



Remote Veterans Apnea Management Portal

## **TECHNICAL OVERVIEW**

### **SYSTEM ARCHITECTURE**

Department of Veterans Affairs,  
REVAMP  
VA118-12-Q-0582

**INTELlica CORPORATION  
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SAN ANTONIO, TEXAS 78212**

**04/18/2013**

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## Change Log

Date	Version #	Author	Revision Description
4/18/2013	1	Intellica	Created

## Introduction

This document describes the overall system architecture for the REVAMP tool.

## System Overview

The Remote Veteran Apnea Management Portal (REVAMP) project is a winner of the Department of Veterans Affairs (VA) 2012 VHA Employee Innovation Competition. VA Employee Innovation Competitions occur annually under the executive sponsorship of the Secretary's Veterans Innovation Initiative (VAI2). The Initiative seeks to empower VA employees at all levels by identifying and supporting innovative concepts that have the potential to dramatically enhance the effectiveness of the department as it strives to deliver the highest-quality services to our Nation's Veterans. VAI2 effectively provides "seed" funding to the competition winners, and places organizational resources at their disposal to implement a proof-of-concept pilot. The REVAMP project is one of approximately twenty (20) awardees of the fourth annual innovation competition.

Obstructive Sleep Apnea (OSA) is a major public health problem, more common than asthma and diabetes. The condition is characterized by the repetitive closure of the throat during sleep. Veterans with sleep apnea are at increased risk of hypertension, heart attacks, strokes, and motor vehicle and work-related accidents. Currently, VA operates approximately 60 VA sleep laboratories nationally that administer in-laboratory overnight sleep testing. In-patient sleep testing, despite being the gold standard diagnostic method, is expensive, requires specialized facilities, and is often inaccessible to Veterans, especially those living in remote and rural areas.

Recent technological advances should allow these patients to be diagnosed and treated without having to visit a VA sleep center. The REVAMP project seeks to deliver a web-based mechanism for the diagnosis and treatment of OSA. A central feature of this software will be a Veteran-facing visualization tool allowing the patient to view data pertaining to their ability (or inability) to adhere to a treatment regimen. The data to generate this graphical presentation will be generated by the patient's Automatically Adjusting Positive Airway Pressure (autoPAP) device and transmitted to REVAMP by wireless modem. This graphical representation of breathing patterns will illustrate the effect of treatment adherence (or noncompliance), placing personalized information at the disposal of the Veteran – empowering them in the management of their own health care and achieving a patient-centric care model.

The VA Lead Innovator (lead SME) for this project, Samuel T. Kuna M.D., Chief of Pulmonary at Philadelphia VA Medical Center, is strategically positioned to guide development and pilot implementation of this novel OSA treatment approach. The strategic goals of the project include the reduction of patient wait times for in-person clinical visits, elimination of Veteran travel and associated costs, enablement of service delivery to Veterans living far from a VA sleep center, cost reduction to VA, and employment of innovative technology to improve clinical workflow and quality of care. The initial implementation will utilize REVAMP to deliver remote sleep apnea diagnosis and treatment to approximately 75 patients located within the geographical footprint of the Philadelphia VA sleep center.

## Scope of Work

The Contractor shall develop a web portal entitled Remote Veteran Apnea Management Portal (REVAMP) to enable the remote diagnosis, data visualization, analysis and treatment of sleep apnea. The REVAMP shall be an interactive, web-based system that will function as a patient tool for Veterans who require remote sleep apnea diagnosis and treatment. This online tool will guide Veterans through the process of managing sleep apnea and allowing VA medical personnel to make important treatment-related decisions in a timely manner. The Contractor shall provide portal design, development, testing, documentation, website management and hosting service, and data analysis and evaluation.

The REVAMP prototype application is a multi-user ASP.NET Web application that contains all the functionality to communicate with CPRS (Computerized Patient Record System) / VistA through the Medical Domain Web Services (MDWS) interface.

## System Architecture Overview

The REVAMP prototype is an ASP.NET Web application that saves and retrieves REVAMP data to and from an Oracle database. The application also communicates with a Decision Support Windows Service to save and retrieve data to and from VistA.

## System Composition

The system architecture consists of the following:

1. A Web Browser capable of navigating and displaying ASP.NET pages and running client side javascript.
2. A Microsoft Windows 2008 Server running Internet Information Server (IIS) and ASP.NET. This is the application server that hosts the Web application.
3. A Microsoft Windows 2008 Oracle database server that holds all REVAMP data.
4. A PIWIK server to collect web usage analytics.
5. A text message server to send notifications out to the patients
6. An outgoing only mail server to send notifications to the patients

## Sources of System Components

The REVAMP is a combination of Government-Furnished-Equipment (GFE), Commercial-Off-The-Shelf (COTS) components, Government-Off-The-Shelf (GOTS) components and code developed from scratch.

## Architecture of the Client Tier

Users access the REVAMP application using a thin client Web browser. The Web browser must be capable of navigating and displaying ASP .NET pages and running client side javascript.

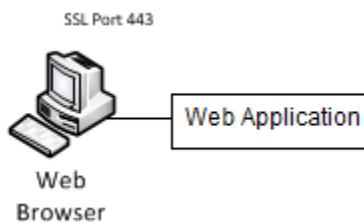


Figure 1 – Client Tier

## Architecture of the Application Web Server

The application Web server is responsible for serving dynamic ASP.NET content to the users Web browser. Access to the Web server is through SSL Port 443. Users will use MDWS credentials to Authenticate to the Web server. The Web server operating system is Microsoft Windows 2008 Server with IIS and ASP.NET.

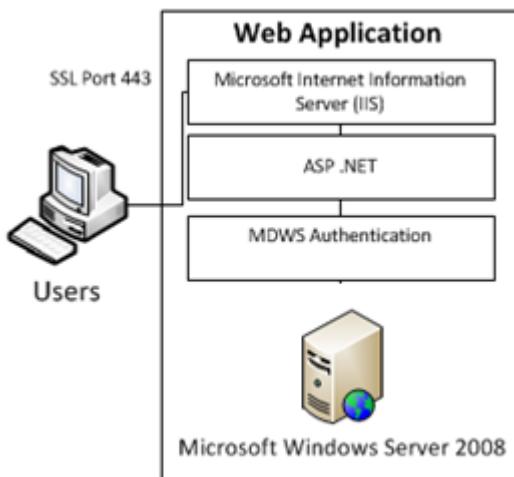


Figure 2 – Application Web Server

## Application Server Components

### *ASPX View pages*

The application uses ASP.NET master pages to create a consistent look and feel across the application. In addition to this, all of our master pages derive from a single base master page. This base page contains common functions that are used across all pages. It also acts as a central controller for security, auditing and page flow. A developer creates a View by developing the user interface in an ASPX page. The Controller functions are implemented in the code-behind file for the ASPX page (.aspx.cs).

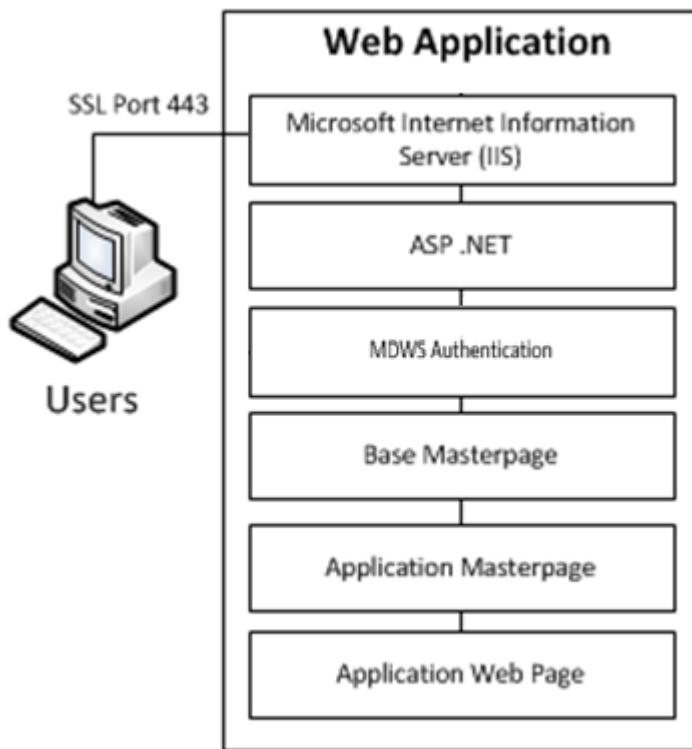


Figure 3 – Web Application Views

### *Data Access*

The application accesses data through a set of Application Data Access Classes developed in C#. These classes will use the General Data Access Classes to insert, update and retrieve data to and from the Oracle database. The General Data Access components contain tools for connecting to Oracle. They also contain tools for passing parameters to Oracle stored procedures and retrieving .NET DataSets. ALL data will be accessed via Oracle stored procedures through the Data Access layer. This will simplify auditing and centralized data access business rules as well as connection to data sources. The General Data Access Classes access the Oracle database using the System.Data.OracleClient library through port 1521.

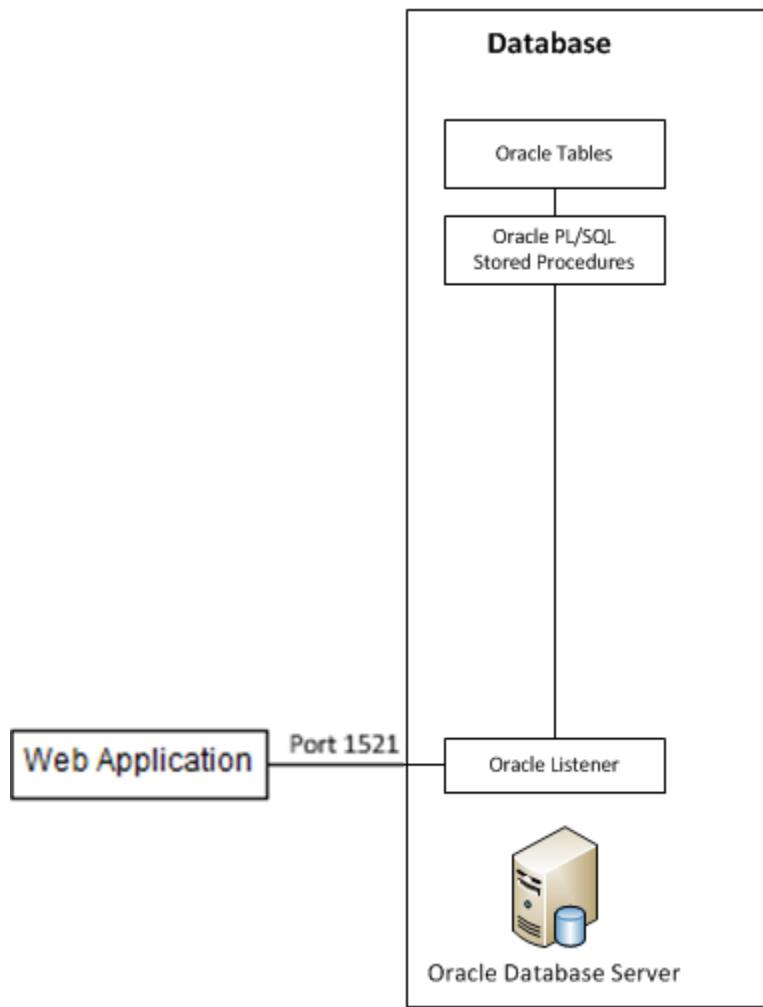


Figure 4 – Web Application Data Access

### Architecture of the REVAMP Database Server

The REVAMP Database server is responsible for storing all REVAMP related data. The database server operating System is Windows Server 2008. As stated above, ALL data will be accessed via Oracle stored procedures through the Data Access layer.

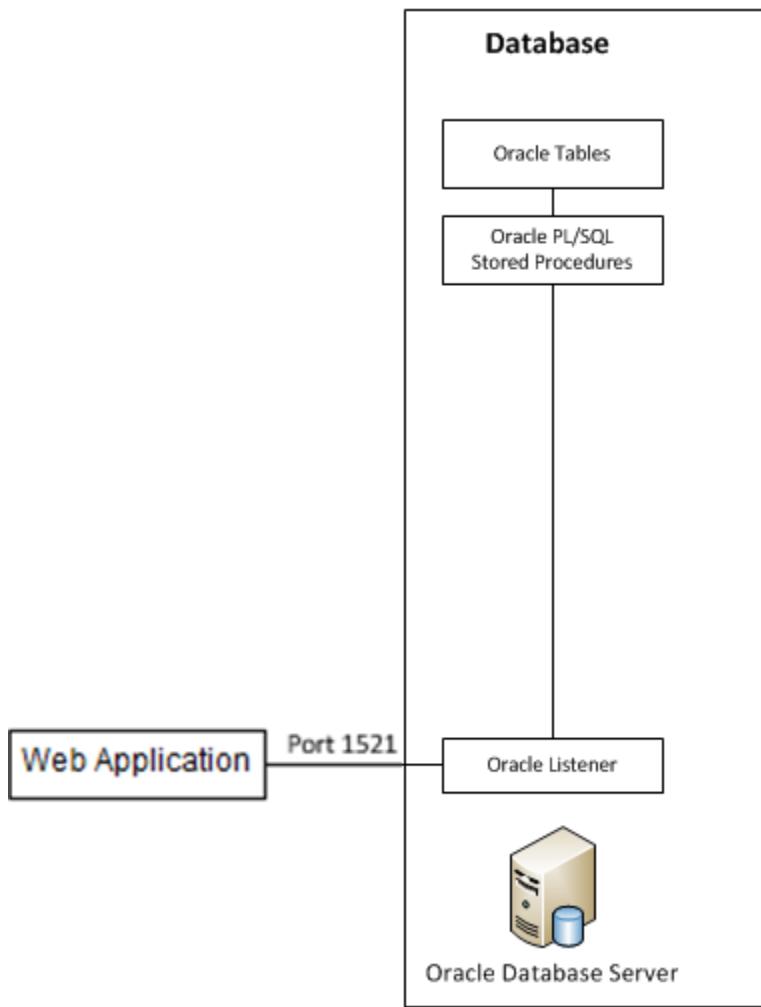


Figure 5 – REVAMP Database

## REVAMP Database Server Components

### *Stored Procedures*

Each functional area of the application has an associated Oracle Stored procedure package containing procedures and functions used to store and retrieve data. The PCK\_COMMON package contains general functions and procedures used by all other packages to save and retrieve data and status information.

### *Scheduled Tasks*

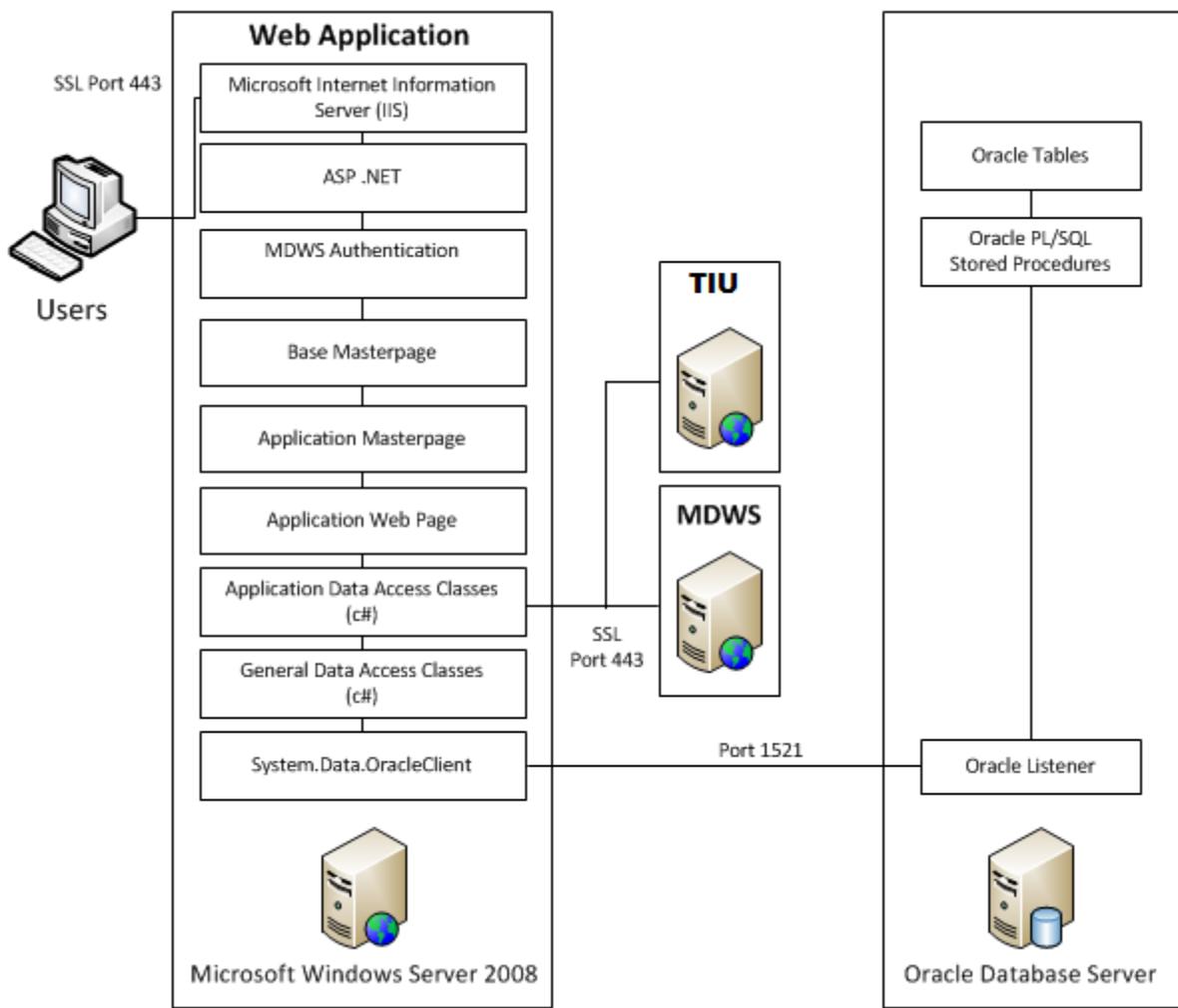
Scheduled tasks, such as updating data in the REVAMP database or backing up audit data, are implemented using Oracle Jobs that call stored procedures.

## Overall System Architecture

The following is the overall System Architecture for the REVAMP prototype. The ASP.NET Web application communicates with the MDWS and the database to store and retrieve data. The database communicates with the Decision Support Windows service to access VISTA.

### REVAMP System Architecture

1. An Internet Explorer 9.0 Web Browser HTML5 compatible and capable of navigating and displaying ASP.NET pages and running client side JavaScript.
2. A Microsoft Windows 2008 Server running Internet Information Server 7 (IIS) and ASP.NET 4. This is the application server that hosts the Web application.
3. A Microsoft Windows 2008 Server running Oracle. This is the database server for the application.
4. TIU and MDWS are used for authentication and access to VistA data.



## User Registration

The REVAMP tool uses MDWS to authenticate users. The user must have a MDWS account to access the application. No user registration capability exists in the application.

## User Login

The user must present valid MDWS credentials to login. When the user logs in to the system, a database session record will be created. Requests after logging in require a match in the session table on IP address, DBSessionID and client IP address. If the MDWS connection times out for any reason, the user will be prompted to login again.

## User Roles

The REVAMP tool will use MDWS roles to determine permissions for the application. Roles are yet to be determined.

## Access to pages

Page access will be restricted by user role. Whenever a user attempts to access a page, the database is queried to determine if the user's role meets the requirement for accessing the page. If the user is unable to access the page, the user is logged off.

## Auditing

Every stored procedure call made by the application is audited. The following items are stored in the database on every audit: database session ID that made the call, client IP from where the call originated, user ID that made the call, date and time the call was made, stored procedure called and parameters passed to the stored procedure. The parameters passed to the stored procedure are will be encrypted before storage.

## Encrypting Data at Rest

### User Name/Password Encryption

User names and passwords for the application are stored encrypted at rest as follows:

The procedures PCK\_FX\_SEC.InsertFXUser and PCK\_FX\_SEC.UpdateFXUser take two input parameters: pi\_vUserName and pi\_vPassword. These parameters are 3DES encrypted from the application before they are passed. The key used for the 3DES encryption is stored encrypted in the connectionStrings section of the web.config file as follows:

- <add name="SEC" connectionString="keygoeshere"/>

The table fx\_user stores the user name and password encrypted at rest in the user\_name and password fields.

### Patient Data Encryption

All stored procedures that need to encrypt or decrypt patient data are passed the encryption key in the pi\_vKey parameter. The data is AES 256 encrypted from the database using the fnc\_utl\_encstr function and decrypted using the fnc\_utl\_decstr function. The key used for the AES 256 encryption is stored encrypted in the connectionStrings section of the web.config file as follows:

- <add name="Key" connectionString="keygoeshere"/>

The procedures PCK\_PATIENT.InsertPatientDemographics and PCK\_PATIENT.UpdatePatientDemographics take all demographic information as un-encrypted parameters and encrypt this data before storing in the patient\_demographics table. The following fields are encrypted at rest:

- FIRST\_NAME

- MI
- LAST\_NAME
- FMP
- SPONSOR\_SSN
- SSN
- DOB
- EMAIL

Stored procedures that return encrypted patient data must first decrypt the data using the key passed in and the fnc\_utl\_destr function.

- Example: fnc\_utl\_destr(t.LAST\_NAME, pi\_vKey, t.PATIENT\_ID)

### Running Oracle Jobs that Require Encryption Key

All stored procedures that must run as jobs are defined in the PCK\_JOBS package.

Stored procedures that run as Oracle jobs cannot be passed the key directly; in this case we must go get the key before calling the procedure. The function below will retrieve the encrypted key from a file in the database server system directory and unencrypt it for use.

- sys.ic\_utl\_gk('DRDB', v\_vKey);

A wrapper procedure is created for each job. This wrapper goes and gets the key and passes it to the stored procedure that needs to run from the job.

- Example:

```
procedure ImportRESMEDData
is
    --get the key
    sys.ic_utl_gk('DRDB', v_vKey);

    --run the sp
    PCK_CPAP_IMPORT.ImportRESMEDData(
        v_vKey,
        nStatusCode,
        vStatusComment);
end;
```

### Remote Systems

The VA REVAMP Tool uses the following remote systems:

1. MDWS

## Mail Groups and Alerts

Outgoing only

## Text Message server

Outgoing only

## Patient-facing application

Same architecture as REVAMP

## Software Development Components

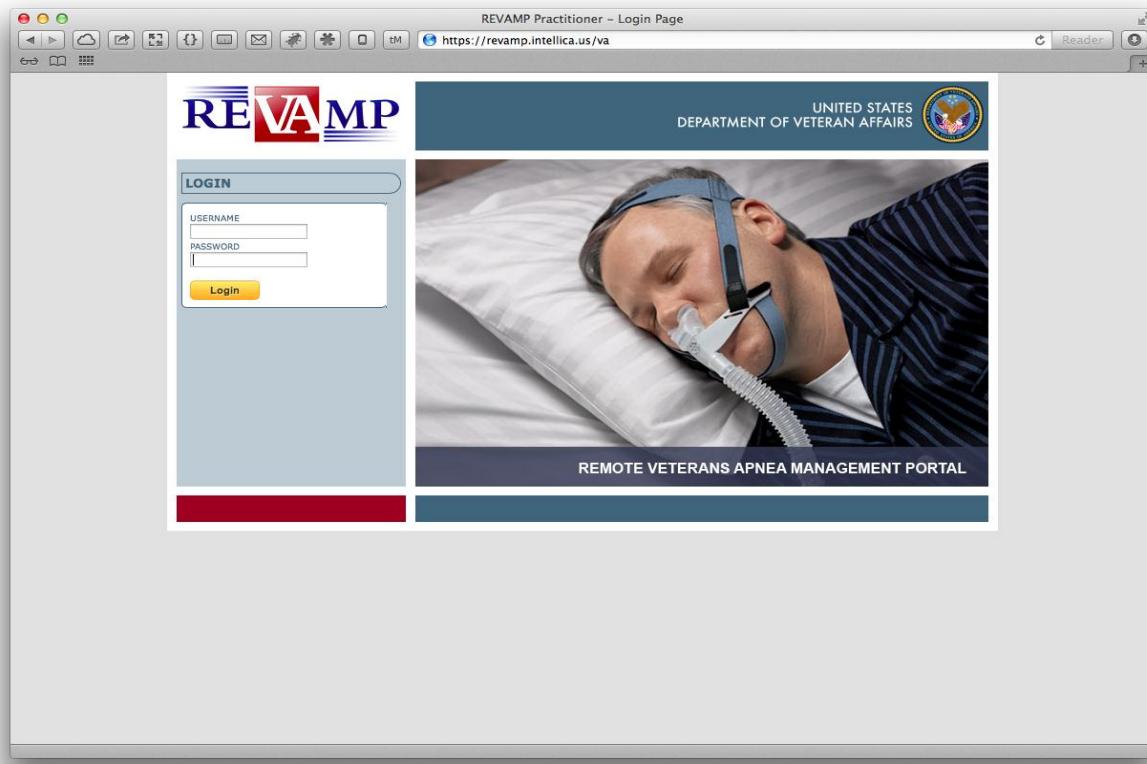
### C# Class Libraries

1. REVAMP.DA – general data access utilities for connecting to Oracle, executing stored procedures and retrieving datasets
2. REVAMP.UI – general user interface utilities
3. REVAMP.Data – grants access to REVAMP database packages
4. REVAMP.TIU – grants access to MDWS for looking up patients and writing TIU notes

### ASP .NET Web Application

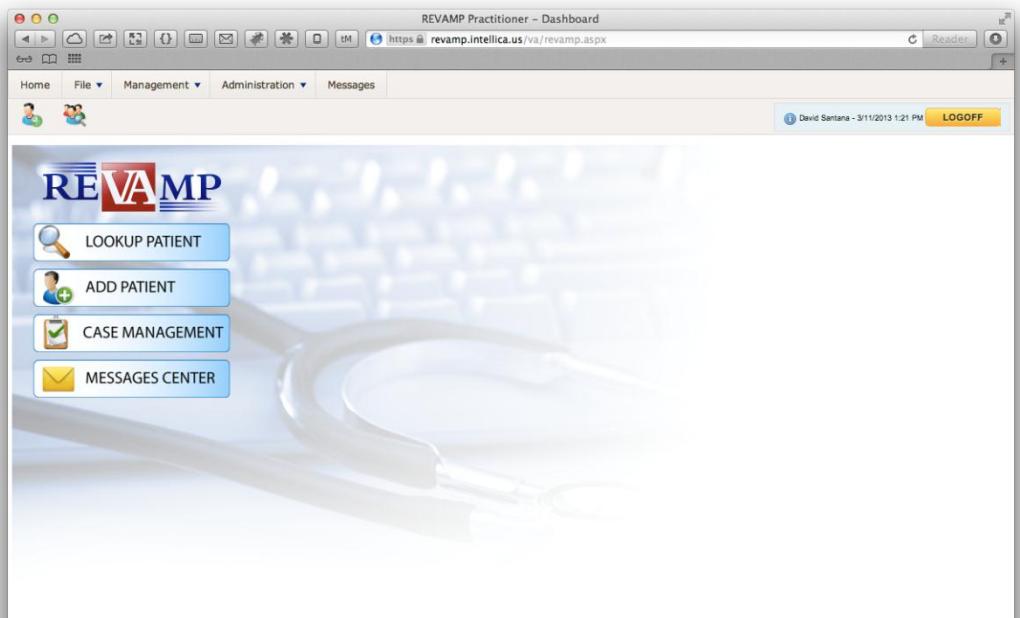
REVAMP – Web application, application and data classes are separated, all master pages derive from our controller class CBaseMaster. REVAMP .UI, REVAMP .DA and REVAMP class libraries are linked in. CAppDBConn derives from CDataConnection class. Error pages are stored in a sub directory.

## Login Page



During the initial login, the User will be prompted to change their password.

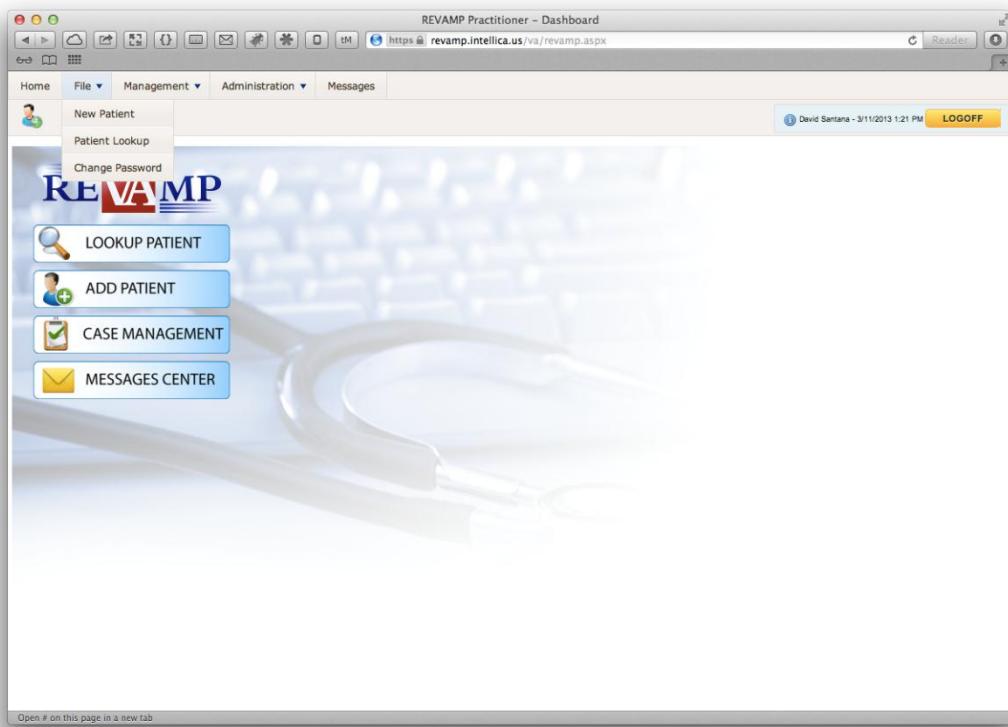
## Dashboard/Home Page



Once the User has logged into the system, the Dashboard will display.

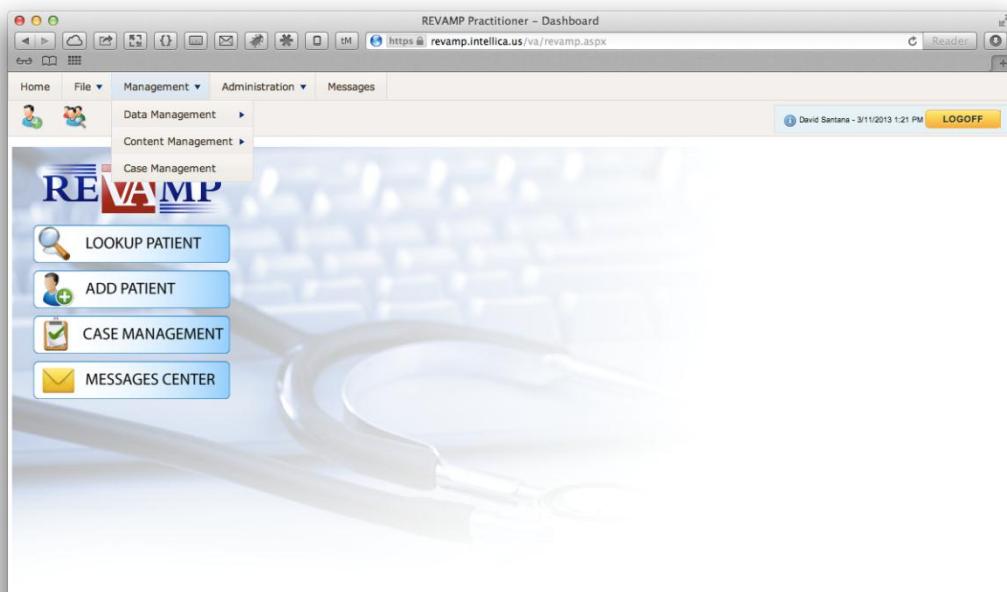
## Application Dropdown Menus and Toolbar

### File



The “File” menu item of the Menu Bar allows the Provider to access “New Patient,” “Patient Lookup,” “Clinical Note,” and to change his/her own password with the “Change Password” button.

## Management



The Management section of the REVAMP application, which will only be accessible by those with the correct User Rights, is where the User can manage Templates, Clinics, and other such Content. To get to the Management section, the User will see it on the Menu Bar.

## Change Password Screen

The screenshot shows a web browser window titled "REVAMP Practitioner - Change Password". The URL in the address bar is [https://revamp.intellica.us/va/change\\_password.aspx](https://revamp.intellica.us/va/change_password.aspx). The page header includes navigation links for Home, File, Management, Administration, and Messages, along with user information for David Santana (logged in on 3/11/2013 at 1:21 PM) and a LOGOFF button.

The main content area is titled "Change Password". It contains four input fields:

- USERNAME:
- CURRENT PASSWORD:
- NEW PASSWORD:
- VERIFY PASSWORD:

A yellow button labeled "Change Password" is positioned below the input fields.

## User Administration Page

From the User Administration page, which can be accessed under the Administration section of the menu bar, a Provider with the necessary Administration rights can look up and create new users, edit their rights, and label them as Providers or Administrators.

### User Details

The screenshot shows a web-based application window titled "REVAMP Practitioner - User Administration". The URL in the address bar is [https://revamp.intellica.us/va/user\\_admin.aspx](https://revamp.intellica.us/va/user_admin.aspx). The top navigation bar includes links for Home, File, Management, Administration, and Messages. On the right side of the header, there is a user profile icon for "David Santana - 3/11/2013 1:21 PM" and a yellow "LOGOFF" button. The main content area is titled "User Administration". On the left, there is a sidebar with icons for Add, Lago, and Show All, and a list of users: Jose Lago and Manolo Lago. The main panel has two tabs: "Details" (which is selected) and "Rights". The "Details" tab contains fields for Name, Title, Phone, E-mail, and Clinic. To the right, there is a "User Account" section with fields for User Name, Password, Verify Password, and checkboxes for Locked and Inactive. The "Rights" tab is currently empty.

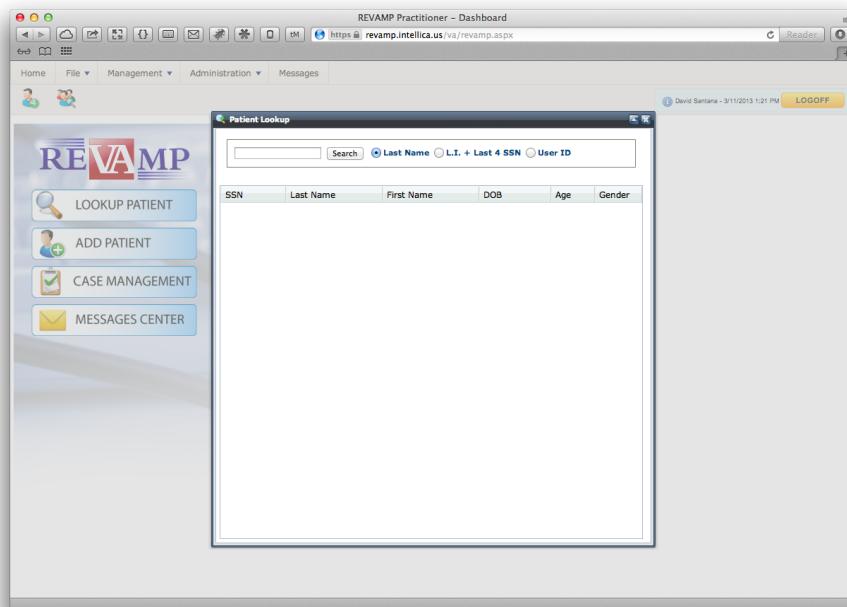
## User Rights

The screenshot shows a web-based application titled "REVAMP Practitioner – User Administration". The URL is [https://revamp.intellica.us/va/user\\_admin.aspx](https://revamp.intellica.us/va/user_admin.aspx). The top navigation bar includes links for Home, File, Management, Administration, and Messages. On the right side, there is a user profile for "David Santana - 3/11/2013 1:21 PM" and a yellow "LOGOFF" button. The main content area has two tabs: "Details" (selected) and "Rights". The "User Types" section contains two radio buttons: "Provider" (selected) and "Administrator". The "User Rights" section lists various checkboxes with their descriptions:

User Rights	Description
<input type="checkbox"/> Note / Subjective	Gives Access to the Subjective Tab on the Note
<input type="checkbox"/> Note / Objective	Gives Access to the Objective Tab on the Note
<input type="checkbox"/> Note / Assessment	Gives Access to the Assessment Tab on the Note
<input type="checkbox"/> Note / Plan	Gives Access to the Plan Tab on the Note
<input type="checkbox"/> Referrals	Gives Access to the Treatment Plan Referrals Tab
<input type="checkbox"/> Note / Flags & To Do	Gives Access to the Treatment Flags on the Note
<input type="checkbox"/> Lock / Unlock Note	Allows a User to toggle Lock state of the Note
<input type="checkbox"/> Process New Patients	Allows a User to Process New Patients
<input type="checkbox"/> Review Notes	Allows a User to Review a Note
<input type="checkbox"/> Review All Notes	Allows a User to Review All Notes
<input type="checkbox"/> Data Management	Gives Access to Data Management Functions
<input type="checkbox"/> Administrator	Gives the User Administration Functions including User Account Management
<input type="checkbox"/> CMS Author	
<input type="checkbox"/> CMS Editor	
<input type="checkbox"/> CMS Publisher	
<input type="checkbox"/> CMS Edit Menus	

After entering all the information in the ‘Details’ tab and before the Provider can save the patient account, the Provider will need to select the ‘Rights’ tab and select whether the New User is a Provider or an Administrator, along with the New Users rights.

## Patient Lookup (modal popup)



## Lookup results

A screenshot of the same dashboard and modal window as above, but with search results displayed. The search bar now contains "Sample". The table below shows 38 rows of patient data, each with a unique SSN and last name starting with "SAMPLE".

SSN	Last Name	First Name	DOB	Age	Gender
S0012	SAMPLE	SEVENTEEN	01/25/1975	38	M
S0016	SAMPLE	SIXTEEN	05/25/1962	50	F
S0026	SAMPLE	TWENTYSIX	01/26/1986	27	F
S0015	SAMPLE	FIFTEEN	05/24/1982	30	M
S0014	SAMPLE	FOURTEEN	01/18/1949	64	M
S0034	SAMPLE	THIRTYFOUR	01/01/1981	32	M
S0019	SAMPLE	NINETEEN	05/19/1985	27	M
S0002	SAMPLE	TWO	05/08/1950	62	M
S0005	SAMPLE	FIVE	05/19/1982	30	F
S0003	SAMPLE	THREE	05/19/1980	32	F
S0027	SAMPLE	TWENTYSEVEN	01/10/1985	28	M
S0033	SAMPLE	THIRTYTHREE	04/25/1982	30	F
S0020	SAMPLE	TWENTY	02/05/1980	33	F
S0006	SAMPLE	SIX	06/15/1985	27	M
S0008	SAMPLE	EIGHT	04/08/1988	24	F
S0030	SAMPLE	THIRTY	01/03/1985	28	M
S0018	SAMPLE	EIGHTEEN	01/01/1980	33	M
S0031	SAMPLE	THIRTYONE	01/23/1985	28	M
S0032	SAMPLE	THIRTYTWO	01/10/1985	28	F
S0038	SAMPLE	THIRTYEIGHT	02/05/1982	31	M
S0021	SAMPLE	TWENTYNINE	12/21/1981	31	M

## Sorting and filtering of lookup results

The screenshot shows the REVAMP Practitioner - Dashboard. The main menu includes Home, File, Management, Administration, and Messages. On the left, there's a sidebar with icons for LOOKUP PATIENT, ADD PATIENT, CASE MANAGEMENT, and MESSAGES CENTER. The central part of the screen displays a "Patient Lookup" window. In the search bar, the text "sample" is entered. Below the search bar are three radio buttons: Last Name (selected), L.I. + Last 4 SSN, and User ID. The results table has columns: SSN, Last Name, First Name, DOB, Age, and Gender. The data in the table is:

SSN	Last Name	First Name	DOB	Age	Gender
S0002	SAMPLE	TWO			M
S0032	SAMPLE	THIRTYTWO			F
S0022	SAMPLE	TWENTYTWO			M

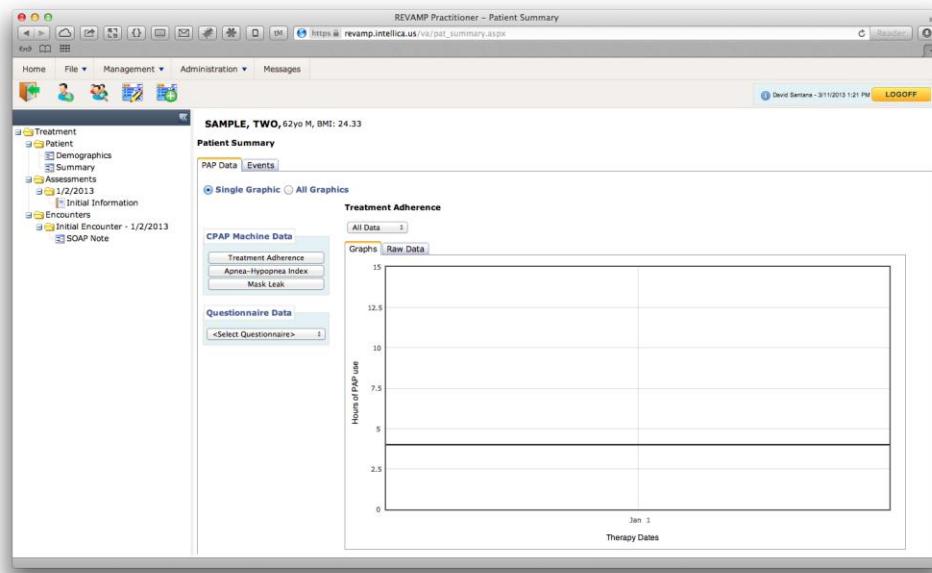
On the right side of the table, there are sorting options: "Sort Ascending" (down arrow) and "Sort Descending" (up arrow). Below these are "Columns" and "Filters". The "Filters" section is expanded, showing a dropdown menu with the value "twd" selected.

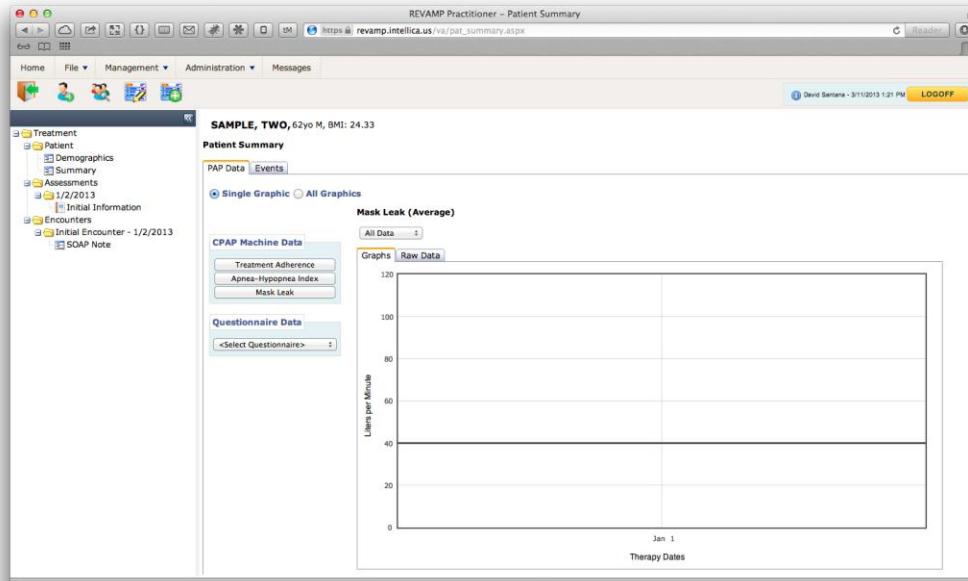
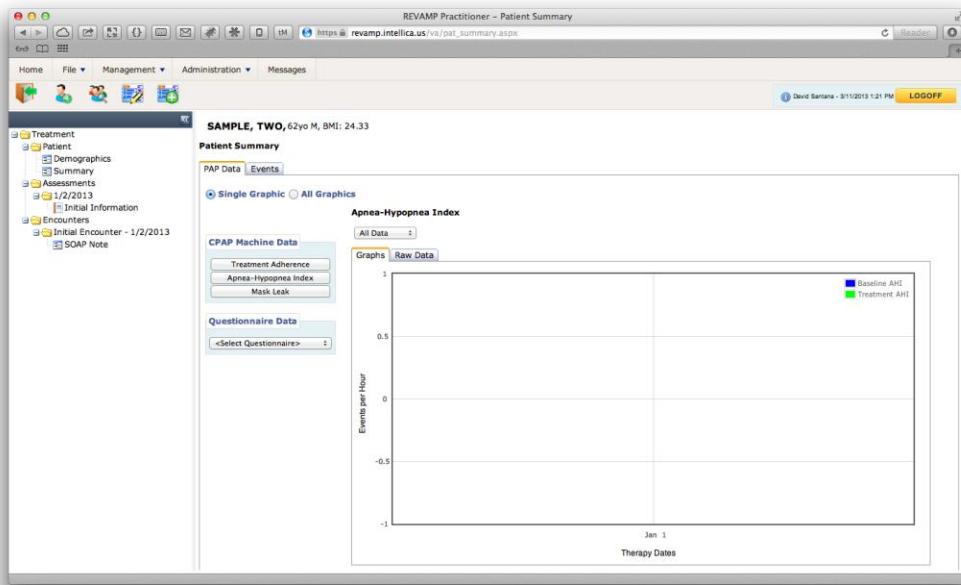
## Patient Summary page

### Treatment results graphics

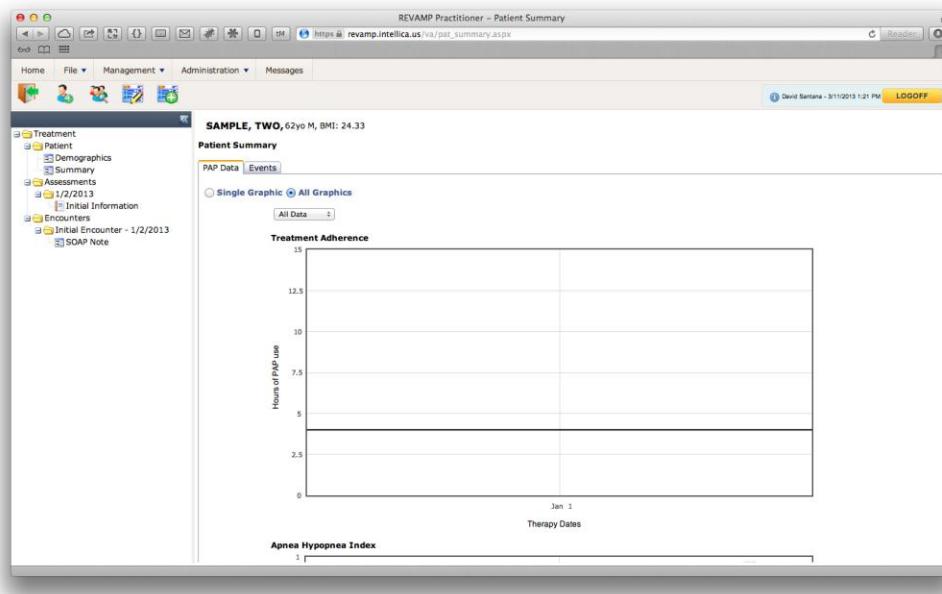
The CPAP Data Tab allows the Provider to monitor the Patient's treatment adherence, mask leak, and view an apnea-hypopnea index in graphical form. The User can select from a dropdown list of questionnaires that have scores attached to them to view graphical displays of the patient's questionnaire results (if data is available).

#### (single graphic view)





## (multiple graphics view)

**Patient events management screen**

The Events tab includes a list of the entire REVAMP treatment plan. Some items will require the Provider to manually enter a scheduled date and the update the status when done, while other will become “completed” only if the Patient does the required action, e.g. viewing the Embletta training video. The Provider may save changes by clicking on the Floppy disk icon next to the “Comments” column.

Event	Scheduled Event Date	Status	Comments
Account setup		✓	
OSA video		✗	
Embletta training video		✗	
Baseline Questionnaires		✗	
Monitor mailed	March 2013		
Monitor Received			
Initial phone call with nurse practitioner			
Process Indicator Questionnaires			
CPAP Data			
One Week FU Questionnaires		✗	
One Week Phone FU			
Process indicator questionnaires - WAI-SR,		✗	

## Patient Demographics

### Patient Details

In the First screen, as shown in the figure above, the Provider can update the Patient's basic identifying information, including First Name, Last Name, Social Security Number, Address, Work and Cell/Home Phones and whether or not it is ok to contact the Patient on them, Date of Birth, Gender, Ethnicity and Race, Email, and which Provider the Patient is assigned to.

The screenshot shows a web-based application titled "REVAMP Practitioner – Patient Demographics". The URL is https://revamp.intellica.us/va/pat\_demographics.aspx. The page displays patient information for "SAMPLE, SIXTEEN, 50yo F,". The left sidebar shows a navigation tree under "Treatment" with "Patient", "Demographics", "Summary", "Assessments", and "Encounters". The main content area contains the following fields:

- Required field.**
- First Name:** SIXTEEN
- Middle Initial:** (empty)
- Last Name:** SAMPLE
- SSN:** 123-45-0016
- Confirmation SSN:** 123-45-0016
- Address1:** 123 Main St
- Address2:** (empty)
- City:** OURTOWN
- State:** IN – INDIANA
- Postal Code:** 47095
- Home Phone:** (Including area code) 1234567895
- Cell Phone:** (Including area code) (empty)
- Work Phone:** (Including area code) 1234561222
- Which phone number would you like us to use to contact you?** Home
- Date of Birth (MM/DD/YYYY):** 05/25/1962
- Gender:** Female
- Ethnicity:**
  - Hispanic or Latino
  - Not Hispanic or Latino
  - Unknown ethnicity
- Race:**
  - Black or African American
  - White
  - Asian
  - American Indian or Alaska Native
  - Native Hawaiian or Other Pacific Islander
  - Some other race
  - Unknown race
- Ethnicity/Race Source:**
  - From Patient (radio button selected)
  - Not From Patient
- Sleep Specialist:** Kathleen Sarmiento
- Email:** sixteensample@mail.c
- OK to receive emails?** Yes (radio button selected)

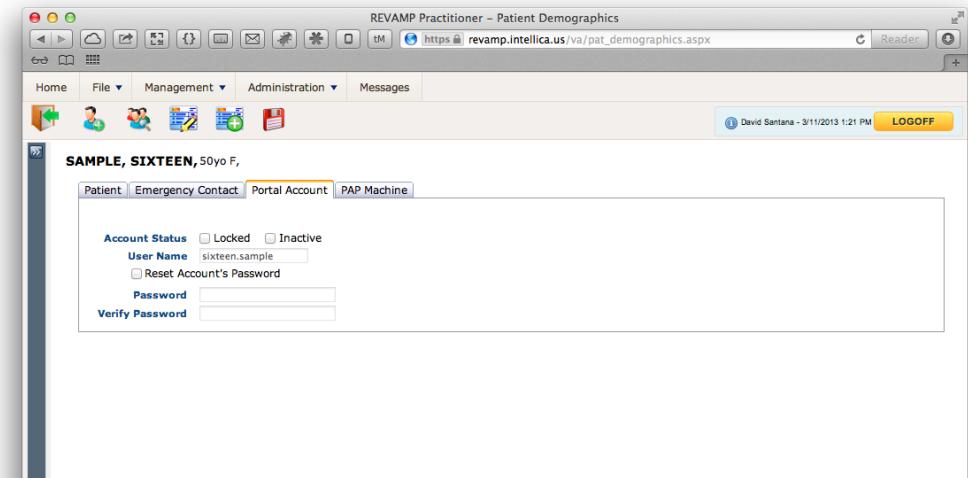
## Emergency Contact tab

In the Second screen, as shown in the figure above, the Provider can update the Patient's Emergency Contact information. The Emergency Contact information includes the Contact's Name, Work and Cell/Home Phones, Address, and Relationship to the Patient.

The screenshot shows a web-based application window titled "REVAMP Practitioner – Patient Demographics". The URL in the address bar is [https://revamp.intellica.us/va/pat\\_demographics.aspx](https://revamp.intellica.us/va/pat_demographics.aspx). The top menu bar includes "Home", "File", "Management", "Administration", and "Messages". On the right side of the header, there is a user session message "David Santana - 3/11/2013 1:21 PM" and a "LOGOFF" button. Below the menu, there are several icons representing different functions. The main content area displays a patient record for "SAMPLE, SIXTEEN, 50yo F,". A navigation bar at the top of this section includes tabs for "Patient" (which is selected), "Emergency Contact", "Portal Account", and "PAP Machine". The "Emergency Contact" tab is active, showing fields for "Emergency Contact" (a dropdown menu), "Work Phone" (a text input field), "Cell/Home Phone" (a text input field), "Street Address" (a text input field), "City" (a text input field), "State" (a dropdown menu), "Postal Code" (a text input field), and "Relationship" (a dropdown menu set to "Not Known"). At the bottom of the page, there is a link "Open # on this page in a new tab".

## Portal Account tab

The Third screen, as shown in the figure below, allows for the Provider to create and update the Patient's Portal Account. The Patient will need a Portal Account to access the Patient facing side of REVAMP.



## PAP Machine details

The screenshot shows a web-based application window titled "REVAMP Practitioner - Patient Demographics". The URL in the address bar is [https://revamp.intellica.us/va/pat\\_demographics.aspx](https://revamp.intellica.us/va/pat_demographics.aspx). The top navigation bar includes links for Home, File, Management, Administration, and Messages. A user profile at the top right indicates "David Santana - 3/11/2013 1:21 PM" and a yellow "LOGOFF" button.

The main content area displays patient information for "SAMPLE, SIXTEEN, 50yo F," with tabs for Patient, Emergency Contact, Portal Account, and PAP Machine (which is selected). The PAP Machine tab contains the following fields:

- Device**:
  - Serial Number: 99991001007
  - Type of Unit: VPAP ST (59) (radio button selected)
  - Manufacturer: ResMed (dropdown menu)
- PAP Pressure Range**:
  - Low Pressure: [input field] (4 - 20)
  - High Pressure: [input field] (4 - 20)
- Mask Interface**:
  - Mask Type:  Full Face
  - Details: [input text area]

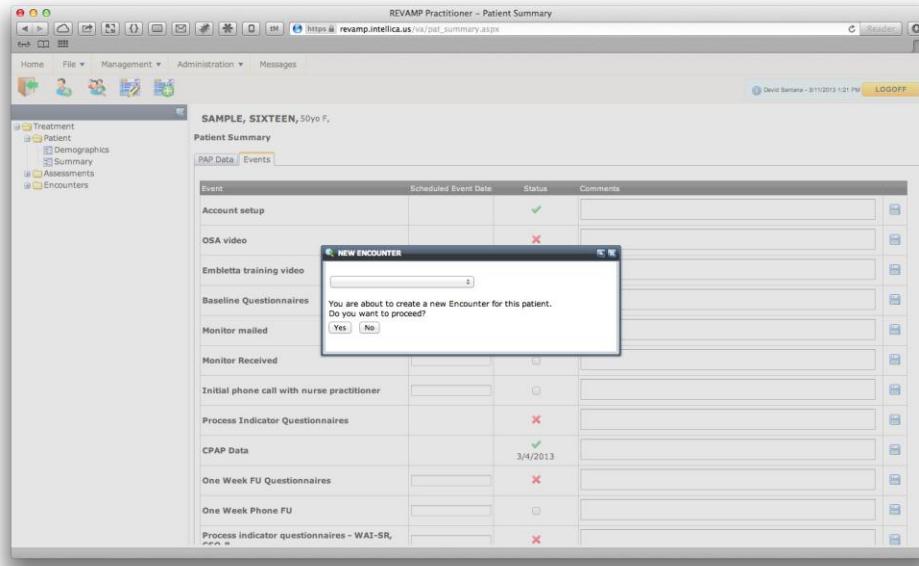
**HOME SLEEP TEST** section:

- Date of Study: 10/01/2012
- Baseline AHI: 0
- October 2012 calendar:

Su	Mo	Tu	We	Th	Fr	Sa
1	2	3	4	5	6	
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

## Encounters

### Create new encounter (modal popup)



### New encounter type options



## SOAP Note page

### Subjective tab

**SAMPLE, SEVENTEEN, 38yo M,**

**INITIAL ENCOUNTER** Session time: NA Visit date: 01/03/2013 Lock Note

Encounter Template:

Subjective Objective Assessment / Plan

Templates  Load Results

Month follow-up Clinic Note for treatment week #\_\_\_\_\_

[NAME]

Phone follow-up of this [age] yo patient on positive airway pressure (PAP) for treatment of obstructive sleep apnea.

**SUBJECTIVE:**

Section 1 of patient FU questionnaire:

Since the last sleep appointment has the patient had:  
Any surgeries or hospitalizations? \_\_\_\_\_  
Any trips away from home? No/Yes? \_\_\_\_\_  
Changes in work times or home responsibilities? No/Yes If Yes? how? \_\_\_\_\_  
Any accidents due to falling asleep while driving? No/Yes If Yes? how? \_\_\_\_\_

Section 2 of patient FU questionnaire:  
Excessive daytime sleepiness Scale: (list all)  
SITUATION:  
1. Sitting and reading: \_\_\_\_\_  
2. Driving a car: \_\_\_\_\_  
3. Sitting inactive in a public place, e.g., theater or a meeting: \_\_\_\_\_  
4. Lying down to rest for an hour without break: \_\_\_\_\_  
5. Lying down to rest in the afternoon when circumstances permit: \_\_\_\_\_  
6. Sitting and talking to someone: \_\_\_\_\_  
7. Sitting in a car (not the driver), with alcohol: \_\_\_\_\_  
8. In a car (as the driver), while stopped for a few minutes in traffic: \_\_\_\_\_  
OR  
patient does not drive

Total score: \_\_\_\_\_

Section 3 and 5 of patient FU questionnaire:  
PAP THERAPY: \_\_\_\_\_  
The patient states that on PAP treatment, the patient's sleep problem is:  
1. .... available improvement.

### Objective tab

**SAMPLE, SEVENTEEN, 38yo M,**

**INITIAL ENCOUNTER** Session time: NA Visit date: 01/03/2013 Lock Note

Encounter Template:

Subjective Objective Assessment / Plan

Templates  Load Results

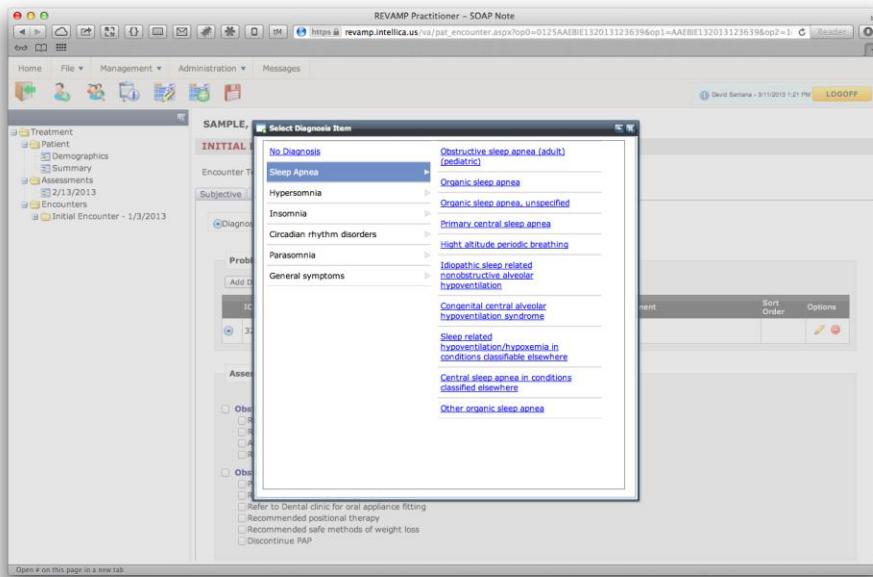
**OBJECTIVE (from PAP data)**

CPAP ADHERENCE DOWNLOAD  
Date range: from \_\_\_\_\_ to \_\_\_\_\_

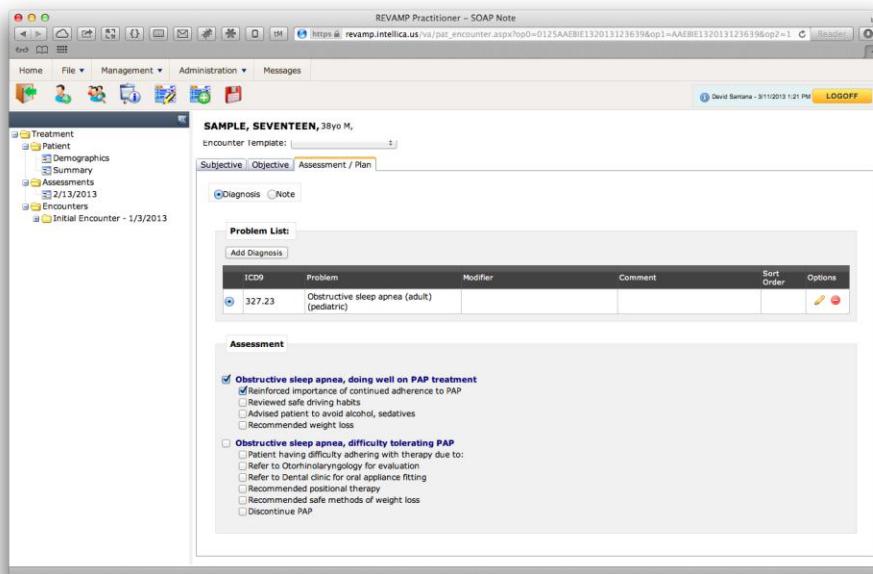
Days with Device Usage: 80 days  
Days without Device Usage: \_\_\_\_\_ days  
Percent Days with Device Usage: \_\_\_\_\_ %  
Cumulative Usage: \_\_\_\_\_ days \_\_\_\_\_ hrs. \_\_\_\_\_ mins. \_\_\_\_\_ secs.  
Maximum Usage (1 Day): \_\_\_\_\_ hrs. \_\_\_\_\_ mins. \_\_\_\_\_ secs.  
Average Usage (All Days): \_\_\_\_\_ hrs. \_\_\_\_\_ mins. \_\_\_\_\_ secs.  
Average Usage (Days Used): \_\_\_\_\_ hrs. \_\_\_\_\_ mins. \_\_\_\_\_ secs.  
Minimum Usage (1 Day): \_\_\_\_\_ hrs. \_\_\_\_\_ mins. \_\_\_\_\_ secs.  
Percent of Days with Usage >= \_\_\_\_\_ Hours: \_\_\_\_\_ %  
Percent of Days with Usage < \_\_\_\_\_ Hours: \_\_\_\_\_ %  
Total Blower Time: \_\_\_\_\_ days \_\_\_\_\_ hrs. \_\_\_\_\_ secs.  
Average AHI: \_\_\_\_\_

## Assessment / Plan tab

### Select diagnosis

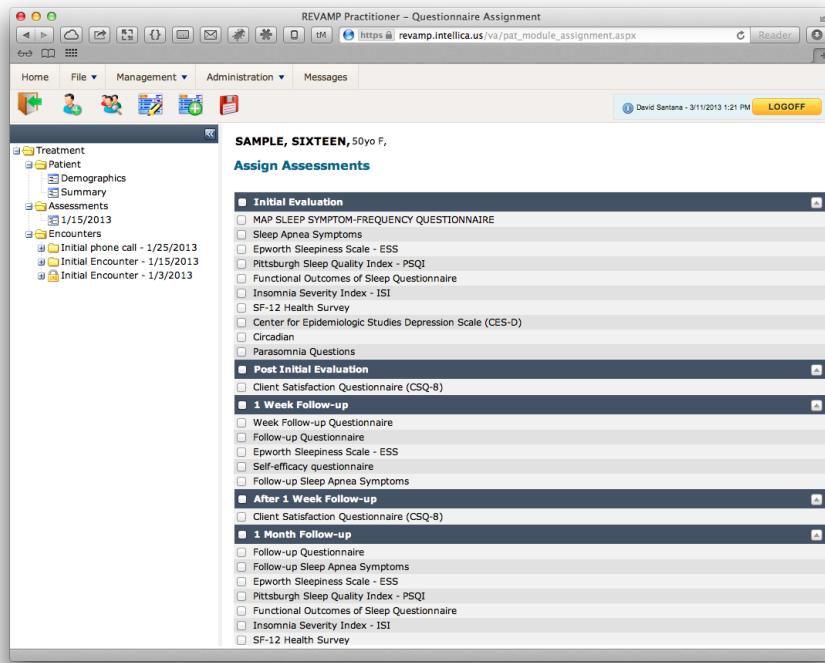


### Main Assessment / Plan screen



## Assign Questionnaires

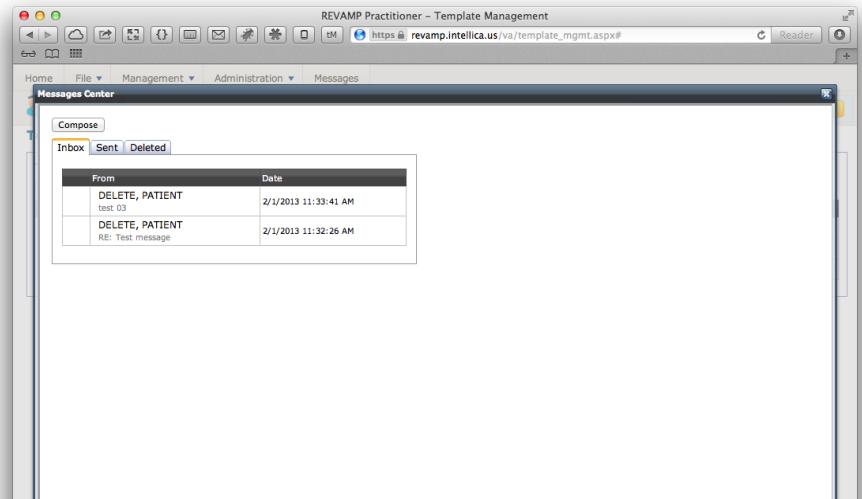
The Provider can assign questionnaires to a patient by clicking on the Assign Assessments icon on the dashboard. The Provider can select a group of questionnaires by clicking the checkbox for the group of questionnaires, or the Provider can select questionnaires individually.



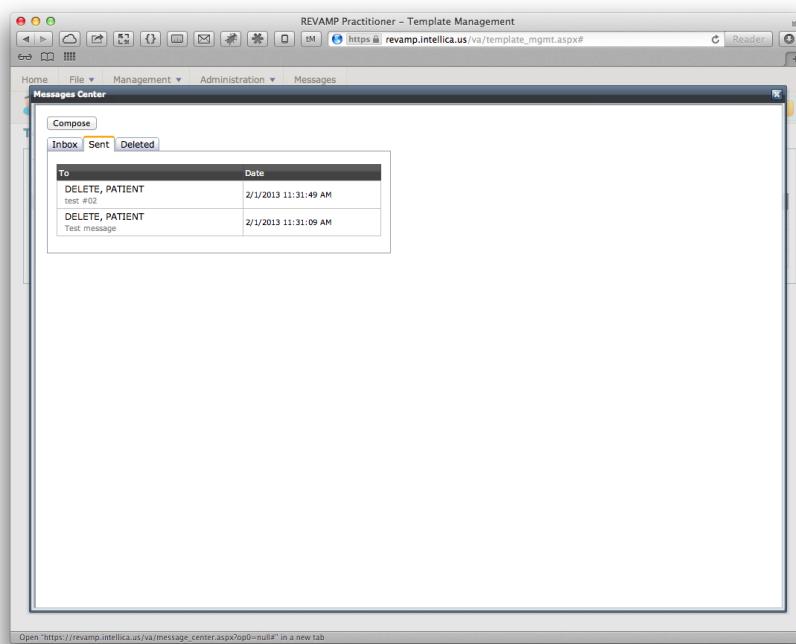
## Secure Messaging system

The Messages section of the Application allows for the Provider to contact the Patient, or other Providers, easily.

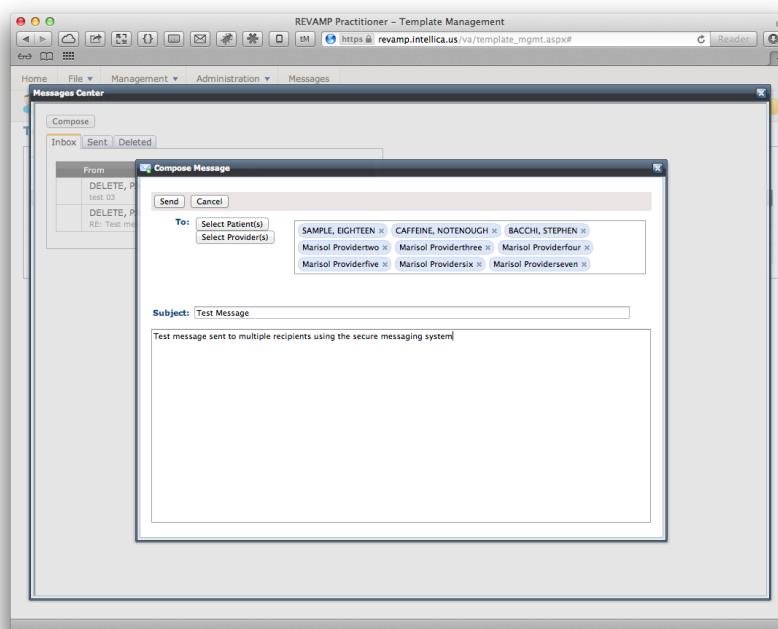
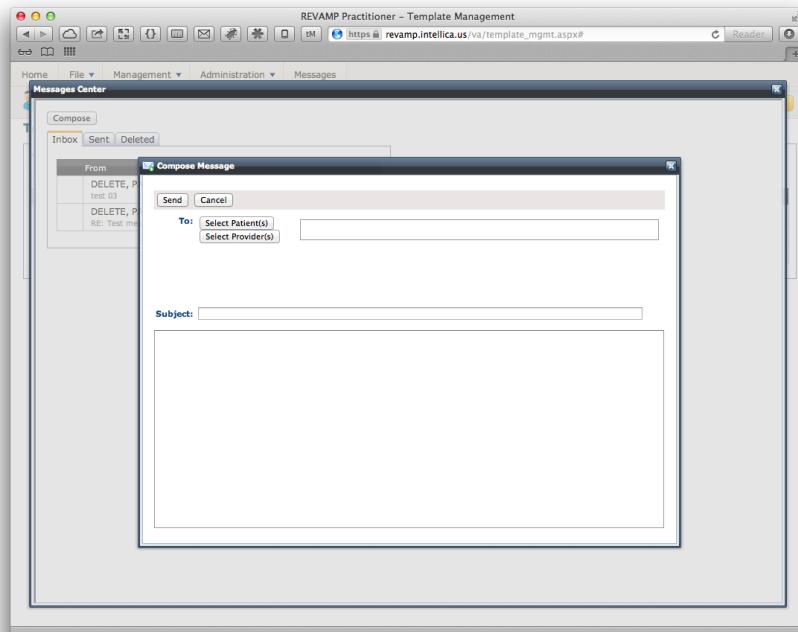
### Inbox



### Sent messages



## Compose new message

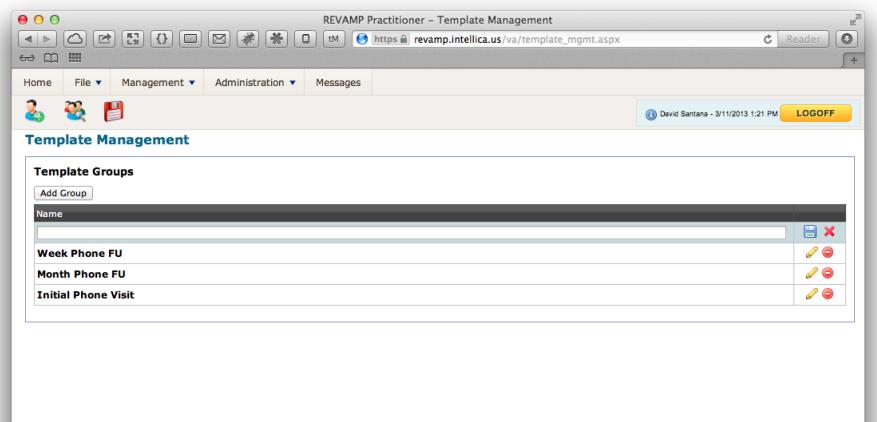


## Data Management

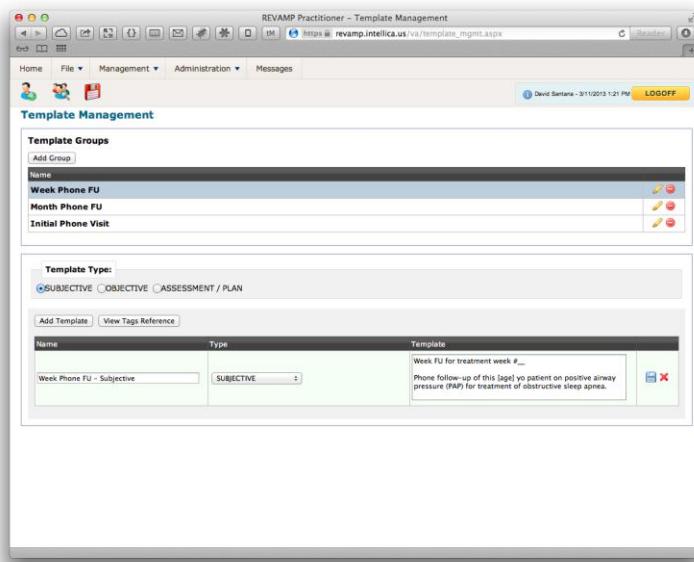
The Management section of the REVAMP application, which will only be accessible by those with the correct User Rights, is where the User can manage Templates, Content and Patient Events. To get to the Management section, the User will see it on the Menu Bar.

### Template Management

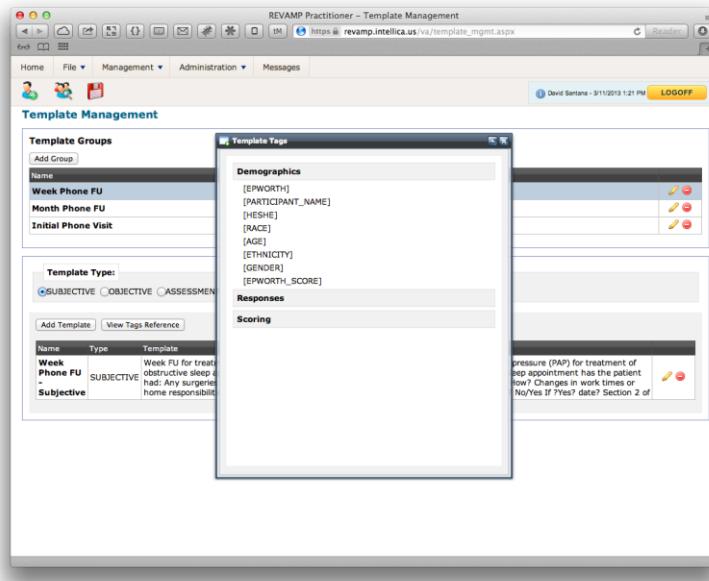
#### Add new template group



#### Add/Edit template group's items



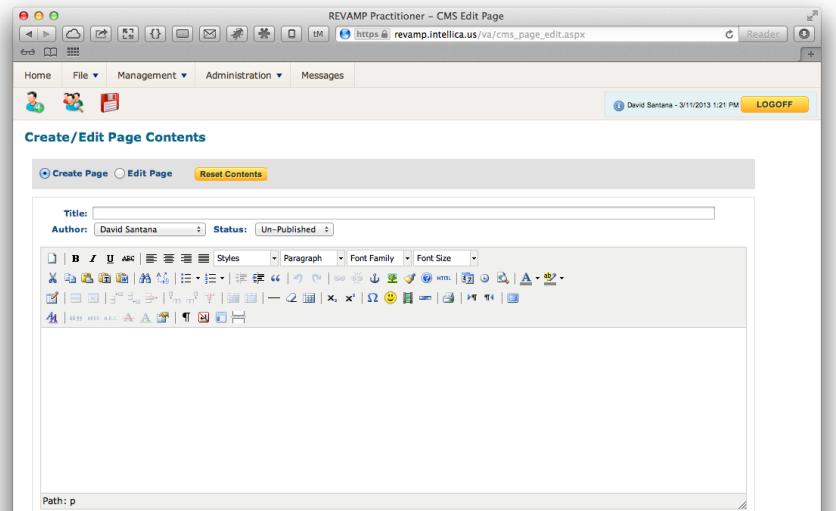
## Template tags reference



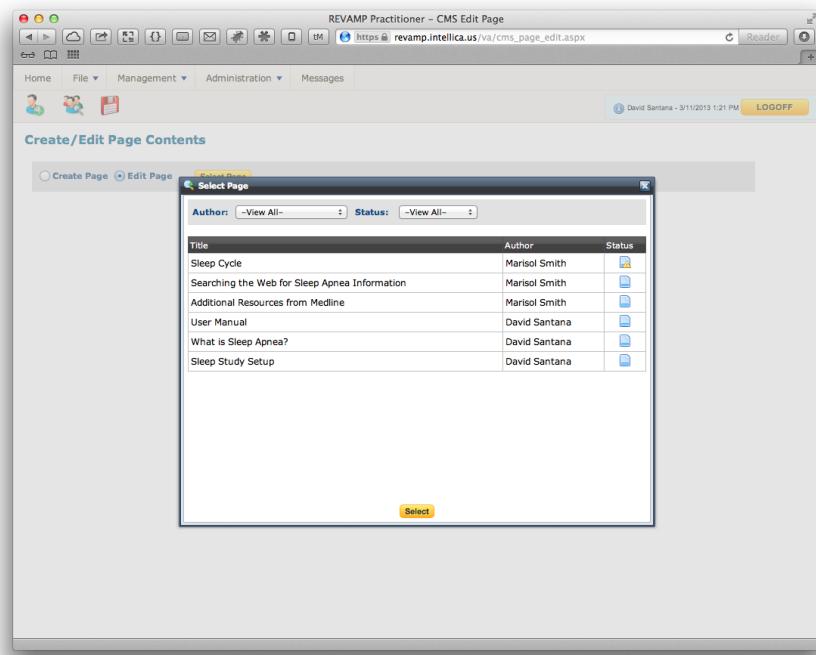
## Content Management System

The Content Management section, which is also located under the Management tab of the Menu bar, allows the User to edit and add Web Pages, and edit the Menu Bar.

### Create / Edit Static pages



### Select page to edit



## Edit page contents

The screenshot shows a web-based CMS editor for the REVAMP Practitioner platform. The title bar reads "REVAMP Practitioner - CMS Edit Page". The main content area is titled "Create/Edit Page Contents" and shows a rich text editor with a toolbar for bold, italic, underline, and various styles. The page content starts with the title "Sleep Cycle" and a paragraph from the National Institute of Neurological Disorders and Stroke. Below the content is a "Path:" field.

## Menu Editor

The screenshot shows the CMS Menu Editor interface. On the left, there is a tree view of menu items under "Root" and "Help". Under "Root", there are "Education" and "Videos" branches. "Education" contains "What is Sleep Apnea?", "Sleep Study Setup", and "Articles". Under "Help", there are "REVAMP Portal" and "User Manual" branches. "REVAMP Portal" contains "CPAP Machine". The main right panel shows a form for editing a menu item. The "Edit Menu Item" radio button is selected. The "Title" field contains "What is Sleep Apnea?", the "Target Page" dropdown also contains "What is Sleep Apnea?", the "Target Portal" radio buttons are set to "Patient", and the "Sort Order" field contains the value "1".

## Case Management

The Case Management section of the REVAMP application allows the Provider to look at a comprehensive list of the Patients in the program and see where they are in their treatment. Selecting a Patient's name will take the Provider to the Patient's Summary Page.

### Patient events (all)

The screenshot shows a web-based application window titled "REVAMP Practitioner - Case Management". The top navigation bar includes links for Home, File, Management, Administration, and Messages. A user profile icon and the text "David Samana - 3/11/2013 1:21 PM" are visible, along with a yellow "LOGOFF" button. Below the navigation is a toolbar with icons for Home, File, Management, Administration, and Messages, and buttons for View Events Due and View All. The main content area is a grid titled "Patients" with a search bar. The grid has columns for patient names and phone numbers, followed by a series of checkmarks indicating completion status for various events:

Patients	(215) 823-4400	Account Setup	OSA video	Embleta training video	Baseline Questionnaires	Monitor mailed	Monitor Received	Initial phone call with nurse practitioner	Process Indicator Questionnaires	CRAP Data	One Week FU Questionnaires	One Week Phone FU	Process Indicator Questionnaires	One Month FU Questionnaires	Three Month FU Questionnaires	Three Month Phone Reminder	Process Indicator Questionnaires	End of protocol
BACCHI, STEPHEN		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	●	⚠	⚠	⚠	⚠
BASIL, ROSEMARY	(215) 823-4400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	⚠	⚠	⚠	⚠
CAFFEINE, NOTENOUGH		✓																
CUMIN, SAGE		✓	✓	✓	✓	✓	✓	✓	✓	✓								
CURRY, JOHN	(215) 823-5800	✓																
DATA, PHILLIPS D	(210) 315-2020	✓																
DATA, RESMED D	(210) 315-2020	✓																
DELETE_PATIENT		✓																
DELETE_TWO																		
EXAMPLE_ONE	(407) 852-1455	✓	✓	✓	✓					✓								
EXAMPLES_TWO		✓																
FIELDS, TREVOR S		✓																
PATIENT_SAMUELS		✓																
PEPPER, JUANITA		✓																
REVIEW_WA																		

## Filter by Overdue Events

The screenshot shows a software application window titled "REVAMP Practitioner - Case Management". The top menu bar includes "Home", "File", "Management", "Administration", and "Messages". A user profile at the top right shows "David Santana - 3/11/2013 1:21 PM" and a "LOGOFF" button. The main content area has tabs "View Events Due" and "Overdue Events" (which is selected). Below this is a search bar labeled "Patients" with a magnifying glass icon. The main grid displays patient information and various status indicators (green checkmarks, red circles, yellow triangles) across different categories:

Patients	Account Setup	OSA video	Embleta training video	Baseline Questionnaires	Monitor mailed	Monitor Received	Initial phone call with nurse practitioner	Process Indicator/Questionnaires	CRAP Data	One Week FU Questionnaires	One Week Phone FU	Process Indicator Questionnaires	WAIS-R CSQ-8	One Month FU Questionnaires	(FSDL, PSQ-10, HAD, ESS)	One Month Phone FU	Process Indicator Questionnaires	WAIS-R CSQ-8	Three Month FU Questionnaires	Three Month Phone Reminder	Process Indicator Questionnaires	WAIS-R CSQ-8	End of protocol
BASIL, ROSEMARY (215) 823-4400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAMPLE, SEVENTEEN (456) 789-1233	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAMPLE, TWENTY	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAMPLE, TWENTYFIVE (850) 699-9626	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAMPLE, TWENTYTWO	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
USER, ONE	✓																						

## Filter by Events Due on the current week

The screenshot shows a software interface titled "REVAMP Practitioner - Case Management". At the top, there are navigation links: Home, File, Management, Administration, and Messages. On the right side, a user profile indicates "David Santana - 3/11/2013 1:21 PM" and a "LOGOFF" button. Below the navigation, a search bar says "View Events Due This Week". The main area displays a grid of patient information and event status. The columns include:

Patients	Account Setup	OSA video	Emblett training video	Baseline Questionnaires	Monitor mailed	Monitor Received	Initial phone call with nurse practitioner	Process Indicator/Questionnaires	CRAP Data	One Week FU Questionnaires	One Week Phone FU	Process Indicator Questionnaires	WAI-SR, CSQ-8	One Month FU Questionnaires (FSGQ, PSQ-9, HAD, ESS)	One Month Phone FU	Process Indicator Questionnaires	WAI-SR, CSQ-8	Three Month FU Questionnaires	Three Month Phone Reminder	Process Indicator/Questionnaires	WAI-SR, CSQ-8	End of protocol
<b>ROSEMARY BASIL</b> (215) 823-4400	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

## Filter by events due on a specific date range

The screenshot shows the same software interface as the previous one, but with a different filter applied. The "View Events Due" dropdown now says "Select Date Range" and includes "From:" and "To:" fields. The "Update List" button is visible next to the date range fields. The grid of patient information and event status is identical to the first screenshot, showing events due this week.

## Filter (search) resulting patient list by any search criteria

The screenshot shows a web-based application titled "REVAMP Practitioner - Case Management". The top navigation bar includes links for Home, File, Management, Administration, and Messages. A user profile for "David Serrano" is shown at the top right, along with a LOGOFF button. Below the navigation is a search bar with fields for "View Events Due", "Select Date Range", "From:", "To:", and "Update List". A "Patients" search input field contains the text "seven". The main content area displays a table of patients:

Patients	(456) 789-1233	Account Setup	OSA video	Emblema training video	Baseline Questionnaires	Monitor mailed	Monitor Received	Initial phone call with nurse practitioner	Process Indicator Questionnaires	CPAP Data	One Week FU Questionnaires	One Week Phone FU	Process Indicator questionnaires	One Month FU Questionnaires	One Month Phone FU	Process Indicator Questionnaires	Three Month FU Questionnaires	Three Month Phone Reminder	Process Indicator Questionnaires	End of protocol
SAMPLE_SEVENTEEN	(456) 789-1233	✓	✓	✓	✓	✓		●	✓											
SAMPLE_THIRTYSEVEN		✓		✓																
SAMPLE_TWENTYSIX	(850) 699-9626	✓																		
USER_SEVEN		✓																		

## Patient Portal Account Lookup

(patient lookup for administrators - no access to clinical data)

The screenshot shows a web-based application window titled "REVAMP Practitioner – Patient Portal Account Management". The URL in the address bar is [https://revamp.intellica.us/va/portal\\_lookup.aspx](https://revamp.intellica.us/va/portal_lookup.aspx). The top navigation bar includes links for Home, File, Management, Administration, and Messages, along with a LOGOFF button. On the left, there's a sidebar with icons for users, patients, and documents. The main content area is titled "Patient Portal Lookup". It features a grid table with columns for Last Name and First Name. The first name column contains placeholder text: "Sort Ascending", "Sort Descending", "Columns", "Filters", and a search input field containing "sample". The grid lists numerous entries starting with "SAMPLE" followed by various names like FIFTEEN, TWENTY, SIXTEEN, FOURTEEN, THIRTEEN, TEN, TWO, THREE, ELEVEN, THIRTYTHREE, TWENTYFIVE, THIRTY, EIGHTEEN, TWENTYSIX, TWENTYSEVEN, and THIRTYONE. To the right of the grid is a "Details" section with fields for Name, Phone, and E-mail. Below that is a "Portal Account" section with fields for User Name, Password, Verify, and checkboxes for Reset Password, Locked, and Inactive. The status bar at the bottom indicates "David Santana - 3/11/2013 1:21 PM".

## System Settings

The System Settings section of the Application can be accessed through the Administration tab on the menu bar.

The screenshot shows a web browser window titled "REVAMP Practitioner – System Settings". The URL in the address bar is "https://revamp.intellica.us/va/system\_settings.aspx". The page has a navigation bar with links for Home, File, Management, Administration, and Messages. On the right side of the header, there is a user profile icon and the text "David Santana - 3/11/2013 1:21 PM" followed by a "LOGOFF" button. The main content area is titled "System Settings" and contains a message: "You have Read-Only access to this section." Below this, there is a form with the following fields:

Web Site URL	<input type="text" value="https://192.168.1.40/"/>
Mail SMTP Host	<input type="text" value="127.0.0.1"/>
Mail SMTP Port	<input type="text" value="9911"/>
Sender Email Address	<input type="text" value="dmonitoring@intellicacorp.com"/>
Notify Email Address	<input type="text" value="craig.rebo@intellicacorp.com"/>
Text Message Host	<input type="text" value="127.0.0.1"/>
Text Message Host Port	<input type="text" value="9912"/>
Text Message Username	<input type="text" value="admin"/>
Text Message Password	<input type="text" value="admin"/>
Oracle Windows Directory	<input type="text" value="C:\Windows\Temp"/>