero).
- Percentage compliance for each task across the customer location hierarchy, tied to the location that was active at the time of the task assignment.
- The percentage of bundles that were compliant.
- The number of cases, the percentage of bundles completed on time (compliant), and the percentage of all bundles completed for each severity level or bundle combination.
- Percentage of bundle compliance over time.
- Percentage of bundle compliance across your (the customer's) location hierarchy, based on the location of the Time Zero.
- The average time to completion from Time Zero for each bundle task.

Report Filters

The following filters can be used to control the display of data on all pages of the **Sepsis Bundle Compliance** report.

Entity

Use to select the tenant hierarchy (Enterprise, Region, Organization, Facility) for which the report is displayed.

Time Zero Location

Select the location of the Time Zero.

Bundle Task Location

Select the location that was active when a bundle task was generated.

Time Zero

Select the year, quarter, and/or month of the Time Zero date.

Bundle

Select the Sepsis severity option and bundle option for the report.

Task

This filter can be found within the **Filters** pane on the right side of the page. Use to select the type of bundle compliance task for which the report is displayed.

Navigating the Sepsis Bundle Compliance report

After you select the report parameters and click **View Report**, the following data is displayed.

Home page

The **Home** page of the **Sepsis Bundle Compliance** report includes:

Bundle Compliance

This gauge indicates the percentage of bundles that were compliant.

Bundle Compliance table

Displays the number of sepsis cases of each type, the percentage of all bundles completed on time (compliant), and the percentage of all bundles completed for each severity and bundle combination.

Bundle Task Compliance Results

This pie chart indicates the percentage of each result category for all sepsis bundle tasks.

Hours to Completion From Time Zero

Displays the average time to completion from Time Zero for each bundle task. Users can hover over each bar on this chart to display a tool tip that includes the details for each bundle task, including time values converted to minutes.

Bundle Task Completion

Displays the percentage of bundle tasks completed, as well as the subset of those tasks that were completed on time (compliant).

Trends page

The **Trends** page

Bundle Compliance Trends

This clustered column chart displays the percentage of bundle compliance over time.

On Time Bundle Task Completion Trends

Illustrates the percentage compliance for each task over time (based on Time Zero).

Comparisons page

The **Comparisons** page includes:

Bundle Compliance Comparisons

Displays the percent bundle compliance across the customer location hierarchy, based on the Time Zero location.

On Time Bundle Task Completion Comparisons

Displays the percentage compliance for each bundle task across the customer location hierarchy, based on the location that was active at the time of the task assignment.

Chapter 3. Data Security and Privacy

Data Security

The Hillrom Digital Health Platform (DHP) enables connectivity to a variety of devices and applications in the healthcare environment. These can include medical devices (for example, beds, nurse communication equipment, and vitals monitors), computers, smart devices (like phones and tablets), and customer infrastructure such as an EMR or ADT system. While these systems may all connect in different ways, the security of the connection and the data is of utmost importance.

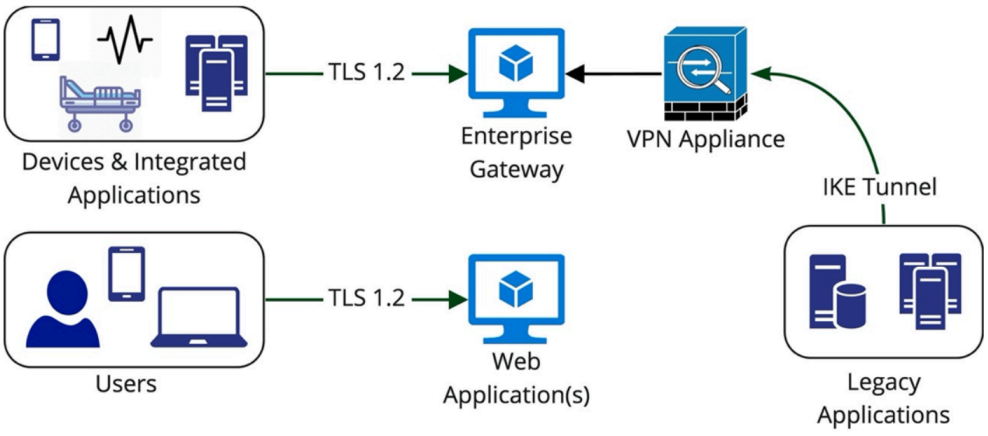
To ensure the security and confidentiality of the data, all data contained within the Hillrom DHP is encrypted while at rest. Hillrom uses three data storage types depending on how the data is formatted or will be used: blob storage, relational databases, and document databases. The Microsoft Azure platform provides AES-256 encryption for data at rest for each of these components, using service managed encryption keys which undergo periodic rotation.

Data Encryption

The Hillrom DHP also enforces the encryption of all data in transit, both incoming and outgoing. Depending on how the DHP resources are accessed, this data encryption can be enforced in two different ways.

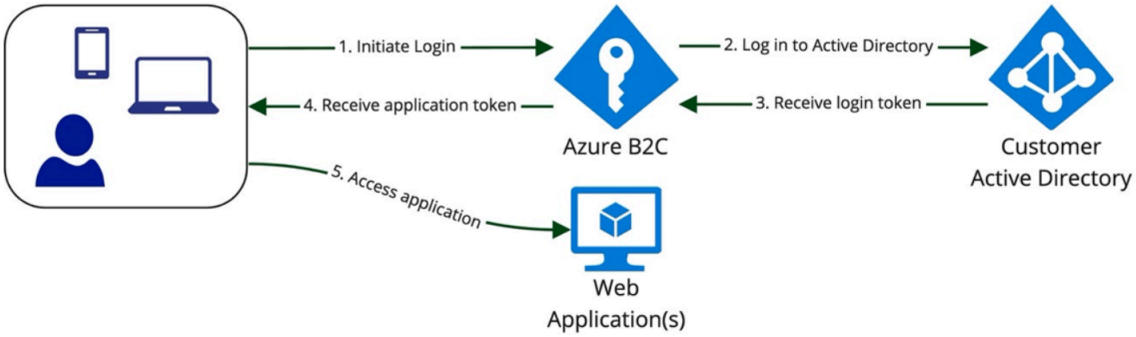
For resources that are assigned direction over the public Internet (such as web applications and device connectivity), Hillrom requires a minimum of TLS 1.2 for all connections. The specific ciphers will be negotiated during the establishment of the connection, but compatible systems can negotiate up to AES256 encryption, with SHA384 hashing.

In some deployments, especially when you are connecting legacy systems that may not support robust encryption protocols, a Virtual Private Network (VPN) can be used to secure traffic between the healthcare environment and the DHP servers. In these instances, the specific protocols can be selected based on the desired hardware and security policies of the customer. Hillrom's default is to use an IKEv1 tunnel, with AES256 encryption and Perfect Forward Secrecy (PFS) enabled.



Authentication and Authorization

Authentication to interactive components of the DHP is handled by Single Sign-On (SSO) federation to the customer's own Active Directory Federation Services, or Azure Active Directory. This ensures that credentials are never seen or handled by Hillrom, local security policies are enforced (for example, account lock-outs, 2-factor authentication, or password complexity), and that the customer maintains audit logs of all attempted logins. The DHP uses Microsoft Azure's B2C service to implement multi-tenant federation.



To ensure control over user authorization, Hillrom provides the ability to map customer Active Directory groups to roles and responsibilities inside the DHP. This enables customers to maintain full control over the privileges of their users without having to manually modify users or groups within a separate web application.

For non-interactive areas of the DHP (for example, applications or devices that send and receive data from the platform), purpose-specific user accounts can be provisioned (or removed) from within the Enterprise Configuration Portal. These accounts have strong randomly-generated passwords and their access rights are restricted to only the locations and data types required to perform their functions.

Security Compliance

As part of our ongoing commitment to the security of our customers' data, the Hillrom DHP maintains SOC 2 Type 2 compliance. The System and Organizational Controls (SOC) reports are independent, third-party evaluations that describe how Hillrom implements compliance controls. The SOC 2 Type 2 report specifically evaluates the effectiveness of organizational controls related to the security, availability, confidentiality, and privacy of customer data. This report is available upon request.

In addition to maintaining our own SOC 2 report, the DHP components are hosted on Microsoft Azure’s cloud platform. Microsoft maintains their own set of security compliance certifications (including SOC 2), which can be viewed at their Service Trust portal: https://servicetrust.microsoft.com/.

Data Privacy

Smart Device Connectivity conforms to all physical, network, and process security measures set forth in the Health Insurance Portability and Accountability Act (HIPAA) standards. The application includes secure procedures to authenticate users, terminate sessions after inactivity, and encrypt all sensitive data—both in transit and at rest—to prevent unauthorized access to data. The Smart Device Connectivity solution conforms to HIPAA standards listed in HIPAA 164.312 Technical Safeguards.

All received data, including vital signs and risk scores, associated with a patient encounter is stored in the Clinical Data Repository, which hosted in the MS Azure Cloud.

Data Retention Rules

Data is retained in the CDR for 90 days post patient discharge ADT message, by default. This configuration can be changed to retain the data for only 24 hours post patient discharge ADT message. Patient data will be removed upon written request.

Chapter 4. Additional Resources

Copyright

Related topics:

Patent Information *(on page 92)*

Release Notes

Digital Health Gateway 1.2 Product Release Notes

Patent Information

The Hillrom companies are leading worldwide manufacturers and providers of medical technologies for healthcare providers, caregivers and patients around the world. We bring passion, dedication, and innovation that matter and make a difference, in the lives of those we touch.

The Hillrom companies are the proprietors of European, US, and other patents and pending patent applications. For a complete list of Hillrom patents, visit http://www.hill-rom.com/patents.

HIPAA Compliance Statement

Smart Device Connectivity conforms to all physical, network, and process security measures set forth in the Health Insurance Portability and Accountability Act (HIPAA) standards. The system includes secure procedures to authenticate users, terminate sessions after inactivity, and encrypt all sensitive data—both in transit and at rest—to prevent unauthorized access to data. The system also supports the export of patient data upon authorized request to provide patients access to their health data. The Smart Device Connectivity solution conforms to HIPAA standards listed in HIPAA 164.312 Technical Safeguards.

Open Source Attributions

This product may contain free open source software (FOSS). Hillrom, Inc. uses and supports the use of FOSS. We believe that FOSS makes our products more robust and secure, and gives us—and our customers—greater flexibility.

To learn more about FOSS that may be used in this product, please visit our FOSS website at https://hillrom.com/opensource. Where required, a copy of FOSS source code is available on our FOSS website.

Related topics:

Hazard Statements *(on page 93)*

Hazard Statements

Please review the following Smart Device Connectivity hazard statements.

CAUTION: Ensure with hospital administration that the Smart Device Connectivity system and all integrated components have been certified by Hillrom prior to room occupation by patients.

CAUTION: The system must be recertified and validated after configuration changes.

CAUTION: It is important to associate any wirelessly connected beds used for patient care to a valid facility location at the bedside to ensure that data from the bed is provided to the electronic medical record (EMR) and supported clinical interfaces.

CAUTION: If a wirelessly connected bed has been associated with an incorrect location, use the bedside interface to associate it with a valid location. If another wirelessly connected bed has been incorrectly assigned to that location, the incorrect location can be overridden via the bedside interface.

CAUTION: The system will remove a wirelessly connected bed from an assigned location if the bed is connected via a wired connection and the assigned wired and wireless locations are different, to defer to the greater reliability of the wired connection being accurate.

CAUTION: If any Smart Device Connectivity connected devices lose connections to the Gateway, follow your hospital's manual processes to complete all patient and caregiver workflows. For example:

- In the event of a system failure to transmit vitals monitor, bed, and/or risk score data to the EMR, this data should be manually charted in the EMR.
- In the event of a system failure to process or transmit ADT messages or notifications, patient admissions/discharges/ transfers should be viewed within the ADT system, via alternative interfaces, or obtained from the charge nurse.
- In the event of a system failure to process or transmit EMR-based notifications, a patient's condition should be assessed based on vital signs and EMR data.
- In the event of loss of power, a backup generator should be used to maintain connected device operations and network connectivity.

- Incorrect association of patient data is mitigated by the segregation of customer data into distinct databases using a unique identifier for each customer. This risk is also addressed via UX design, usability testing, and other risk control measures on supported vital signs monitors. If incorrect association of patient data were to occur, only patient data from the vital signs monitor would be impacted; notifications based on orders, lab values, medications, and other EMR data *not* from the vital signs monitor *would not be* impacted. Erroneous data could be detected by comparing displayed data on the vitals monitor to data in the ADT and EMR systems.
- The Connex® Spot Monitor and Connex® Vital Signs Monitor will indicate loss of network connectivity and indicate failed patient queries, along with suggested troubleshooting actions.
- System deployment will be certified prior to clinical use and after any configuration changes.
- System software updates are validated by Hillrom at the system level prior to clinical deployment. Software updates should not disrupt clinical operation of the system, as single clustered servers can be taken offline for software updates without affecting online servers.
- In the event of a system failure, the system can be rolled back to a prior software release to maintain operations while troubleshooting occurs.

CAUTION: Smart Device Connectivity relies on complete and accurate data being entered into all integrated systems and devices. It is very important that complete and accurate patient, facility, and location information is entered at the device level for all component systems to ensure the correct data is associated with the correct patients, facilities, and locations.

CAUTION: Hospital network connectivity is necessary for bed data and patient vitals and risk score data to be transmitted to the hospital EMR system and supported clinical interfaces and for hospital ADT- and EMR-based notifications to be sent to caregiver Voalte mobile devices. An indication of loss of network connectivity on Hillrom vitals monitors and caregivers' Voalte mobile devices mitigates the risk of a hospital network outage and is consistent with industry standards. Standard hospital procedures should be followed to prevent possible delays in treatment. A patient must be manually checked and vitals signs monitor data confirmed by a caregiver at the patient's bedside before treatment decisions are made.

CAUTION: In the event the Dashboard loses connection with the Smart Device Connectivity system, it will display a visual indication of connectivity loss so it is clear that the displayed data may not be the latest available.

CAUTION: In the event of an error in the process of the client browser rendering the Smart Device Connectivity Dashboard, the Dashboard will display an error indication so it is clear that the Dashboard is non-functional.

CAUTION: The Dashboard can be configured to remove stale/outdated patient-related data after a configured amount of time has elapsed. It is important to define appropriate “remove after” times if facility policy dictates that caregivers should not act on stale/outdated data. Otherwise, the most recent data will be displayed until patient discharge or transfer.

CAUTION: All instances of the Dashboard will restart in staggered fashion upon a saved edit of a dynamic data column (such as those displaying patient physiologic data) or communication disruption in order to distribute the processing required to load each instance. Each connected Dashboard instance will be randomly assigned a recovery wait time between 2 and 7 minutes, with the remaining wait time displayed counting down in seconds to zero.

CAUTION: Data changes or notifications indicating high risk to a patient must be manually checked and confirmed by a caregiver at the patient's bedside before treatment decisions are made.

CAUTION: When the Smart Device Connectivity system is not operational—either due to system maintenance, servicing, or an unanticipated failure—staff must follow standard hospital notifications and patient care procedures. The system must be recertified and validated after configuration changes. For more information, contact Hillrom Technical Services at (800) 445-3730.

CAUTION: All caregivers should be trained on a hospital's proper notification workflow and be aware of possible consequences to the patient if notification procedures are not followed.

CAUTION: The hospital should perform periodic testing of the Smart Device Connectivity system to ensure the system is working properly, including after any Smart Device Connectivity system upgrades or component device upgrades, connections, disconnections, or resets. The system must be recertified and validated after configuration changes. For more information, contact Hillrom Technical Services at (800) 445-3730.

CAUTION: Hillrom recommends that multiple levels of escalation should be in place for Voalte notification calls.

CAUTION: Clinical decision support systems such as Smart Device Connectivity are not meant to take the place of provider or caregiver interactions and knowledge or judgement. This system is meant to augment their clinical knowledge and assist in more timely and patient-specific care. Caregivers should not view this system as a replacement for their current clinical practice.

Related topics:

Release Notes (to be added)

Contact Information

If additional assistance is needed, please contact Hillrom's Technical Services at (800) 445-3720 or email hrccwssupport@hillrom.com.

Chapter 5. Hillrom Patient Risk Surveillance R1.0 Help Center

Select one of the topics below for more information.

About

Product Description

The Hillrom Patient Risk Surveillance product will analyze near real-time clinical data from point-of-care devices to help identify patient deterioration and sepsis risks. The Hillrom Patient Risk Surveillance product will also communicate hospital-defined interventions based on common scoring systems to output devices via the Hillrom Smart Device Connectivity Medical Device Data System (MDDS) software.

Intended Use Statement

The Patient Risk Surveillance solution will receive near real-time clinical data that will be used to calculate risk scores that assist in implementing hospital-defined patient risk assessment protocols. The Patient Risk Surveillance solution will also communicate potential changes in patient risk status to the clinical team.

Sources for calculations will be provided to the end-product user for independent verification of the results. The Patient Risk Surveillance solution is not meant to be the sole basis for risk assessment recommendations.

Documentation

Select one of the following topics for more information:

LAB01457 Digital Health Gateway HL7 Interface Specification

LAB01488 Digital Health Gateway Allscripts Interface Summary

LAB01420 Digital Health Platform Product Compatibility Matrix

Technical Specifications

NNC Server Specifications

NNC Hardware Specifications

LAB01485 Voalte Platform Server Specifications

Welch Allyn Wireless Best Practices

Welch Allyn Connex Spot Monitor Spec

Welch Allyn Connex Devices Spec

Centrella Smart Bed Spec

Before You Begin

Click one of the topics below for more information.

About Rule Manager *(on page 97)*

About Terminology Services *(on page 103)*

About Rule Manager

Rule Manager is a web-based application that serves as the user interface of the Hillrom Patient Risk Surveillance product. It is used for configuring and enabling risk scores and risk stratification rules based on risk scores.

Risk stratification rules are defined and approved by the customer, and can include risk context, suggested risk-based clinical tasks, and risk-based notifications. These configurations are applied to all admitted patients within a defined entity (for example, a Facility or Unit) and determine the patient-specific risk-based information and notifications that are displayed in supported clinical interfaces.

Rule Manager is designed to assist your organization in the risk stratification of patients, notification of patient status, and delivery of medical care. However, Rule Manager is not intended to be the sole basis for risk assessment and response nor a substitute for independent professional medical judgment. Your organization is solely responsible for all decisions, acts, and omissions of its clinicians in connection with the delivery of medical care to patients. Hillrom makes no warranty, express or implied, including the warranties of merchantability and fitness for a particular purpose. Furthermore, Hillrom does not assume any legal liability or responsibility for the accuracy, completeness, clinical efficacy or value of the Rule Manager and any rule defined and approved by your organization.

Related information

What are Risk Scores? *(on page 98)*
What is Risk Context? *(on page 100)*
What is a Rule? *(on page 100)*
What is a Notification? *(on page 101)*
What is a Clinical Task? *(on page 101)*
Connected Clinical Interfaces *(on page 101)*
Default NNC Call Types *(on page 102)*

Enterprise Configuration and Rule Inheritance

Access to the Rule Manager is provided to authorized users from the Enterprise Configuration Portal interface. After an Enterprise hierarchy and a Patient Risk Surveillance deployment is created, you can access the Rule Manager by clicking the manage rules  icon next to an entity. Clicking this icon opens new browser tab for the Rule Manager and enables you to view, create, edit, or delete rules for that entity only (meaning, no parent or child entities), depending on the permissions for your role. You can also do the following:

- Assign or unassign a rule created for a parent entity to one or more specified child entities
- View the assigned rules for a specified Unit-level entity
- View the assigned entities for a specified rule

What are Risk Scores?

Risk scores, also known as early warning scores, are metrics used as guides by clinicians to determine the level of risk for a patient.

These scores have been validated in the clinical literature as predictors of patient outcomes and are in common use in health care facilities. Risk scores are comprised of multiple parameters—or risk factors—each of which is assigned a specific point value. The sum of the point values for the individual risk factors determines the risk score.

For example, the patient deterioration Modified Early Warning Score (MEWS) is comprised of the following parameters:

- Heart rate
- Respiratory rate
- Temperature
- Systolic blood pressure
- Level of consciousness

The Rule Manager enables you to configure the range of values of each parameter that are assigned to each point value (from 0 – 3, in the case of MEWS), as well as the assigned point values themselves. The table below shows the default configuration of MEWS, showing the range of parameter values and assigned point values:

Component	**Point Value**						
	3	**2**	**1**	**0**	**1**	**2**	**3**
Respiratory rate (breaths/ min)		< 8	8	9 - 17	18 - 20	21 - 29	> = 30

Component	Point Value						
	3	**2**	**1**	**0**	**1**	**2**	**3**
Heart rate (beats/min)		< 40	40 - 50	51 - 100	101 - 110	111 - 129	> = 130
Temperature (°C)		< 35.0	35.0 - 36.0	36.1 - 38.0	38.1 - 38.5	> = 38.6	
Systolic blood pressure (mmHg)	< = 70	71 - 80	81 - 100	101 - 159	160 - 199	200 - 220	> 220
Level of Consciousness	U	P	V	A			

For Level of Consciousness, the letters represent the following:

A = Alert

V = Reacts to Voice

P = Reacts to Pain

U = Unresponsive

Risk score values are used to determine a patient's risk stratification, which also drives display and annunciation of notifications and suggested clinical tasks on supported clinical interfaces. For example, the default risk stratification for MEWS is, as follows:

Risk Stratification	**Low**	**Medium**	**High**
Score	0 - 4	5 - 6	≥ 7

Other than MEWS, the Patient Risk Surveillance product also supports the Systemic Inflammatory Shock Syndrome (SIRS) criteria as an indication of sepsis risk.

Related information

About Rule Manager *(on page 97)*
What are Risk Factors? *(on page 100)*

What is Risk Stratification?

Risk stratification is the level of risk of a patient, based on the value of that patient’s risk score as configured in the Rule Manager.

For Modified Early Warning Scores (MEWS), the risk stratification can be *Low*, *Medium*, or *High*. For SIRS, it can be *Low* (Not at Risk) or *High* (At Risk).

Risk stratification can be displayed along with the risk score and determines when risk-based notifications and clinical tasks are provided to supported clinical interfaces. Risk stratification acts as the basis for the clinical decision support provided by the Patient Risk Surveillance product.

What are Risk Factors?

Risk factors are the clinical parameters that make up a risk score.

Risk factors can include vital signs, lab values, the outcome of nursing assessments (for example, the level of consciousness), and other clinical data. Risk factors can be displayed with the risk score to which they correspond on supported clinical interfaces.

Related information

What are Risk Scores? *(on page 98)*

What is Risk Context?

Risk context refers to risk factors for a condition that is not included as a component of the associated risk score.

These risk factors are specific to a diagnosis such as sepsis, rather than a broad condition such as patient deterioration, and are based on the following well-respected sources:

- Merck Manual of Diagnosis and Therapy (20th Ed.)
- Lippincott Williams and Wilkins
- Ward, NS and Levy, MM. “Sepsis Definitions, Pathophysiology and the Challenge of Bedside Management.” *Respiratory Medicine*, DOI 10.1007/978-3-319-48470-9.
- SepsisAlliance.org

Risk context can include risk factors such as diagnoses, medications, nursing assessments, and demographics. The Rule Manager allows configuration of the specific risk context categories and risk factors to be displayed on supported clinical interfaces.

Related information

About Rule Manager *(on page 97)*

What is a Rule?

A *rule*—or risk stratification rule—defines the risk stratification for a patient, based on their risk score.

A rule also determines whether risk-based notifications, risk context, and suggested clinical tasks are displayed on supported clinical interfaces and, if so, which risk context items and clinical tasks are displayed.

Risk stratification rules drive the output (that is, clinical decision support) of the Patient Risk Surveillance product. The Rule Manager allows configuration of all aspects of these rules, with some limitations with respect to risk-based notifications, as discussed below.

Related information

About Rule Manager *(on page 97)*

What is a Notification?

A *notification*—or risk-based notification—consists of a message provided to, and displayed on, supported clinical interfaces that communicate a patient's risk stratification.

Notifications might be transmitted as nurse calls via NaviCare Nurse Call, as well as third-party IHE-compatible alert managers, depending upon how they are configured. Notifications are triggered during a change in patient-risk stratification, and are generated as follows:

- Always for patients with *High* risk stratification
- As configured (defaulted to **No**) for *Medium* risk stratification
- Never for *Low* risk stratification

To minimize unnecessary notifications, the Rule Manager provides configurations to notify only upon an increase (rather than a decrease) in risk stratification (this setting is defaulted to **Yes**) and to only send a repeated notification for the same risk stratification if the patient did not return to that risk stratification within a specified period of time (defaulted to **No**). The time-based configuration supersedes the configuration to only notify upon an increase in risk stratification.

Sent notifications are not cancelled within the Patient Risk Surveillance product, regardless of the patient's risk stratification. However, they can be cancelled with the Facility's nurse call system via defined clinical interfaces, as configured.

Related information

About Rule Manager *(on page 97)*

What is a Clinical Task?

A clinical task is a suggested action to take on the part of caregivers for a given patient, based on the patient's risk stratification.

You must define clinical tasks for each risk stratification within the Rule Manager, since no default clinical tasks are provided. These tasks are displayed on supported clinical interfaces to provide clinical decision support for caregivers in accordance with Facility protocol. The Rule Manager has no knowledge of which clinical tasks were performed, so the configured clinical tasks are displayed based on the patient's risk stratification, regardless of completion status.

Related information

About Rule Manager *(on page 97)*

Connected Clinical Interfaces

The Hillrom Patient Risk Surveillance 1.0 release is compatible with the following products and clinical interfaces:

- Hillrom Smart Device Connectivity (version 1.1 and above)
- NaviCare (version 3.9.500 and above, including NurseCall and Status Board)
- Voalte (version 3.6.3 and 3.7.10 and above)

The Patient Risk Surveillance product receives both raw data from Smart Device Connectivity and provides its clinical decision support output to the Smart Device Connectivity for transmission to the clinical interfaces listed above.

The following table shows which clinical interfaces support display of each clinical decision support element:

Data Element	NaviCare NurseCall	Status Board	Voalte
Risk Scores	No	Yes	Yes
Risk Stratification	No	Yes	Yes
Risk Factors	No	No	Yes
Risk Context	No	No	Yes
Clinical Tasks	No	No	Yes
Notifications	Yes	Yes	Yes

Although not listed here, IHE-compatible alert managers would also be able to transmit risk-based notifications to caregivers, as configured.

Related information

About Rule Manager *(on page 97)*

Default NNC Call Types

For customers with NaviCare NurseCall 3.9.500 and above, the following nurse calls are configured by default to support risk-based notifications from the Patient Risk Surveillance product:

- High MEWS score
- Medium MEWS score
- High SIRS score

These calls will be triggered by the corresponding risk-based notifications within the Patient Risk Surveillance product. They may be cancelled within NaviCare NurseCall on the same clinical interfaces (for example, room stations, staff stations, primary console) they are displayed and annunciated on, as configured. These nurse calls include dome light colors and flashing patterns, as configured.

Related information

About Rule Manager *(on page 97)*

About Terminology Services

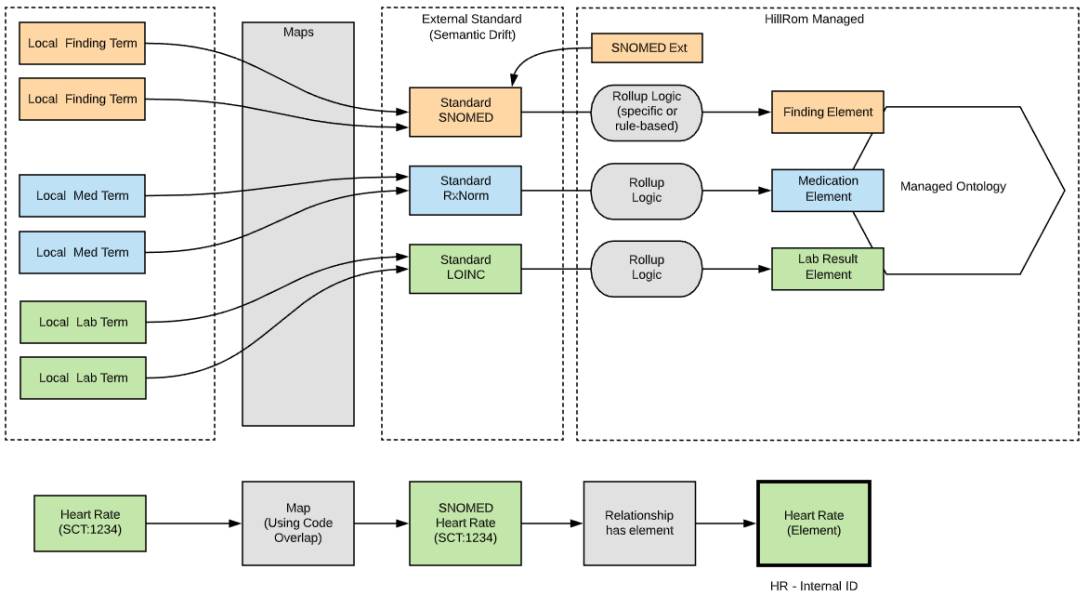
Symedical® is an application built by Clinical Architecture®. Symedical handles all terminology mappings and concept definitions, and provides Hillrom Digital Health with the following benefits:

- One source of truth for all terminologies used throughout the system.
- An easy-to-use interface for authoring items such as local hospital and bed codes, as well as other codes that don’t exist in Hillrom's standard catalogs (for example, group and map terminologies) that involve:
    - Defining, creating, and managing relationships between concepts, and
    - Creation of value sets that define specific concepts (for example, immune compromised)
- Run-time API calls that perform mappings as data is received into the system, with the benefit that Hillrom does not need to maintain mapping tables in our code.
- Automatic updates to standard catalogs compiled on the Symedical side, where codes are added and deprecated in regular cadences by their governing bodies. Hillrom does not have to query, diff, or account for changes in these massive mapping files on a weekly, monthly, or biannual basis.
- An easy-to-use workflow for clinicians to approve changes to clinical content prior to publishing to production and propagating throughout the system.

We need to normalize codes, concepts and terminologies because simple translation tables and human-powered manual mapping cannot keep up with rapidly evolving standard and local terminologies. Symedical offers the following advantages:

Goal of Interoperability - HIT systems working together to advance the effective delivery of healthcare and to break down existing silos.

How do we do that?Through a process whereby data is normalized into a standard format to ensure that it means the same thing to all components and systems that interface with each other—for both incoming and outgoing data. The figure below illustrates how Symedical is currently used by Hillrom today:



As shown in the diagram above, external terms from different Electronic Medical Record (EMR) applications can be represented in a variety of standard code systems (for example, ICD-10-CM, ICD-9-CM, SNOMED CT, LOINC, RxNorm) as well as non-standard, proprietary, or local terms. Clinical Architecture enables mappings of these terms to standard reference terminology targets to achieve semantic normalization. Clinical Architecture also facilitates a transparent rule-based approach to defining element sets (for example, collections of terms that define a clinical concept) and an efficient incremental update process, as reference terminologies evolve over time. In the above diagram, EMR terms from a variety of code systems might be ingested into Hillrom, understood as standard reference terminologies, and rolled up to a clinical concept that can be used for decision support or analytics.

Symedical Glossary of terms

Term - A term is the lowest level data point used in Symedical. Each term contains a unique identifier (or description).

Catalog - A catalog is a *group of terms* collected under one name and usually grouped together by one of six domain types.

Element - An element (which can also be called a *value set*) is a collection of terms that define a clinical concept. An element then becomes a published set of codes that roll up to a clinical concept.

Element Set - An element set is a collection of related elements that are grouped together and then managed, published, and distributed as related content. For example, the Hillrom Patient Risk Surveillance element set contains all risk context and risk factors.

Map - A map defines a cross-reference relationship that converts a set of terms from a source catalog to equivalent terms in a target catalog.

Medical Coding Standards used Today

- **ICD-10 -** Diagnostic codes (of which there are 68,000+ codes)

- **CPT -** Procedures
- **LOINC -** Labs, results, and observation values (for example, vitals)
- **SNOMED -** Broad coverage of most medical concepts
- **MDC -** Medical devices
- **CVX/MVX -** Vaccines
- **RxNorm -** Specific medication codes, down to dose/strength
- **NDC -** Packaging-level codes for medications
- **Local Codes -** Hospital specific

APIs and Back End Services

The Terminology Service provides the following resources:

- Management (or wrapper) APIs that interface with a third-party vender's terminology
- Transcoding APIs that support Enterprise Gateway, and
- Lookup API components (for example, Rules Manager, Mapping) for configuring terminology maps during tenant onboarding

Management APIs

The following management APIs manage API proxies and products:

- **POST/api/v{version}/Management/TerminologyMappings**

  Description: Supplies terminology catalogs and maps to Hillrom's terminology provider.
- **GET/api/v{version}/Management/CodeSystemMapping**

  Description: Retrieves code system normalization mappings.
- **POST/api/v{version}/Management/CodeSystemMapping**

  Description: Adds (or updates) code system normalization mappings.

Transcoding APIs

The following transcoding API looks up predefined mappings between existing terminologies. It also uses mapping algorithms to attempt to programmatically map terms that are not already mapped. If a term isn’t mapped, it is then routed to a Hillrom Clinical Informatics Specialist for review and completion.

- **POST/api/v{version}/Terminology/Transcode**

  Description: This transcoding API translates customer-implemented terminology codes into industry standard codes as well as Hillrom normalized codes.

Lookup APIs

The following lookup API components return both risk factor and content with associated groupings that are used by Hillrom Patient Risk Surveillance for rules management and clinical decision support:

- **GET/api/v{version}/Terminology/RiskFactors**

  Description: This lookup API returns a list of Hillrom-defined risk factors that synchronize with Clinical Vector risk-factor configurations.
- **GET/api/v{version}/Terminology/RiskContext**

  Description: This lookup API returns a list of Hillrom-defined risk categories and context that synchronize with Patient Risk Surveillance risk context configurations.

What is a Term?

In Symedical®, a *Term* is the lowest level data point used. Each term contains a unique identifier (or description) consisting of a group of characters that represents a concept in a terminology. In a catalog, this is a member of the catalog that has a unique identifier and is rolled up into maps.

What is a Map?

In Symedical Waypoint, a map defines a cross-reference relationship that converts a set of terms from a source catalog to equivalent terms in a target catalog.

What is an Element?

An *Element* (or value set) is a published set of codes that roll up to a clinical concept.

An *Element Set* is a collection of related elements that are grouped together and then managed, published, and distributed as related content. For example, the Hillrom Patient Risk Surveillance Element Set contains all risk context and risk factors.

Related topics:

Element Attributes *(on page 107)*

Defining Element Set Attributes *(on page 107)*

Creating an Element within an Element Set *(on page 108)*

Related information

Element Attributes *(on page 107)*
Defining Element Set Attributes *(on page 107)*
Creating an Element within an Element Set *(on page 108)*

Creating an Element Set

An element set is a group of related elements that can be managed, published, and distributed as related content. You can create an element set from the Symedical client.

1. First, log into Symedical Client.
2. Open **Element Set Manager**.
3. To create a new element set, select **File > New**.

4. Enter the **Element Set Properties**, which include:
    a. **Name**
    b. **Mnemonic**
    c. **Catalog Template** (one of these must be created prior to creating a new element set)
    d. **Catalog name**
    e. **Mnemonic**
    f. **Model name**
    g. **Mnemonic**
    h. Applicable reference catalogs for the *element set* (for example, SNOMED, LOINC, ICD-10).

    Note: Prior to emtering applicable reference catalogs, you must be subscribed to these catalogs in the **Subscription Portal**.
5. Enter a **Model alias** for each catalog.
6. To finish creating the new element set, click **OK**.

Element Attributes

What is an Attribute Set on an Element?

An *attribute* is a variable (or data element) that further describes an *element*. Attributes are used for informational purposes to maintain context and meaning.

Related information

What is an Element? *(on page 106)*

Defining Element Set Attributes

An attribute is a data element that describes an element. It is important to define attributes for element sets to maintain meaning and context.

1. First, log in to Symedical Client and open **Catalog Manager**.
2. Search for the **Hillrom Clinical Vectors Element Set** catalog.
3. Double-click on the catalog to open it, and then click **Apply**.
4. Click the fourth icon from the left, **Catalog Properties**.
5. Next, click the **Attributes** tab and create unique names for each desired attribute.
6. Set the attribute type to **Manual**.
7. Select the appropriate data type related to this Element (for example, Boolean, Alphanumeric, Term, Any) and click **OK**.
8. Close **Catalog Manager** and open **Element Set Manager**.
9. Search for the **Hillrom Clinical Vector Element Set** and double-click the chosen Element Set to open it.
10. Click **Apply**.
11. Double-click each Element, and then define the **Attributes** of the Element in the pop-up window, as applicable.

    Attributes for this release include:

a. **ElementGroupCategory – Boolean –** This attribute tells the system, if this element was created to be a grouping for Risk Content, it does not have any medical codes rolled up to it.
b. **FHIR_type – string –** This attribute tells the system where this data should be stored in FHIR (e.g., Observation, Medication, etc.).
c. **GroupID – string –** This attribute tells the **Rules Manager** which grouping a Risk Context falls under for display in the UI.
d. **Risk context – Boolean –** Selecting "True" indicates to the system that this is a Risk Context for SIRS.
e. **Risk Factor – Boolean –** Selecting "True" indicates to the system that this is a Risk Factor used for score calculation.
f. **UoM_default_code –** Selection from unitsofmeasure.org.

Creating an Element within an Element Set *(on page 108)*

Related information

What is an Element? *(on page 106)*

Creating an Element within an Element Set

Use these instructions to create an Element within an existing Element Set.

Note: For the purpose of this section, a new Element will be created in the Hillrom Patient Risk Surveillance Element Set. Hillrom only has one Element Set and it contains all of the content for both the Smart Device Connectivity and Patient Risk Surveillance products.

1. Log in to **Symedical Client** and open **Element Set Manager**.
2. Search for the **Hillrom Clinical Vectors Element Set** and double-click the element set to open it.
3. Click **Apply**.
4. In the top **Menu** bar, click **Element**, and then click **Add**.
5. Create a **Term** name and select the term type (which domain the term belongs to).

   Note: If the domain is unknown, let it default to **General Term**.
6. Complete any **Attributes** related to this term.
   Attributes are essentially variables that can be used in APIs to further identify this Element. Examples of attributes that are used for CV 1.0 include the following:
   a. ElementGroupCategory – Boolean
   b. FHIR_type – string
   c. GroupID – string
   d. Risk context – Boolean
   e. Risk Factor – Boolean
   f. UoM_default_code – Selection from unitsofmeasure.org.

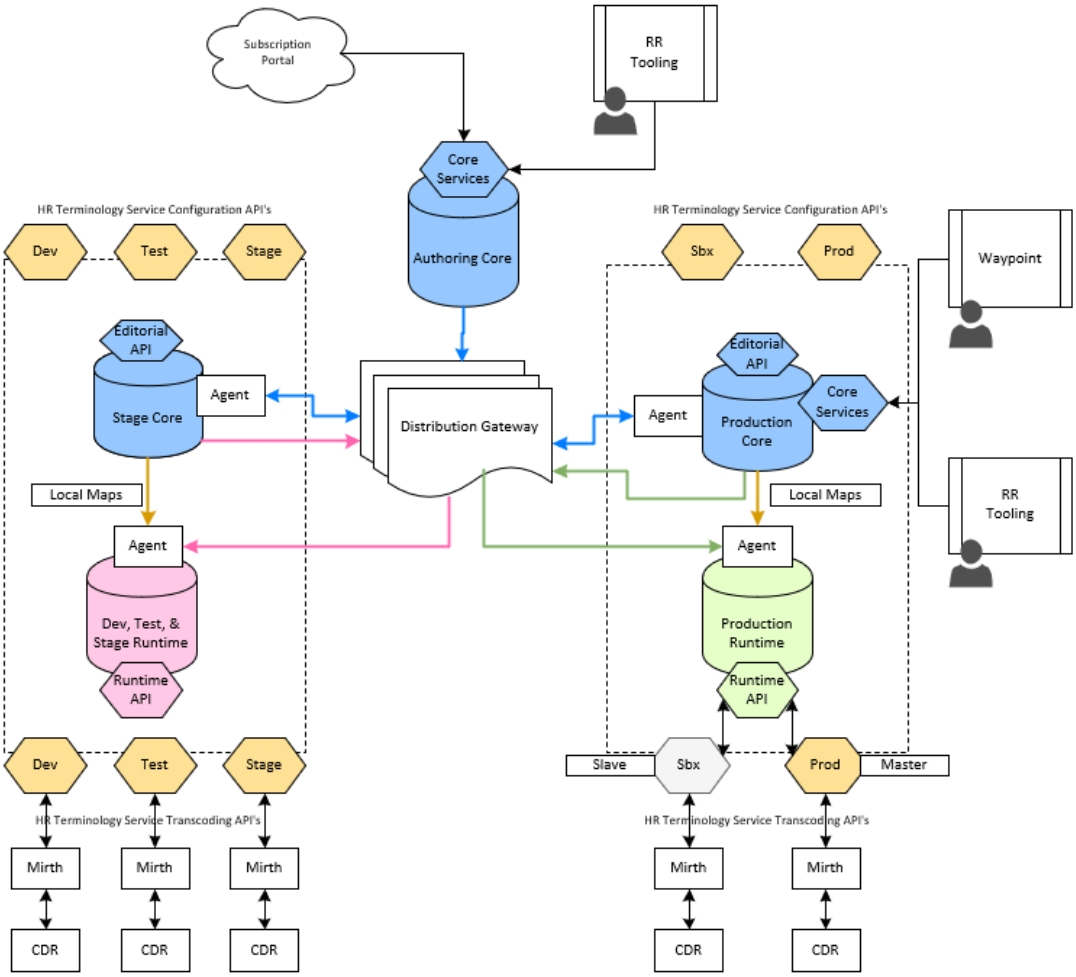
Note: For more information, see Defining Element Set Attributes *(on page 107)*.

Related information

What is an Element? *(on page 106)*

Symedical - System Architecture

The diagram below illustrates the Hillrom / Clinical Architecture:



Clinical Content Review Process

Hillrom Smart Device Connectivity 1.1 and Patient Risk Surveillance 1.0 utilize Clinical Architecture's Symedical product for the management of clinical terminology, medical codes, and associated attributes associated. All clinical terms are rolled up into Elements, which are clinical concepts that the system utilizes to trigger logic.

Note: An element is a group of terms that all equate to the same clinical concept. For example, cancer as an "Element" and melanoma, leukemia, sarcoma, etc., as the group of terms that would roll up to the broader clinical concept.

The following two sections of clinical content must be reviewed internally by Hillrom clinicians:

1. A one-time review must be performed prior to release of all elements that are created in the Hillrom Patient Risk Surveillance Element Set, which is maintained in Symedical's **Element Set Manager**. In this Element set, there is a list of elements.
    a. All clinical content—including Element Set creation, Element roll up, and mappings—should be authored and created by a licensed clinician who is familiar with medical terminology and coding standards related to the content for release.
    b. Once content creation has been completed, it must be reviewed by a separate, non-authoring clinical team. The clinical team will review the Element Set for the following criteria:
        - **Accuracy of Element definition:** Do the terms rolled up into this Element make sense (i.e., are they the correct terms)?
        - **Completion of Element definition:** Is the Element inclusive of all content in that specific category (i.e., is there any content that is missing)?
2. Clinical terminology mapping must be reviewed by a clinical team prior to release, as well as on an ongoing basis. Clinical terminology mapping can be found in Symedical's **Map Manager**.

    Symedical APIs have been configured so that they will automap new terminology coming into the system if the system is able to understand the code and display. However, if the system cannot automap the new terminology, a notification is generated and sent to the clinical team. The clinical team will then use the WayPoint website to review and approve the unmapped clinical terminology.

    Mappings will be displayed in groups per tenant; therefore, there may be multiple maps that the clinicians will need to review for a given Domain Catalog. A clinical analyst must be in place on a regular review basis once a client goes live. The clinical analyst will review maps for local terminology that the system is not able to automatically map to a standard (or defined) local term. WayPoint will allow a clinician to search for—and select—the appropriate clinical terminology for manually mapping a term.

    Once the manual map is completed, a non-authoring clinician must be assigned to review the content. Once reviewed and approved, the map will be marked "Production Ready," and can be published and distributed for use in the appropriate environment.

    Note: Please see instructions in Help Center for the following topics: Creating an Element Set, Creating an Element within an Element Set, Uploading Terms/Codes to Source Catalogs in Symedical, Mapping Terms, Publishing and Distributing Content, and User Management.

Using Symedical Waypoint

Intended Use

Symedical Waypoint provides a secure method for providing review and feedback of Symedical mappings based on an authenticated user's role. Clinical content reviewers will have limited access to create, change or delete maps. However, Map Viewers have the access required to ensure clinical content accuracy.

Glossary of Terms

Flag Set: A flag set is a group of symbols used to prioritize and identify catalog, map, and content model terms for clinical attention in the workflow.

Tip: Content Flag Set for a Clinical Approval workflow:

- **Red -** Review (Immediate)
- **Yellow -** Review (within 1-2 days)
- **Blue -** Review (within 1-5 days)
- **Green -** Verify

Source Term: The description (or display) of an original source code.

Source Code: The primary key (or identifier) for a term in a catalog, which is usually the medical code (for purposes of this project).

Target Term: The description (or display) that the source term and code are mapped to, via the Symedical application.

Target Code: The primary key (or identifier) for the *target term* in a catalog, which is usually the medical code (for purposes of this project).

Map Review and Approval

As a user with Map Viewer access, you can review and approve Symedical mappings to ensure clinical content accuracy.

1. First, go to Symedical Waypoint for Hillrom Digital Health in production.
2. Log in with authenticated Map Viewer credentials.

   Note: By default, the dashboard displays all maps available to the logged in user.
3. Click **Assigned Only** to view only those maps that you are assigned for review.
4. Click **Map Manager** to navigate to a specific map.
5. Select the applicable source term in the **Source Term** window.
6. Right-click the target term in the **Candidates** window and select **View Term Comparison**.
7. To review a term, use **Term Comparison** to compare what is on both sides of the map.

   Note: This feature assists with mapping a decision by displaying the source and target term details side-by-side for review. The clinician may have to manually look up both terms to ensure that they are accurate and mean what the system intends them to mean.
8. After verifying that the map is correct, set the green **Verify Flag** to signify that the map is ready for production.

9. Once the map has been reviewed, assign the map back to the Hillrom Clinical Specialist, who will publish the map as appropriate.
10. If you have a question for a clinician, use the **Annotation** function to enter notes or comments for assignment to the intended clinical team member.

Patient Risk Surveillance Troubleshooting Guide

This section identifies issues that may arise during use of the Rules Manager interface and Patient Risk Surveillance product as a whole, along with suggested mitigations/workarounds and corrective actions. Issues with the Rules Manager interface and corresponding troubleshooting steps are addressed first, followed by other issues that could arise using the system in tabular format. For more technical issues, please see Technical Issues and Workarounds *(on page 121)*.

If any questions remain unanswered after viewing this information, please contact Hillrom's Technical Support Department at 1-800-445-3720.

BASIC TROUBLESHOOTING

Choose a topic from the list below.

I am unable to:

Access Rules Manager *(on page 113)*

Approve (or enable) a rule *(on page 115)*

Assign (or unassign) rules *(on page 119)*

Change (or update) a rule configuration *(on page 121)*

Configure rules (or perform other actions in Rules Manager) *(on page 113)*

Create a new rule *(on page 114)*

Create a new rule based on an existing risk score template *(on page 115)*

Delete a rule *(on page 116)*

Edit a risk context *(on page 118)*

Edit a risk score *(on page 117)*

Edit a risk stratification *(on page 117)*

Edit a rule *(on page 115)*

Edit a rule response *(on page 117)*

Edit risk factor stale times *(on page 118)*

Pause (or resume) a rule *(on page 119)*

Print out rules *(on page 119)*

View rules, assigned entities, or other content in Rule Manager *(on page 120)*

Access Rules Manager

Note: Rules Manager is only accessible to authorized users via the Enterprise Configuration Portal (ECP).

To access Rules Manager, the "Patient Risk Surveillance" connection must first be configured in ECP. Once configured, a manage rules  icon is displayed at the Enterprise level of the configured tenant hierarchy in ECP.

Clicking on this icon will open Rules Manager in a separate tab. If clicking the  icon does not launch Rules Manager, disable any pop-up blocker installed on the machine—or at least allow access to ECP/Rules Manager. If clicking the icon *still* does not launch Rules Manager, try performing the following steps: 1) log out of ECP, 2) close the browser, 3) log back into ECP, and 4) click the icon. If the Rules Manager tab still doesn't open, contact Hillrom Technical Support.

1. Click  to open the Rules Manager in a separate tab.

   Note: If clicking the icon does not launch the Rules Manager, disable any pop-up blocker installed on the machine, or at least allow access to the ECP/Rules Manager. If clicking the icon *still* does not launch the Rules Manager, log out of ECP, close the browser, log back in to ECP, and click the icon again.

If the Rules Manager tab still doesn't open, contact Hillrom Technical Support at 1800445-3720.

Configure rules (or perform other actions in Rules Manager)

Note: Customer access to the Rules Manager is view-only; customers do not have the ability to directly configure rules, risk scores, risk context, clinical tasks, risk-based notifications, or to perform any other functions within the Rule Manager while logged in with a customer account. If any changes to the existing configurations are desired, please contact Hillrom Technical Support at 1-800445-3720.

Rules Manager permissions depend on the role being used to access Rule Manager. First, make sure that the desired function is enabled for your role. The table below is a guide to the permissions provided for each role in Rules Manager:

Permissions Table

Role	Create / Edit / Delete Rules, Risk Scores, Risk Context, Clinical Tasks, Notification Settings, etc.	Enable / Disable Rules	Approve Rules*	Pause / Resume Rules
Hillrom Admin	Yes	Yes	View Only	Yes
Hillrom Clinical Specialist	Yes	Yes	View Only	Yes
Hillrom Technical Support	View Only	View Only	View Only	View Only
Hillrom Read-Only	View Only	View Only	View Only	View Only
Customer Admin	View Only	View Only	View Only	View Only
Customer Rule Approver	View Only	No	View Only	No
Customer Clinical Informatics Specialist	View Only	View Only	View Only	View Only
Customer Read-Only	View Only	View Only	View Only	View Only

Note: *No official rule-approval permissions are implemented within the Rules Manager. Instead, official rule approval is performed via a manual process, where the Customer signs a printout of the rules from the Rules Manager. Rules can then be approved and enabled within Rules Manager via check box selections.

If any changes to the existing configurations are desired, please contact Hillrom Technical Support at 1800445-3720.

Create a rule

There are two ways to create a new rule:

- If no rules have been created yet, refer to **Step 1** below.
- If a rule using the desired risk score template has already been created, refer to **Step 2**.

1. In Rules Manager, click the "hamburger"  menu icon (upper left corner) to access the Main Menu.
2. Under Rule Configuration, click **New Rule**.

Note: If **New Rule** button is not displayed, you will need to obtain the proper permissions. Refer to the Permissions Table *(on page 113)* for guidance.

3. Select one of the risk score templates provided.
4. Name the rule
5. Click **Continue**.

   The risk score configuration template for that rule will be displayed.
6. To edit the risk score configuration, click **Edit**.

Note: To edit the response (or "notification") settings, select the **Response Configuration** tab. For a SIRS score, there will also be a **Risk Context** tab for editing a rule's risk context.

If you are unable to create a rule after following these steps, contact Hillrom Technical Support at 1-800-445-3720.

Create a new rule based on an existing risk score template

1. Click **Save As** on the **Score Configuration** tab of the risk score template.
2. When a prompt is displayed, name the rule and then click **Save**. The rule will then be editable.

Edit a rule

There are two ways to edit a rule:

- From the **Score Configuration**, **Response Configuration**, or **Risk Context** tabs, refer to **Step 1** below.
- From the **Rule Inventory** screen, use **Step 2**.

1. In one of the tabs listed above, click **Edit**. Then, make the desired changes to the rule via the configuration options provided.
2. Access the **Main Menu** by clicking the "hamburger"  menu icon (upper left corner of the screen), then select **Rule Inventory** to view the created rules. Next, click**View/Edit** on the desired rule to display the **Rule Configuration** screen with the **Score Configuration**, **Response Configuration**, and **Risk Context** tabs (as applicable).

   Attention: Editing a rule will affect all Units assigned to that rule.
3. Click **Done Editing** when finished.

If you are unable to edit a rule after following these steps, contact Hillrom Technical Support at 1-800-445-3720.

Approve (or enable) a rule

A rule can be approved and enabled in Rules Manager by checking the box next to **Rule is Approved and Enabled** on the **Score Configuration** tab of the rule. However, in order for a risk score (or risk stratification) configuration to be accepted, the values entered must be valid. If a validation error is displayed when configuring a risk score (or risk stratification), make sure that all configurations conform to the following requirements:

- All values must be in a range of 1-99.
- No special characters are allowed except for Level Of Consciousness.
- For the Level of Consciousness risk factor, only values indicated in the score configuration legend (below) for **A**, **V**, **P**, and **U** may be entered. Also, only **one** *HRXXXX value should be entered per score column in the score configuration table*.

  All parameter (or risk factor) ranges and thresholds must be continuous to the level of resolution of the specific risk factor, and *must not overlap*.
- ◦ For example, a heart rate range of 51-100 beats/min. could be assigned a point value of 0 and a heart rate range of 101110 beats/min. could be assigned a point value of 1, since the difference between the top of the lower range (100) and the bottom of the upper range (101) is within 1 beat/min., the resolution of heart rate measurements. However, ranges of 5199 beats/min. and 101110 beats/min. would be invalid.
  - ◦ Similarly, a temperature range of 35.0°38.4°C could be assigned a point value of 0 and a temperature range of ≥ 38.5°C could be assigned a point value of 1, since the difference between the top of the lower range (38.4°C) and the bottom of the upper range (38.5°C) is within 0.1°C, the resolution of temperature measurements. However, ranges of 35.0°-38.4°C and ≥ 38.6°C would be invalid.
- All risk stratification ranges and thresholds must be continuous and must not overlap.
  - ◦ For example, a Medium risk stratification could be defined as a MEWS score of 59, and a High risk stratification could be defined as a MEWS score of ≥ 10. However, ranges of 58 and ≥ 10 would be invalid because there is a gap (i.e., a MEWS score of 9 with no associated risk stratification).
  - ◦ Likewise, a Low risk stratification could be defined as a MEWS score of ≤ 4 and a Medium risk stratification could be defined as a MEWS score of 59. However, ranges of ≤4 and 49 would be invalid because there is an overlap (a MEWS score of 4 with both Low and Medium risk stratifications).
  - ◦ Rules that have not passed the minimum validation requirement cannot exit out of Edit mode, as listed above. The area of the score configuration that does not meet requirements (highlighted in pink) must be changed to meet validation before the rule can exit Edit mode.

If you are unable to approve or enable a rule within the Rules Manager by following these steps, contact Hillrom Technical Support at 1-800-445-3720.

Delete a rule

Note: Rules that are enabled cannot be deleted; the Delete button will display as greyed out.

1. Access the **Main Menu** by clicking the "hamburger"  menu icon (upper left corner of the screen).
2. Select **Rule Configuration** to view rules that have already been created.
3. Click **Delete** on the desired rule to remove it.

If you are unable to delete a rule after following these steps, contact Hillrom Technical Support at 1-800-445-3720.

Edit a risk score

1. To edit a *risk score*, click **Edit** on the **Score Configuration** tab of a rule.
2. To edit a *point* value assigned to specific values of the risk factors comprising the risk score, select the point value in the first row of the risk score configuration table and enter the desired value.
3. To edit the *range* of values for a risk factor that will generate a given point value, select the range and enter the desired range, making sure to conform to the risk score validation requirements. The following legend should be used as displayed in the UI for calculations in score configuration:

Equal	== X	Less Than Equal To	<= X
Less Than	< X	Range	> X < Y ; >= X <= Y
Greater Than	> X	Not Between	< X > Y ; <= X >= Y
Greater Than Equal To	>= X	Y is larger value than X	

4. Click **Done Editing** when finished.

If you are unable to edit a risk score after following these steps, contact Hillrom Technical Support at 1-800-445-3720.

Edit a risk stratification

1. Click **Edit** on the **Score Configuration** tab of a rule.
2. Select—and enter—the desired ranges for the provided risk stratifications for the risk score, making sure to conform to the risk stratification validation requirements.
3. Click **Done Editing** when finished.

If you are unable to edit a risk stratification after following these steps, contact Hillrom Technical Support at 1-800-445-3720.

Edit a rule response

To edit the system response (i.e., clinical decision support) for a rule:

1. Click **Edit** on the **Response Configuration** tab of a rule. This allows:
    - Risk-based notifications to be enabled (or disabled) by risk stratification (unless locked)
    - Risk-based notification text to be entered for each risk stratification
    - Notification fatigue settings to be specified, and
    - Clinical tasks to be entered (or removed) for each risk stratification
2. Click **Add** to add clinical tasks (or **Delete** to remove them) after selecting the associated checkbox.
3. Click **Done Editing** when finished.

If you are unable to edit a rule response after following these steps, contact Hillrom Technical Support at 1-800-445-3720.

Edit a risk context

1. Click **Edit** on the **Risk Context** tab of a rule (*for SIRS only*).

    Note: This allows risk context groups and individual risk context elements to be selected for display on supported clinical interfaces.
2. Use the dropdown elements to display the individual risk context elements within each group.

    Note: All risk context elements within a group can be selected by checking the box next to that group (or just the desired *individual* risk context elements can be selected via their associated checkboxes.
3. Click **Done Editing** when finished.

If you are unable to edit risk context after following these steps, contact Hillrom Technical Support at 1-800-445-3720.

Edit risk factor stale times

To edit stale times of risk factors that comprise a risk score:

1. Access the **Main Menu** by clicking the "hamburger"  menu icon (upper left corner of the screen).
2. Select the rule you want to edit the stale times for under the **Rule Configuration** tab.

    Note: This will display the stale time for each risk factor in separate boxes for days, hours, and minutes.
3. Enter the desired value in each box—*up to a maximum of 7 days*.

If you are unable to edit risk factor stale times after following these steps, contact Hillrom Technical Support at 18004453720.

Assign (or unassign) rules

To assign (or unassign) rules to child entities:

1. Click **Assign Rule** on one of the **Rule Configuration** tabs to display a slide-over control with the tenant hierarchy (i.e., Region, Organization, Facility, and Unit) under the Enterprise.
2. Use the **Select All** checkbox to select all entities at a given level of the tenant hierarchy (or click the dropdown arrow at a given level of the hierarchy to display all the entities at that level and select each entity individually via its associated checkbox).

   Note: Similarly, a rule can be unassigned from an entity by de-selecting the associated checkbox.

If you are unable to assign (or unassign) rules after following these steps, contact Hillrom Technical Support at 18004453720.

Pause (or resume) a rule

Pause a rule

1. Access the **Main Menu** by clicking the "hamburger"  menu icon (upper left corner of the screen).
2. Select **Rule Inventory** to view rules that have already been created.
3. Click **Pause** on the desired rule to pause it.

Resume a rule

1. Perform Steps 1 and 2, above.
2. Click **Resume** on the rule.

If you are unable to pause (or resume) a rule after following these steps, contact Hillrom Technical Support at 18004453720.

Print out rules

To print out a specific rule:

1. Click **Print This Rule** on the **Score Configuration** tab of the risk score template.

To print out *all* rules configured for a Unit:

1. Click **Print All Rules** on the **Rule Inventory** screen.

Note: Both screens can be accessed via the **Main Menu** by clicking the "hamburger" menu icon (upper left corner of the screen).

Note: A specific entity can be chosen via the **Current Entity** dropdown at the top of the screen.

If you are unable to print out rules after following these steps, contact Hillrom Technical Support at 1-800-445-3720.

View rules, assigned entities, or other content in Rules Manager

Note: The same roles that have permissions to create, edit, and delete rules also have the permissions needed to assign (or unassign) rules and view entities.

View assigned rules

The assigned rules for a Unit can be viewed on the **Rule Inventory** page, accessible from the **Main Menu** by clicking the "hamburger" icon (upper left corner of the screen). Once on the **Rule Inventory** page:

1. Select a Facility and a Unit from the two dropdown boxes, respectively.
2. Click **View** (right side of the rule).

Note: This will then display a list of all rules for that Unit. Clicking **View** (on the *right* side of the rule) will display the risk score configuration for the rule in a new page.

Also, from within the **Rule Score Configuration** page, the response (notification) configuration and risk context configuration (as applicable) can be viewed by selecting the corresponding tabs.

View assigned entities

The assigned entities for a rule can be viewed, as follows:

1. Click **Assign Rule** on the **Rule Configuration** tab.

Note: A control will be displayed with checkboxes corresponding to all entities within the tenant hierarchy to which the rule is assigned.

If the **Rule Inventory** or **Rule Configuration** pages do not populate with content, try performing the following steps:

1. Close the browser window.
2. Navigate back to ECP.
3. Select that same level of hierarchy again.

If you are unable to view rules, assigned entities, or other content in the Rules Manager after following these steps, contact Hillrom Technical Support at 1-800-445-3720.

Change (or update) a rule configurations

Note: Customer access to the Rules Manager is view-only; customers do not have the ability to directly configure rules, risk scores, risk context, clinical tasks, risk-based notifications, or to perform any other functions within the Rules Manager while logged in with a customer account.

To make a change in any rule configuration, rule assignment, or other rule-related setting in the Rules Manager, please contact Hillrom Technical Support at 1-800-445-3720.

Additional troubleshooting can be found in the Gateway Internal Troubleshooting Guide.

※※※

※※※

TECHNICAL ISSUES AND WORKAROUNDS

Choose a topic from the list of subjects below.

I am having trouble with:

ADT/EMR

Bed/integrated contact-free continuous monitoring device

Caregiver

Mapping

Patient data

Patient data from vitals monitors is not properly being processed by the system.

Suggested workarounds:

- Failed communication will generate a visual indication on CSM/CVSM, indicating that data was not successfully transferred and providing suggested troubleshooting actions.

- Patient vitals and risk scores may still be available if manually charted in EMR.
- Caregivers will still be able to assess a patient's condition based on other EMR data, and respond per the facility's protocol.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Data from the hospital's ADT system that is not being processed by the system.

Suggested workarounds:

- CSM/CVSM will indicate failed patient queries and provide suggested troubleshooting actions.
- Status Board will indicate if an ADT admit/discharge for a patient wasn't received.
- Voalte mobile will indicate if an ADT admit/discharge for a patient wasn't received.
- Alternative interfaces and the charge nurse may be available for tracking admits, discharges, and transfers.
- Caregivers will still be able to assess a patient's condition based on vital signs and EMR data, and respond per the facility's protocol.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

A system fault due to loss of power.

Suggested workarounds:

- CSM/CVSM will indicate loss of network connectivity and provide suggested troubleshooting actions.
- Status Board will indicate a power outage via lack of data displayed for a patient and/or bed.
- Voalte mobile will indicate a power outage via lack of data displayed for a patient and/or bed.
- Hospitals should use backup generators to restore power in the event of an outage.

Action: FIRST, restore power. Then, if the problem persists, contact Hillrom Technical Support at 1-800445-3720.

Corrupted Patient data..

Suggested workarounds:

- CSM/CVSM will indicate when data transmission to EMR fails and provide suggested troubleshooting actions.
- Caregivers will still be able to assess a patient's condition based on vital signs and EMR data, and respond per the facility's protocol.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Association of patient data to the wrong tenant.

Suggested workarounds:

- The system deployment is certified prior to clinical use.
- Only patient data from vital signs monitor will be impacted; notifications based on orders/lab values/meds will not be affected.
- Erroneous data may be detected by comparing displayed data on vitals monitor to data in hospital ADT and EMR systems.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

System failure due to software update.

Suggested workarounds:

- Single, clustered servers will be taken offline for software updates without affecting other servers.
- The system deployment is certified prior to clinical use.
- System may be rolled back to a prior software release in the event of a system failure.
- Software updates are validated at the system level prior to deployment.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

System failure due to network outage.

Suggested workarounds:

- Status Board will indicate a network outage via lack of data displayed for a patient and/or bed.
- Voalte mobile will indicate a network outage via lack of data displayed for a patient and/or bed.
- CSM/CVSM will indicate loss of network connectivity and provide suggested troubleshooting actions.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

System failure due to configuration change during system operation.

Suggested workaround:

- The system deployment is re-certified after configuration changes.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

System failure due to incompatible software versions.

Suggested workarounds:

- Software updates are validated at the system level prior to deployment.
- Failed communication will generate a visual indication on CSM/CVSM, indicating that data was not successfully transferred.
- Status Board will indicate failed communication via lack of data displayed for a patient and/or bed.
- Voalte mobile will indicate failed communication via lack of data displayed for a patient and/or bed.
- System may be rolled back to a prior software release in the event of a system failure.
- Patient vitals and risk scores will still be available if manually charted in EMR.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

ADT/EMR data is not being properly processed by the system.

Suggested workarounds:

- Caregivers will still be able to assess a patient's condition based on vital signs data and respond per facility protocol.
- Caregivers will still have access to ADT to view patient admissions/discharges/transfers, and EMR to view charted data.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

ADT/EMR-based notifications not being transmitted to Voalte mobile devices.

Suggested workarounds:

- Caregivers will still be able to assess a patient's condition based on vital signs data and respond per facility protocol.
- Caregivers will still have access to ADT to view patient admissions/discharges/transfers, and EMR to view charted data.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Bed/integrated contact-free continuous monitoring because it is unavailable.

Suggested workarounds:

- Status Board and Voalte mobile will visually indicate when bed/integrated contact-free continuous monitoring data is unavailable.

- Patient weight, vitals, and bed status will still be available if manually charted in the EMR.
- Caregivers may still assess a patient's condition based on vital signs and EMR data, and respond per facility protocol.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Incorrect/incomplete mapping of clinical data elements to codes (value sets) has occurred.

Suggested workarounds:

- The system is not intended to diagnose patients or replace clinical judgment.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Status Board is unable to display patient/bed data.

Suggested workarounds:

- Status Board will visually indicate when data is not available.
- Patient vitals/risk score data will still be displayed on supported vital signs monitors, the EMR, and other supported clinical interfaces, such as Voalte mobile.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Voalte mobile is unable to display patient/bed data.

Suggested workarounds:

- Voalte mobile will visually indicate when data is not available.
- Patient vitals/risk score data will still be displayed on supported vital signs monitors, the EMR, and other supported clinical interfaces, such as Status Board.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Notifications were not sent to alert the communication manager.

Suggested workarounds:

- Vital signs, risk scores, risk stratifications, and risk context will still be viewable on supported clinical interfaces.
- Caregivers will still be able to assess a patient's condition based on vital signs/risk score data, and respond per facility protocol.
- Caregivers will still have access to the EMR to view charted data.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Caregiver alert fatigue.

Suggested workarounds:

- Vitals alert thresholds may be configured per patient to minimize false alerts.
- CSM/CVSM vitals alerts may be filtered and/or delayed, as necessary.
- Escalation procedures configured in alert communication manager will ensure ignored notifications are sent to multiple back-up caregivers.
- Alert manager settings can be configured to minimize vitals alert fatigue, as desired.

Action: Contact assigned Clinical Specialist for assistance in configuring risk-based notification settings, as necessary.

Notification not created or processed correctly.

Suggested workarounds:

- Caregivers will still be able to assess a patient's condition based on bed, vital signs, and EMR data, and respond per facility protocol.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Risk monitoring does not respond to resume command, which prevents system notifications.

Suggested workarounds:

- Caregivers will still be able to assess a patient's condition based on bed, vital signs, and EMR data, and respond per facility protocol.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

Miscalculation of incoming data causes erroneous risk monitoring, clinical decision support, and data transmission to clinical interfaces.

Suggested workarounds:

- Erroneous data may be detected by comparing displayed data on connected clinical interfaces with data on supported vital signs monitors (e.g., vital signs, risk scores), beds (e.g., patient weight, vitals, and bed safety status), and in the EMR.

Action: If the problem persists, contact Hillrom Technical Support at 1800445-3720.

No display of bed/integrated contact-free continuous monitoring data on supported clinical interfaces due to a late ADT admission.

Suggested workarounds:

- Late ADT admission is indicated on Status Board as a row without any patient identifier in the default "Patient" column, but with the patient icon colored green in the default "Rails" column of the Bed Status indicators.
- Late ADT admission is indicated on Voalte mobile as a patient not being available to a given room, and no patient data being available.
- Proper nursing practice includes assessment and charting of patient vitals upon placing a patient in the bed.

Action: Admit patient via ADT system.

Incorrect display of bed/integrated contact-free continuous monitoring device data on supported clinical interfaces because the previous patient is still assigned to the bed.

Suggested workarounds:

- Status Board will display the previous patient assigned to the bed in that room.
- Voalte mobile will display the previous patient assigned to the bed in that room.
- Proper nursing practice includes assessment and charting of patient vitals upon placing a patient in the bed.
- Incorrect data display for a patient should prompt caregiver to contact appropriate hospital personnel to rectify the admit record.

Action: Correct patient admit record via ADT system.

Incorrect display of bed/integrated contact-free continuous monitoring data on supported clinical interfaces because another person has gotten into a patient's bed.

Suggested workarounds:

- Bed exit alarm will trigger, when set, due to a patient bed exit or sufficient weight change.
- The bed displays a message that only the patient should be placed in the bed, after a patient reset is performed on the bed.

Action: Remove other person from bed and ensure patient is returned to bed.

No display of bed/integrated contact-free continuous monitoring device data on supported clinical interfaces because another person has gotten into bed with the patient.

Suggested workarounds:

- Bed exit alarm will trigger, when set, due to a sufficient weight change.
- The bed displays a message that only the patient should be placed in the bed, after a patient reset is performed on the bed.
- EarlySense will generate an "Unstable Signal" alert if EarlySense vitals cannot be measured/ interpreted.

Action: Remove other person from bed.

No risk-based notification was generated because of a late ADT admission.

Suggested workarounds:

- Late ADT admission is indicated on Status Board as a row without any patient identifier in the default "Patient" column, but with the patient icon colored green in the default "Rails" column of the Bed Status indicators.
- Late ADT admission is indicated on Voalte mobile as a patient not being available to a given room, and no patient data being available.
- Proper nursing practice includes assessment and charting of patient vitals upon placing a patient in the bed.

Action: Admit patient via ADT system.

No risk-based notification was generated because the previous patient is still assigned to the bed.

Suggested workarounds:

- Status Board will display the previous patient assigned to the bed in that room.
- Voalte mobile will display the previous patient assigned to the bed in that room.
- Proper nursing practice includes assessment and charting of patient vitals upon placing a patient in the bed.

Action: Correct patient admit record via ADT system.

Incorrect risk-based notification that was generated because the previous patient is still assigned to the bed.

Suggested workarounds:

- Status Board will display the previous patient assigned to the bed in that room.
- Voalte mobile will display the previous patient assigned to the bed in that room.
- Proper nursing practice includes assessment and charting of patient vitals upon placing a patient in the bed.
- Incorrect notifications for a patient should prompt caregiver to contact appropriate hospital personnel to rectify the admit record.

Action: Correct patient admit record via ADT system.

Incorrect risk-based notification that was generated because another person has gotten into the bed.

Suggested workarounds:

- Bed exit alarm will trigger, when set, due to a patient bed exit or sufficient weight change.
- The bed displays a message that only the patient should be placed in the bed, after a patient reset is performed on the bed.

Action: Remove other person from bed and ensure patient is returned to bed.

No risk-based notification was generated because another person has gotten into bed with the patient.

Suggested workarounds:

- Bed exit alarm will trigger, when set, due to a patient bed exit or sufficient weight change.
- The bed displays a message that only the patient should be placed in the bed, after a patient reset is performed on the bed.
- EarlySense will generate an "Unstable Signal" alert if EarlySense vitals cannot be measured/ interpreted.

Action: Remove the other person from the bed.

Measurement units of incoming data result in erroneous risk score, risk stratification, risk factor, risk context, risk-based notification, and/or clinical task transmission to clinical interfaces.

Suggested workarounds:

- The system is not intended to diagnose patients or replace clinical judgment.

Action: Contact Hillrom Technical Support at 1-800-445-3720.

Additional Resources

Select one of the following sub-topics for more information:

Copyright *(on page 92)*

Patent Information *(on page 132)*

Legal Disclaimer

Open Source Attributions *(on page 132)*

Hazard Statements *(on page 132)*

Contact Information *(on page 95)*

Copyright Information

Patent Information

The Hillrom companies are leading worldwide manufacturers and providers of medical technologies for healthcare providers, caregivers and patients around the world. We bring passion, dedication, and innovation that matter and make a difference, in the lives of those we touch.

The Hillrom companies are the proprietors of European, US, and other patents and pending patent applications. For a complete list of Hillrom patents, visit http://www.hill-rom.com/patents.

Legal Disclaimer

THE HILLROM DIGITAL HEALTH CLINICAL VECTORS SOLUTION ANALYZES NEAR REAL-TIME CLINICAL DATA FROM POINT-OF-CARE DEVICES TO IDENTIFY PATIENT DETERIORATION AND SEPSIS RISK AND COMMUNICATES INTERVENTIONS, BASED ON COMMON SCORING SYSTEMS AND DEFINED BY YOUR ORGANIZATION, TO OUTPUT DEVICES. THE RULE MANAGER IS THE PART OF THE SOLUTION WHERE THOSE INTERVENTIONS ARE CONFIGURED AND ENABLED. THE RULE MANAGER IS A TOOL TO ASSIST YOUR ORGANIZATION IN THE DELIVERY OF MEDICAL CARE BUT IT IS NOT INTENDED TO BE THE SOLE BASIS FOR RISK ASSESSMENT AND RESPONSE, AND NOR IS IT A SUBSTITUTE FOR INDEPENDENT PROFESSIONAL MEDICAL JUDGMENT. YOUR ORGANIZATION IS SOLELY RESPONSIBLE FOR ALL DECISIONS, ACTS, AND OMISSIONS OF ITS CLINICIANS IN CONNECTION WITH THE DELIVERY OF MEDICAL CARE TO PATIENTS. HILLROM MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, NOR DOES IT ASSUME ANY LEGAL LIABILITY OR RESPONSIBILITY FOR THE ACCURACY, COMPLETENESS, CLINICAL EFFICACY OR VALUE OF THE RULE MANAGER OR ANY RULE DEFINED AND APPROVED BY YOUR ORGANIZATION.

Open Source Attributions

This product may contain software known as “free” or “open source” software (FOSS). Hillrom, Inc. uses and supports the use of FOSS. We believe that FOSS makes our products more robust and secure, and gives us and our customers greater flexibility.

To learn more about FOSS that may be used in this product, please visit our FOSS website at https://hillrom.com/opensource. Where required, a copy of FOSS source code is available on our FOSS website.

Related topics:

Hazard Statements *(on page 132)*

Hazard Statements

The following hazard statements apply specifically to the Patient Risk Surveillance product.

Important: Please also review the hazard statements for Smart Device Connectivity.

CAUTION: Ensure that the risk scoring, risk stratification, and risk-based notification rules configured in the Rules Manager are properly defined in accordance with hospital guidelines prior to system deployment. This includes defining the risk factor (risk score components) stale times, displayed risk context, and recommended clinical tasks per Facility policy. If adjustments need to be made, contact the assigned Hillrom Clinical Specialist or Hillrom Technical Services at (800) 445-3730.

CAUTION: Ensure that the configured risk stratification rules are assigned to the proper child entities (e.g., Facilities, Units) prior to system deployment. Configured rules must be explicitly assigned in order to be active at child entity levels. If adjustments need to be made, contact the assigned Hillrom Clinical Specialist or Hillrom Technical Services at (800) 445-3730.

CAUTION: Ensure that the configured risk stratification rules are enabled, paused, or disabled, as desired, prior to system deployment. Rule status can be viewed on the Rule Inventory section of the Rules Manager. It is especially important to ensure that only a single rule is configured and enabled for a given risk score to avoid any conflicts or unexpected system behavior. If adjustments need to be made, contact the assigned Hillrom Clinical Specialist or Hillrom Technical Services at (800) 445-3730.

CAUTION: Ensure with hospital administration that the DHCV system and all integrated components have been certified by Hillrom prior to room occupation by patients.

CAUTION: The DHCV system must be recertified and validated after configuration changes.

CAUTION: In the event of outages, other connectivity disruptions, or system failure, follow your hospital's manual processes to complete all patient and caregiver workflows. For example:

- In the event of a system failure to process risk-based notifications, a patient's condition should be assessed based on vital signs and EMR data.
- System deployment will be certified prior to clinical use and after any configuration changes.
- System software updates are validated by Hillrom at the system level prior to clinical deployment. Software updates should not disrupt clinical operation of the system, as single clustered servers can be taken offline for software updates without affecting online servers.
- In the event of a system failure, the system can be rolled back to a prior software release to maintain operations while troubleshooting occurs.

CAUTION: Hospital network connectivity is necessary for risk-based notifications to be sent to alert managers and caregiver Voalte mobile devices. An indication of loss of network connectivity on Hillrom vitals monitors and caregivers' Voalte mobile devices mitigates the risk of a hospital network outage and is consistent with industry standards. Standard hospital procedures should be followed to prevent possible delays in treatment. A patient must be manually checked and vitals signs monitor data confirmed by a caregiver at the patient's bedside before treatment decisions are made.

CAUTION: The hospital should perform periodic testing of the DHCV system to ensure the system is working properly, including after any DHCV system upgrades or component device

upgrades, connections, disconnections, or resets. The system must be recertified and validated after configuration changes. For more information, contact Hillrom Technical Services at (800) 445-3730.

CAUTION: Hillrom recommends that multiple levels of escalation should be in place for risk-based notifications.

CAUTION: Clinical decision support systems such as DHCV are not meant to take the place of provider or caregiver interactions and knowledge or judgement. This system is meant to augment their clinical knowledge and assist in more timely and patient-specific care. Caregivers should not view this system as a replacement for their current clinical practice.

Release Notes

Download Internal Release Notes: Digital Health Clinical Vectors 1.0.000 Technical Bulletin

Download External Release Notes: Digital Health Clinical Vectors 1.0.000 Release Notes

Contact Information

If additional assistance is needed, please contact Hillrom's Technical Services at (800) 445-3720 or email hrccwssupport@hillrom.com.