



# **The urgency for Remote Patient Monitoring during the COVID-19 crisis**

**Jason Bains**  
**Systems Analyst**  
**HSIS - UAB Medicine**  
**UAB MEDICINE**  
Knowledge that will change your world

# Objectives

- Background on how this started and the need for urgency
- Discuss build and build decisions to get us to current state
- Future of RPM

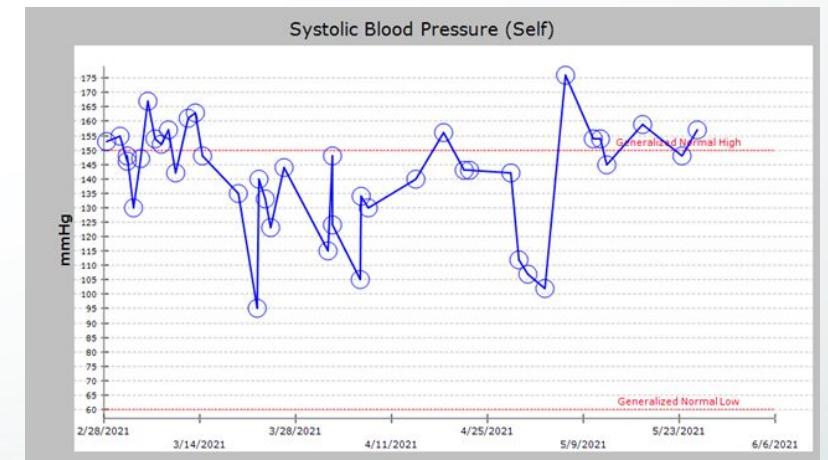
# Where did we start

- Some patients were already on remote patient monitoring
- Ideal Life was a Cerner partner
- Patients were being monitored by the eMedicine staff using the Ideal Life web portal
  - ◆ *Ideal Life portal (Raziel Health)*
    - ◆ *View and track RPM results*
    - ◆ *Set / Manage customized alert plans with alert levels to assign patients*
      - *Blood Pressure , Weight, Blood Glucose, PulseOx*
    - ◆ *Work Tasks*
      - *Engagement, Compliance follow-up*
    - ◆ *Reporting*
      - *Enrollment, Productivity, Utilization, Inventory*

# Why is RPM important

**RPM allows for continuous monitoring of individuals outside of the standard health care setting**

- ◆ COVID-19
- ◆ Increased clinician efficiency and overall understanding of patient's health data
- ◆ Frequency allows for better disease / chronic condition management and better outcomes
- ◆ Reduction in ED utilization and readmissions
- ◆ Better patient experience and engagement





# The need for urgency

**With the onset of the COVID-19 pandemic and resulting limits to operations, the urgency to implement RPM became a priority.**

- ◆ **Partnership with Cerner and Ideal Life (Raziel Health) allowed us the opportunity to integrate RPM workflow and patient results into Cerner.**
- ◆ **Allow providers to work in and view results within the patient's chart in Cerner.**
- ◆ **Cerner Implementation for RDC/RPM is projected at 12-weeks – we couldn't wait that long**

## Remote Patient Monitoring - Stand Alone Time Line

**UAB MEDICINE**

**Knowledge that will change your world**

# Project Team

## Cerner RDC/RPM Consultants

- ◆ Provide the support and guidance needed from the Cerner side.

## Ideal Life (Raziel Health)

## UAB Project Team

- ◆ HSIS Project Manager
- ◆ HSIS System Architect Manager
- ◆ HSIS Clinical Applications (Orders, ESH, Core, Mpage)
- ◆ UAB eMedicine Team
- ◆ Tech Support
- ◆ iCommand / iBus Support

# Data Flow

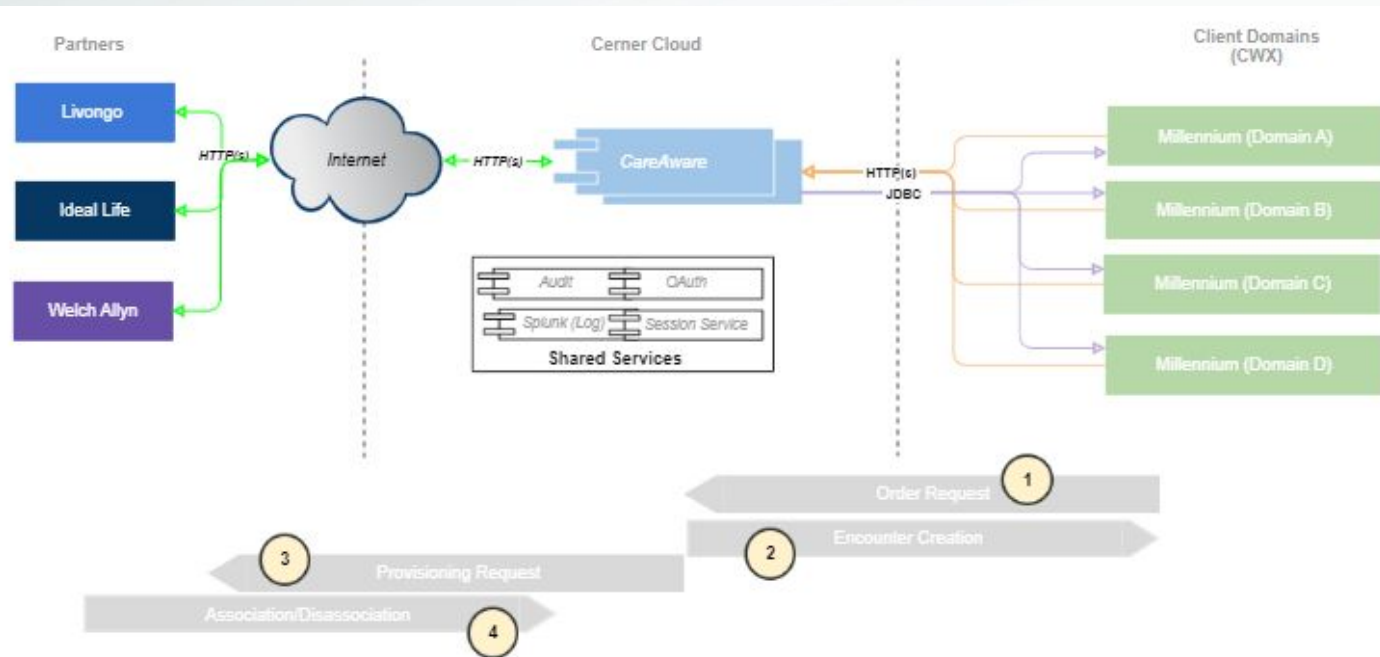


Image source: Cerner Wiki

- RPM Order is placed in Cerner
- Data flow to iBus (CareAware)
- RPM encounter created
- Order generates RPM task for the MPTL / Message Center (RPM Pool)
- Raziel Health receives order information (updates portal)
- Raziel Health assigns devices and matches to patient in Raziel portal
- Device and Order linkage in Cerner Cloud
- Patient deploys device at home (eMedicine assists)
- Patient starts taking readings
- Raziel Hub transmits to Raziel Health servers
- Information is displayed in Raziel portal
- Data is transmitted to Cerner Cloud (CareAware)
- Data is received in Cerner Millennium (PowerChart)
- Flowsheet in PowerChart displays patient RPM data
- RPM Cancel Order is placed when patient has completed or terminates program
- RPM Cancel Order disassociates device from patient



# Data Flow

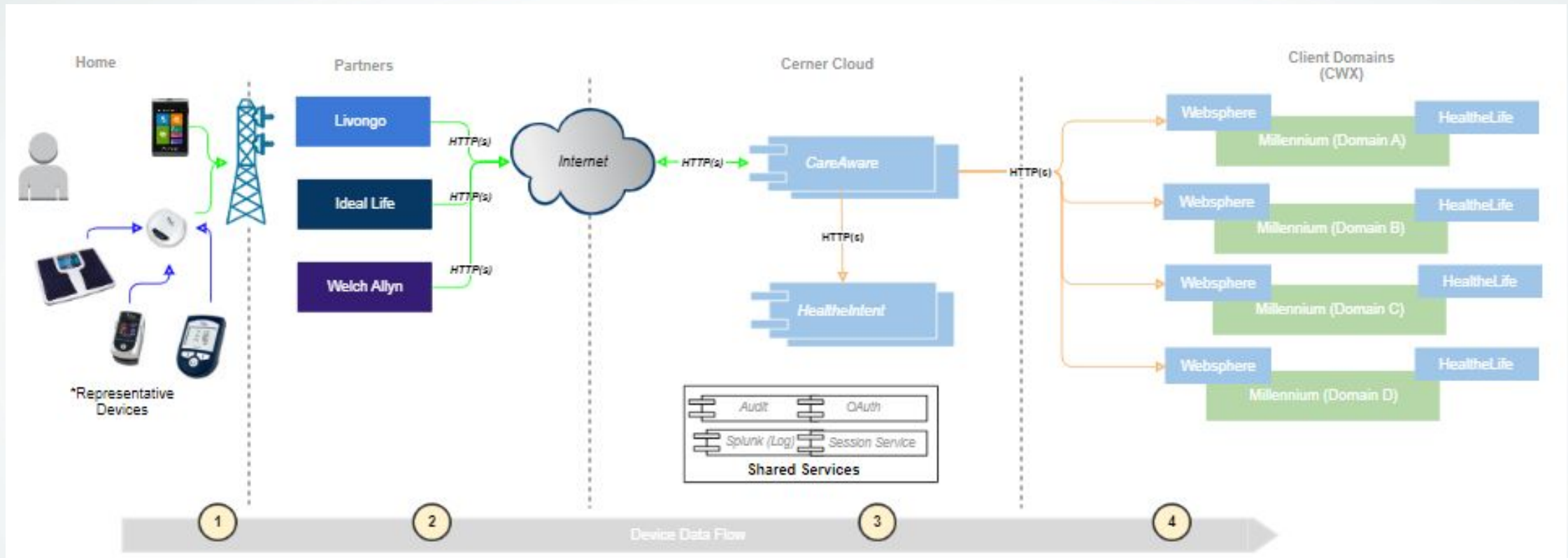


Image source: Cerner Wiki

# API Data Transmission

## Registration Data

```
{
  "orderId": "{EHR}",
  "tenant": {
    "anemonic": "{EHR}",
    "id": "{EHR}"
  },
  "kitType": "{KIT NAME}",
  "startTime": "{EHR:UTC}",
  "endTime": "{EHR:UTC}",
  "comments": "",
  "patient": {
    "id": "{EHR}",
    "identifiers": [
      {
        "type": "PID",
        "value": "{EHR}",
        "issuer": "CERNER_MILLENNIUM"
      }
    ],
    "firstName": "{EHR}",
    "lastName": "{EHR}",
    "middleName": "{EHR}",
    "gender": "{EHR}",
    "birthDate": "{EHR}",
    "isBariatric": false,
    "email": "{EHR}",
    "address": {
      "streetAddress": "{EHR}",
      "city": "{EHR}",
      "state": "{EHR}",
      "zipCode": "{EHR}"
    },
    "phoneNumbers": [
      "{EHR}"
    ]
  },
  "state": "PROVISIONING_REQUEST"
}
```

## Readings Data

```
{
  "device": {
    "vendor": "Rasiel Health",
    "serialNumber": "02000400012345",
    "model": "BP Manager II"
  },
  "entries": [
    {
      "context": "SYSTOLIC_BLOOD_PRESSURE_NON_INVASIVE",
      "units": "mmHg",
      "value": "142",
      "acqDtTm": "2019-10-10T16:08:02.000Z",
      "clinSigDtTm": "2019-10-10T16:07:53.000Z"
    },
    {
      "context": "DIASTOLIC_BLOOD_PRESSURE_NON_INVASIVE",
      "units": "mmHg",
      "value": "69",
      "acqDtTm": "2019-10-10T16:08:02.000Z",
      "clinSigDtTm": "2019-10-10T16:07:53.000Z"
    },
    {
      "context": "HEART_RATE_MONITORED_CUFF",
      "units": "bpm",
      "value": "77",
      "acqDtTm": "2019-10-10T16:08:02.000Z",
      "clinSigDtTm": "2019-10-10T16:07:53.000Z"
    }
  ]
}
```

# RPM / RDC Build Decisions

## Device Types

- ◆ Body Manager (Scale)
- ◆ Blood Pressure Manager (BP Cuff / Pulse)
- ◆ Glucose Monitor
- ◆ PulseOx

## Kit Types (Core Code Builder – Code Set 4256016) need to configure with vendor

- ◆ RPM Kits (Hypertension, CHF, Diabetes, COVID, COPD)
  - ◆ Predefined kit types
- ◆ RPM FlexKit Types (Diabetes-Hypertension, Stroke-HTN, OBGYN-Diabetes-Hypertension)
  - ◆ Allows for custom kit types

# RPM / RDC Build Decisions

## Encounter Type (Code Set 71 - send data back)

- ◆ RPM Encounter\*

## Order (DCP Tools)

- ◆ RPM Order
  - ◆ Cerner sets fields
- ◆ RPM Task Order
  - ◆ Populates MPTL and Message Center (RPM Pool) to assist eMedicine staff
- ◆ RPM Cancel Order
  - Disassociate device from patient



# RPM / RDC Build Decisions

## Order (DCP Tools)

- ◆ **RPM Order**
  - ◆ Cerner sets fields
- ◆ **RPM Task Order**
  - ◆ Populates MPTL and Message Center (RPM Pool) to assist eMedicine staff
- ◆ **RPM Cancel Order**
  - Disassociate device from patient

## Discrete Task Assays (DTAs) – sending data to Cerner Millennium

DTA	Unique Mnemonic	Description	Activity Type	Result Type	Numeric Mapping	Associated Event Code
Blood Glucose (Self)	Blood Glucose (Self)	Blood Glucose (Self)	Patient Care	Numeric	<ul style="list-style-type: none"><li>Maximum: 4</li><li>Minimum: 1</li><li>Decimal: 0</li></ul>	Blood Glucose (Self)
Blood Glucose, Postprandial (Self)	Blood Glucose, Postprandial (Self)	Blood Glucose, Postprandial (Self)	Patient Care	Numeric	<ul style="list-style-type: none"><li>Maximum: 4</li><li>Minimum: 1</li><li>Decimal: 0</li></ul>	Blood Glucose, Postprandial (Self)
Blood Glucose, Preprandial (Self)	Blood Glucose, Preprandial (Self)	Blood Glucose, Preprandial (Self)	Patient Care	Numeric	<ul style="list-style-type: none"><li>Maximum: 4</li><li>Minimum: 1</li><li>Decimal: 0</li></ul>	Blood Glucose, Preprandial (Self)
Daily Weight (lbs, Self)	Daily Weight (lbs, Self)	Daily Weight (lbs, Self)	Patient Care	Numeric	<ul style="list-style-type: none"><li>Maximum: 8</li><li>Minimum: 1</li><li>Decimal: 04</li></ul>	Daily Weight (lbs, Self)
Diastolic Blood Pressure (Self)	Diastolic Blood Pressure (Self)	Diastolic Blood Pressure (Self)	Patient Care	Numeric	<ul style="list-style-type: none"><li>Maximum: 3</li><li>Minimum: 1</li><li>Decimal: 0</li></ul>	Diastolic Blood Pressure (Self)
Oxygen Saturation (Self)	Oxygen Saturation (Self)	Oxygen Saturation (Self)	Patient Care	Numeric	<ul style="list-style-type: none"><li>Maximum: 3</li><li>Minimum: 1</li><li>Decimal: 0</li></ul>	Oxygen Saturation (Self)
Peripheral Pulse Rate (Self)	Peripheral Pulse Rate (Self)	Peripheral Pulse Rate (Self)	Patient Care	Numeric	<ul style="list-style-type: none"><li>Maximum: 3</li><li>Minimum: 1</li><li>Decimal: 0</li></ul>	Peripheral Pulse Rate (Self)
Systolic Blood Pressure (Self)	Systolic Blood Pressure (Self)	Systolic blood pressure (Self)	Patient Care	Numeric	<ul style="list-style-type: none"><li>Maximum: 3</li><li>Minimum: 1</li><li>Decimal: 0</li></ul>	Systolic Blood Pressure (Self)

# Remote Monitoring Flowsheet

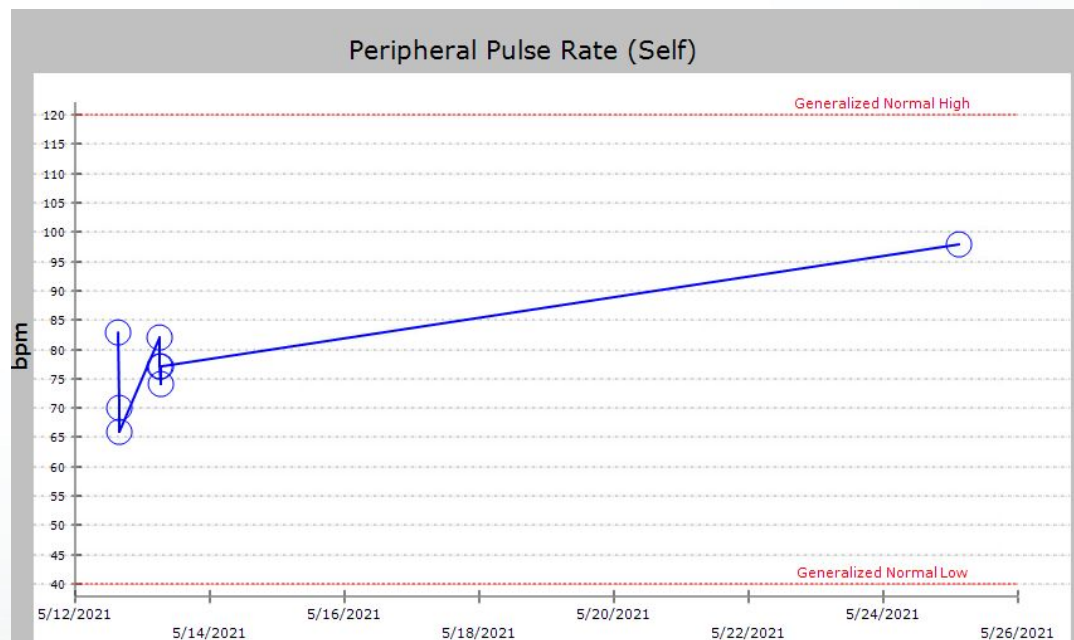
- Patient Information
- Last 2 Days Results
- Vital Signs
- Lab Results
- Results Review
- Rad/Imaging Reports
- Clinical Assessment Results
- Form Browser
- Reports and Documents
- Opioid Stewardship
- Orders
- ICH Flowsheet

Lab 48 Hour view Pathology Rad/Imaging All Results/Specialty Flowsheet CV/Pulmonary Results **Remote Monitoring**

Flowsheet: Remote Patient Monitoring ... Level: Remote Patient Monitoring ☒ Table ☐ Group ☐ List

Last 200 Results in the Past 3 Years

Remote Patient Monitoring	5/25/2021 8:20	5/25/2021 3:05	5/14/2021 15:43	5/14/2021 15:36	5/14/2021 14:20	5/14/2021 8:54	5/13/2021 6:18	5/13/2021 6:17
<b>Vital Signs - Self</b>								
<input type="checkbox"/> Daily Weight (lbs, Self)	150		180.1	163.6	180.3	179		
<input type="checkbox"/> Systolic Blood Pressure (Self)		180 H, 100					185 H, 101	133, 84
<input type="checkbox"/> Peripheral Pulse Rate (Self)		98					77	74



## RPM Results have also been added to the eMedicine MPage

Ambulatory W... X

Inpatient Wor... X

Cardio Orders X

Inpatient Disc... X

eMedicine X

Inpatient Sum... X

+

0

No Severity

Telemedicine Visit Validation

Documents (0)

RPM Results

Informed Consents

RPM Results

All Visits

Last 3 months

Last 6 months

Last 12 months

	MAY 25, 2021 08:20	03:05	MAY 14, 2021 15:43	15:36	14:20	08:54	MAY 13, 2021 06:18	06:17
Remote Patient Monitoring								
Daily Weight... lb	150	--	180.1	163.6	180.3	179	--	--
Systolic... mmHg	--	180	--	--	--	--	185	133
Peripheral... bpm	--	98	--	--	--	--	77	74



# RPM Enhancements

## Manual entry of results:

- ◆ Can now enter results in Raziel phone
  - ◆ Allows patient to continue to report without devices







## Reporting:

- ◆ CCL reports to assist with billing for the MSO
- ◆ HealtheAnalytics
  - ◆ RPM Dashboard
    - Reported Result Totals
    - BP management
    - Diabetes management
    - Geospatial Reporting





# RPM Enhancements

## Additional RPM Order Tasks:





- ◆ Certain order types needed ability to monitor and set alerts at different levels


***For ALL patients, enter diagnosis on the Diagnosis tab of the RPM order.***		
<input checked="" type="checkbox"/>	 RPM	
<input checked="" type="checkbox"/>	 RPM Task	T;N
***For OB patients with hypertension, select appropriate category and OB site below.***		
<input type="checkbox"/>	 RPM Task	T;N, Pregnancy Induced Hypertension (PIH), OBCC
<input type="checkbox"/>	 RPM Task	T;N, Pregnancy Induced Hypertension (PIH), WRH
<input type="checkbox"/>	 RPM Task	T;N, Pregnancy Induced Hypertension (PIH), MFM
<input type="checkbox"/>	 RPM Task	T;N, Chronic Hypertension in Pregnancy (CHTN), OBCC

### ▼ Details for RPM Task

 Details  Order Comments  Offset Details  Diagnoses



Requested Start Date/Time: \*\*/\*\*/\*\*\*\*    

OB-HTN Category: Pregnancy Induced Hyperten... 

OB Site: OBCC 

# RPM by the numbers

## User Enrolled:

- ◆ 2019 – 75
- ◆ 2020 – 351
- ◆ 2021 (YTD) – 263 [For 2021, averaging ~ 50 per month]

## RPM Results:

- ◆ Jan 2021 – 15,345
- ◆ Feb 2021 – 15,807
- ◆ March 2021 – 19,110
- ◆ April 2021 – 25,200
- ◆ May 2021 – 22,501

# The future of RPM

## Internal Expansion

- ◆ Continue expanding within UAB clinics and divisions
- ◆ Care Management

## External Growth

- ◆ Nursing Homes / ACM
- ◆ As we expand our eMedicine footprint
- ◆ Sharing of RPM data

## Device Expansion



# Items to note

- ◆ 'Mail to' and 'Deliver at visit' options
- ◆ Ability to add additional RPM kits to the order
- ◆ Notes interface (Raziel > Cerner)

# Cerner RDC / RPM Resource Links

## **Remote Patient Monitoring Idea Page (UCERN):**

<https://wiki.cerner.com/display/public/reference/Configure+CareAware+Remote+Device+Connectivity>

## **Install CareAware Remote Device Connectivity:**

<https://wiki.cerner.com/display/public/reference/Install+CareAware+Remote+Device+ConnectivityNotes> interface (Raziel > Cerner)

## **Configure CareAware Remote Device Connectivity:**

<https://wiki.cerner.com/display/public/reference/Configure+CareAware+Remote+Device+Connectivity>

# Questions/Comments

# Build Decisions

## Kit Types

- ◆ Kit 1

## Order

- ◆ RPM Order
  - ◆ Cerner Custom



# RPM Workflow

## Kit Types

- ◆ Kit 1

## Order

- ◆ RPM Order
  - ◆ Cerner Custom

# RPM Flowsheet

## Kit Types

- ◆ Kit 1

## Order

- ◆ RPM Order
  - ◆ Cerner Custom

# eMedicine Operations related to RPM

- ◆ Kit 1

## Other Projects:

- ◆ Telemedicine Visits
- ◆ eICU
- ◆ teleStroke
- ◆ telepsychiatry

## Kit Types

- ◆ Kit 1

## Order

- ◆ RPM Order
  - ◆ Cerner Custom