**RADV**

**Risk Adjustment Data Validation Tool**

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**Software Documentation and User Guide**

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# **Statement of Goals**

The Affordable Care Act requires health insurance companies to offer insurance to people with pre-existing conditions. By only offering policies with high co-pays and high-deductibles, insurance companies can discourage ill patients from purchasing their products. Risk adjustment prevents this by transferring premiums from insurers with healthy members to those organizations that are insuring for a more ill population.

Risk scores are used to determine the average level of illness in an insurers’ population. A risk score is calculated using the list of diagnoses recorded for a patient during the previous calendar year and is a relative score against the average patient (risk score for an average patient=1). This gives providers and insurers a strong financial interest in making medical records accurate and complete.

The RADV tool was designed to help providers validate medical records by identifying health care conditions that may be missing from a patient’s recent medical record.

# **Background Information**

Risk Scores are an estimate of an individual’s future medical costs. Recent diagnostic history is the most important data in determining an individual’s risk score. Other predictors include the individual’s geographic area, age/gender and the type of insurance policy (high-deductible, low co-pays, etc.)

Risk Selection occurs when insurers try to avoid enrolling unhealthy people by making their products unattractive to people requiring costly medical care.

Risk Adjustment discourages risk selection by transferring premiums from insurers with healthy members to those with members who are more ill.

If a member has an illness, but the diagnosis code is not reported to the insurance carrier during the calendar year, their risk score will be artificially low.

This data quality issue can substantially reduce an insured's premiums. When provider payments are on a percent-of-premium basis, it also reduces payments to hospitals and doctors.

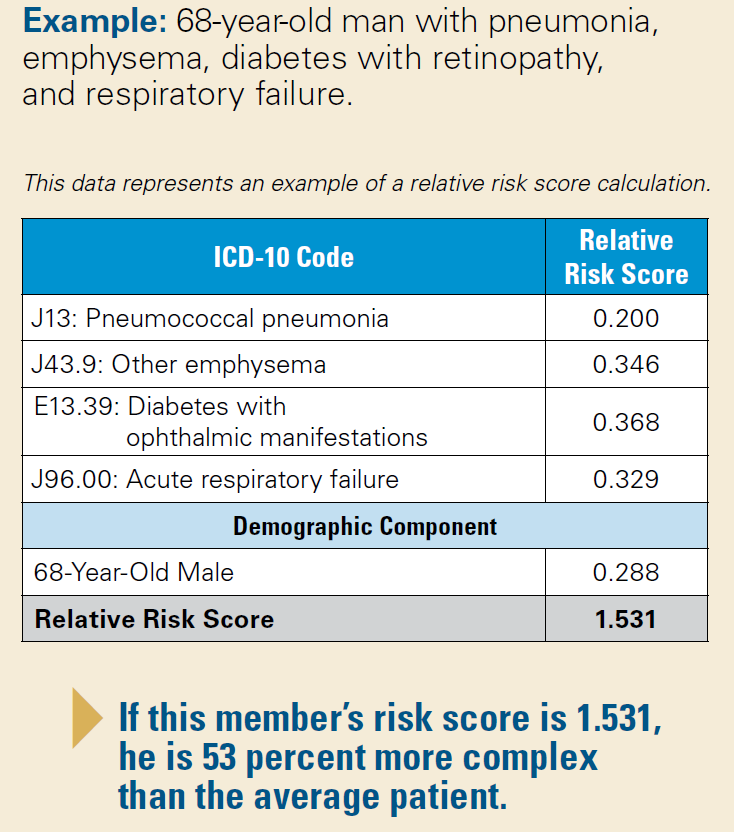
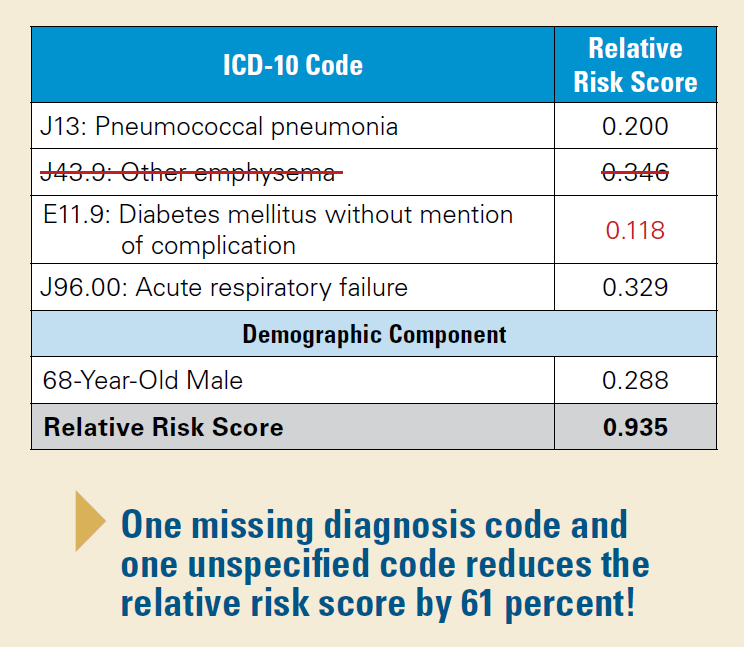
As doctors and hospitals move to a pay-for-performance structure, correct risk assessment and diagnostic codes ensure appropriate payment for treatment of patients with multiple chronic diseases.

The American Health Lawyers Association recommends the following strategies:

* Know high revenue HCCs that are often undiagnosed or under-coded
* Review missing diagnoses from prior years’ HCCs and send reminders to MDs
* Audits of records vs. codes for missing codes: last year and this year.
* Conduct annual comprehensive exams for members who have not yet been seen early in the year.

Example of Risk Score Error and consequences:

68-year-old man with pneumonia, emphysema, diabetes with retinopathy, and respiratory failure has the following risk profile



Source: https://www.bcbsal.org/providers/pdfs/riskAdjustment.pdf

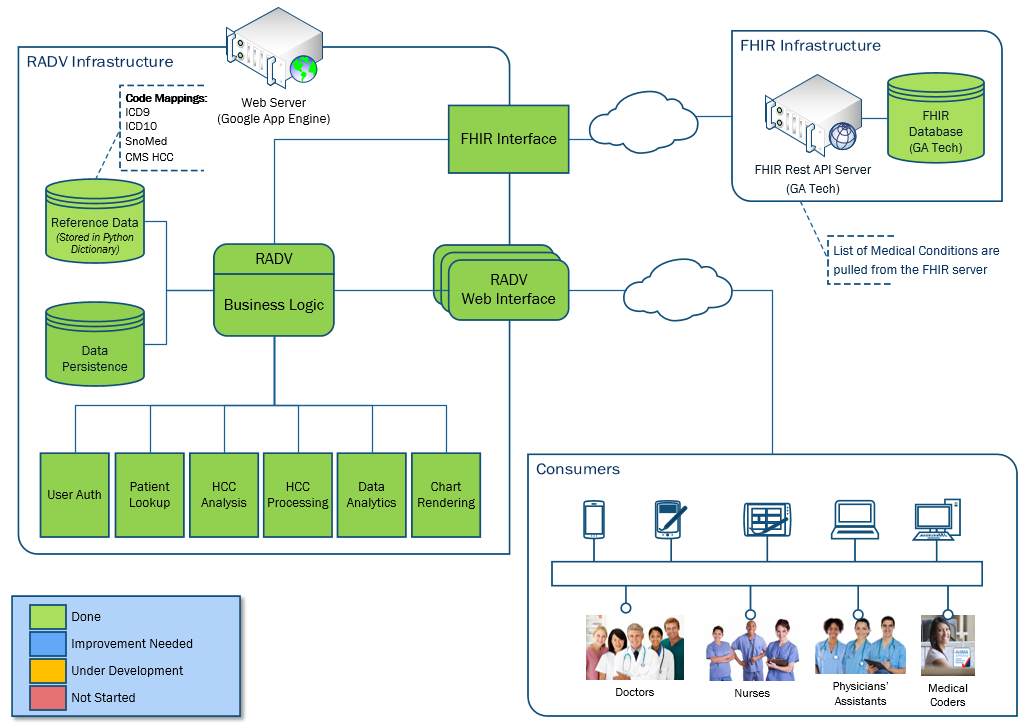
# **Functional Description**

For systems that use a Fast Healthcare Interoperability Resources (FHIR) Server or another centralized data source, RADV allows clinical staff and doctors to search a patient’s available clinical history for any conditions that are not listed in the current year. Upon finding any missing conditions or hierarchical condition categories (HCCs), clinical staff can add the HCC to the patient’s record. This facilitates accurate risk scoring and financial accounting and payments.

# **Future of the Application**

In its current version, RADV uses the FHIR server with artificial data provided by the Georgia Institute of Technology for educational and research purposes. A real world implementation would interact with an actual FHIR server or one of the open source FHIR servers.

# **System Architecture**



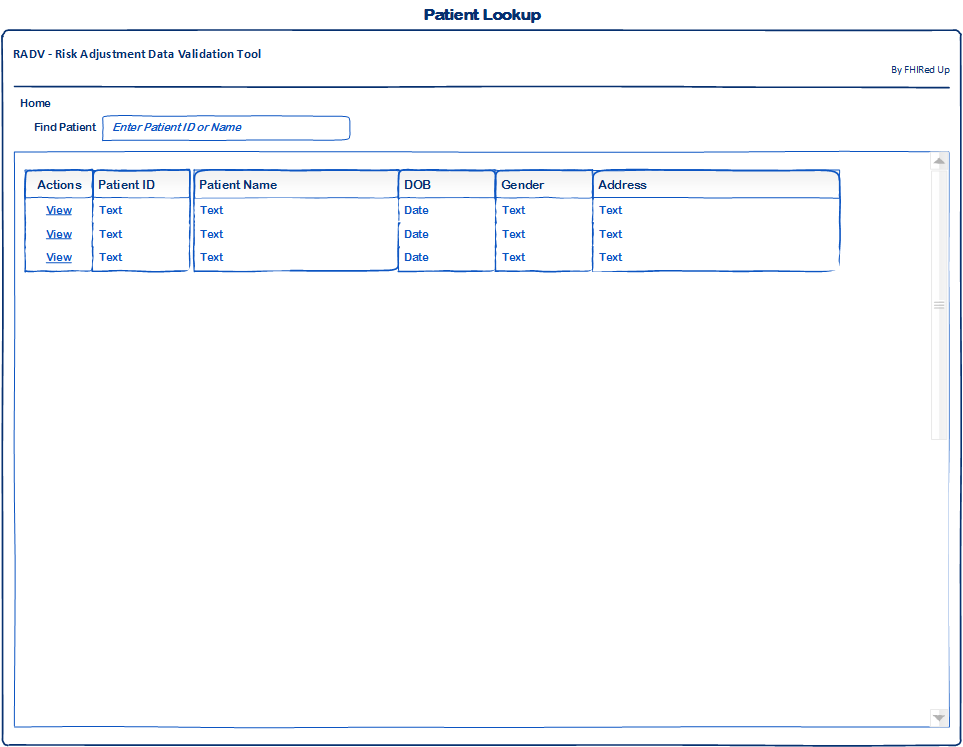
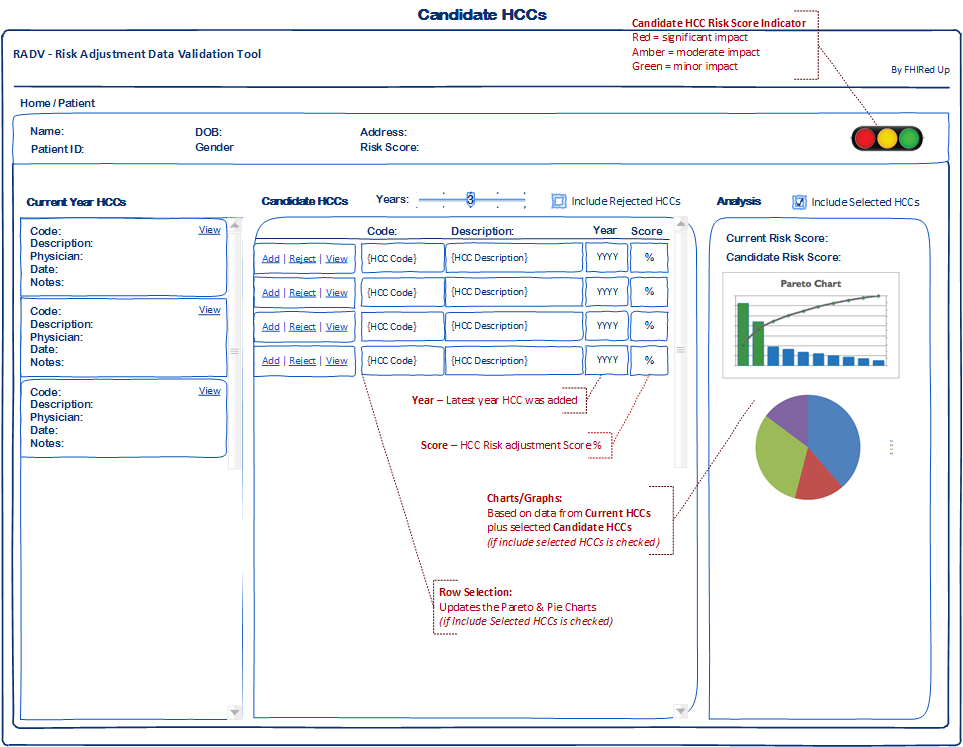
# **System Requirements**

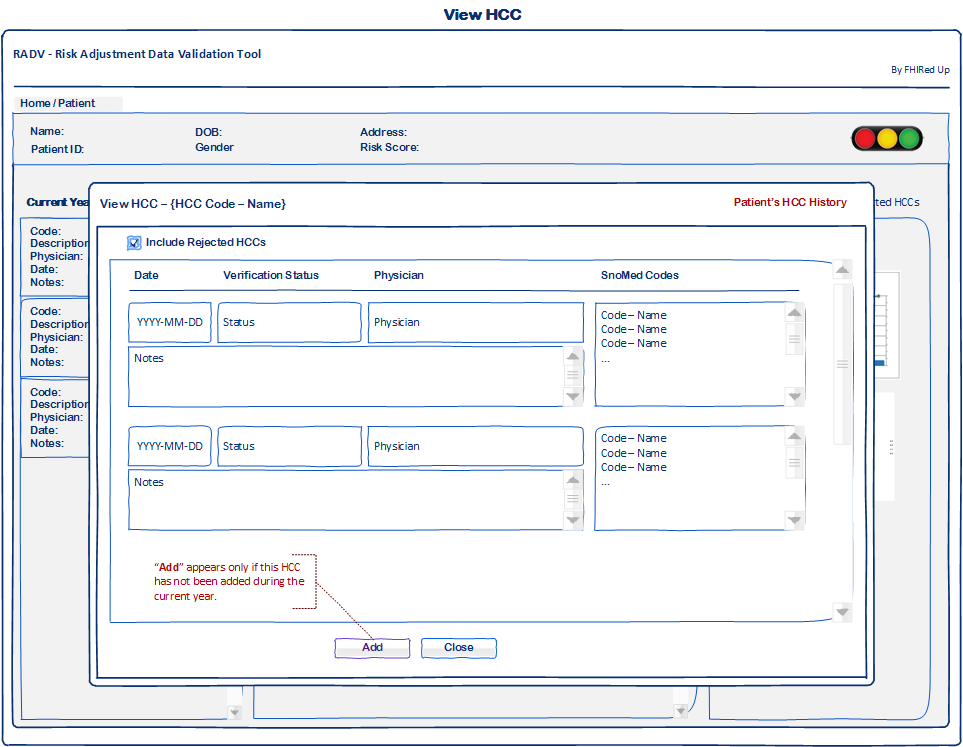
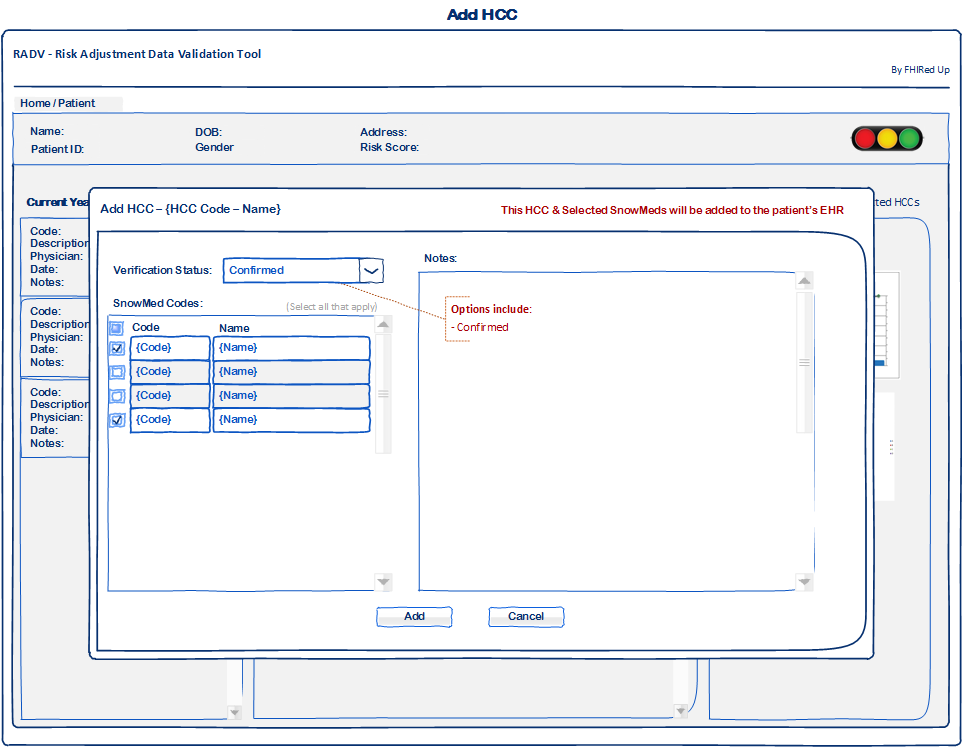
The RADV tool prototype was developed in Python and currently hosted on the Google App Engine.

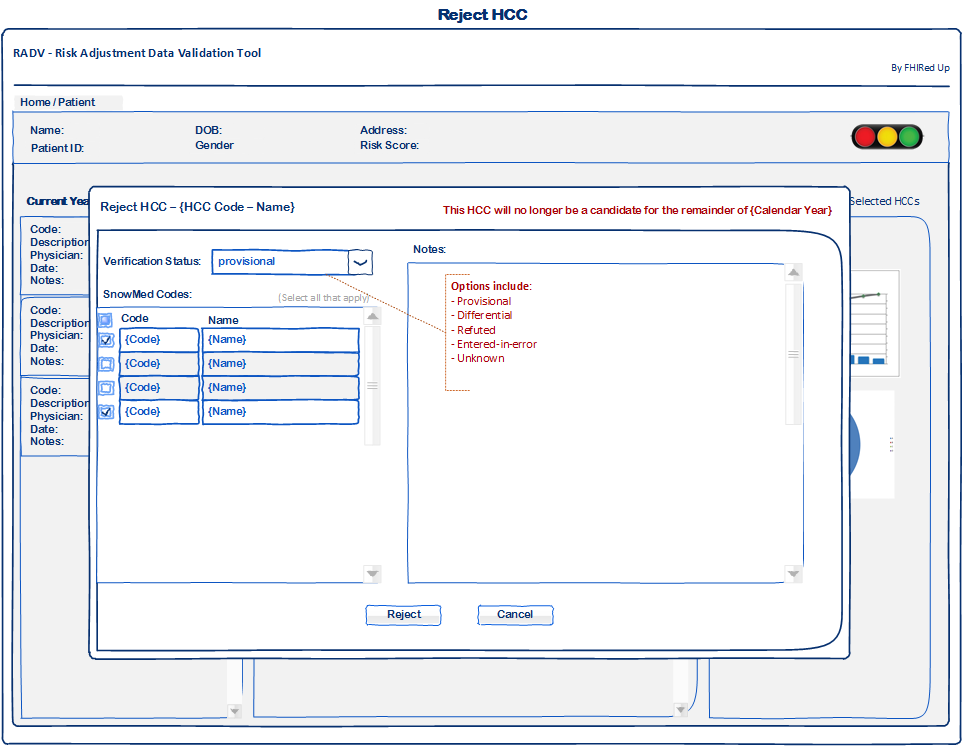
In order for a user to gain access to the RADV tool they will need a machine with a modern operating system installed (tested on Windows 8, Windows 10, OS X, Ubuntu 16.04, CentOS 7, and Chrome OS) with a modern browser installed (tested on Internet Explorer 11, Safari, Firefox, Chrome, and Microsoft Edge. The minimum specs tested 4 GB of RAM and a dual core 1.70 GHz processor although lower specifications should also work as the client machine does not perform processing in the application.

# **User Interface**

RADV is accessible via <https://focus-appliance-122323.appspot.com/login>. It connects to and directly parses the Georgia Institute of Technology’s FHIR server. Original wireframes are displayed below.



# **Acronyms & Abbreviations**

|  |  |
| --- | --- |
| EHR | Electronic Health Record |
| FHIR | Fast Healthcare Interoperability Resources |
| HCC | Hierarchical Condition Categories |
| HIPAA | Health Insurance Portability and Accountability Act of 1996 |
| HL7 | Health Level Seven International |
| RADV | Risk Adjustment Data Validation |
| SNOMED | Systematized Nomenclature of Medicine |

# **User Access Levels**

All users have the same permissions in this implementation.

# **Constraints**

* A real-world implementation would employ Role-Based Access Control or other permissions and workflows to ensure that a medical doctor confirms all additions or deletions to patient’s Electronic Health Record in the FHIR server in addition to complying with HIPAA regulations for privacy and HL7 for security.
* The application server’s cache is flushed automatically every 5 minutes to ensure the patient’s record is obtained with the most recent information.
* There is a persistence API to store all changes made through RADV. A real world application would add data to the FHIR server itself, making entries on the FHIR server’s audit trail.
* There is limited patient data in the FHIR server used. Patients 4 and 725 have entries that demonstrate features of the RADV application.

# **GitHub Repository**

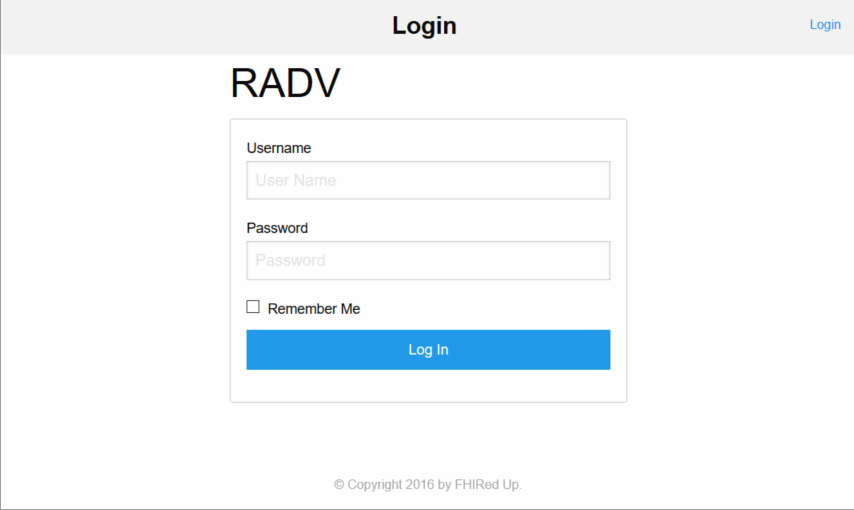
FHIRed\_Up used the following GitHub repository for collaboration and file storage:

<https://github.gatech.edu/sganas3/FHIRed_Up/>

# **Using RADV**

## Login

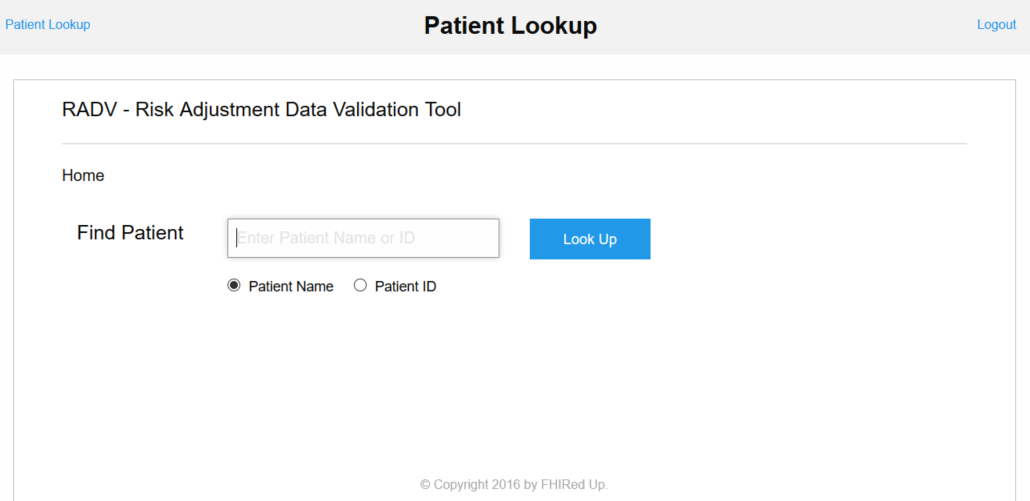
Using your web browser, navigate to <https://focus-appliance-122323.appspot.com/login>.



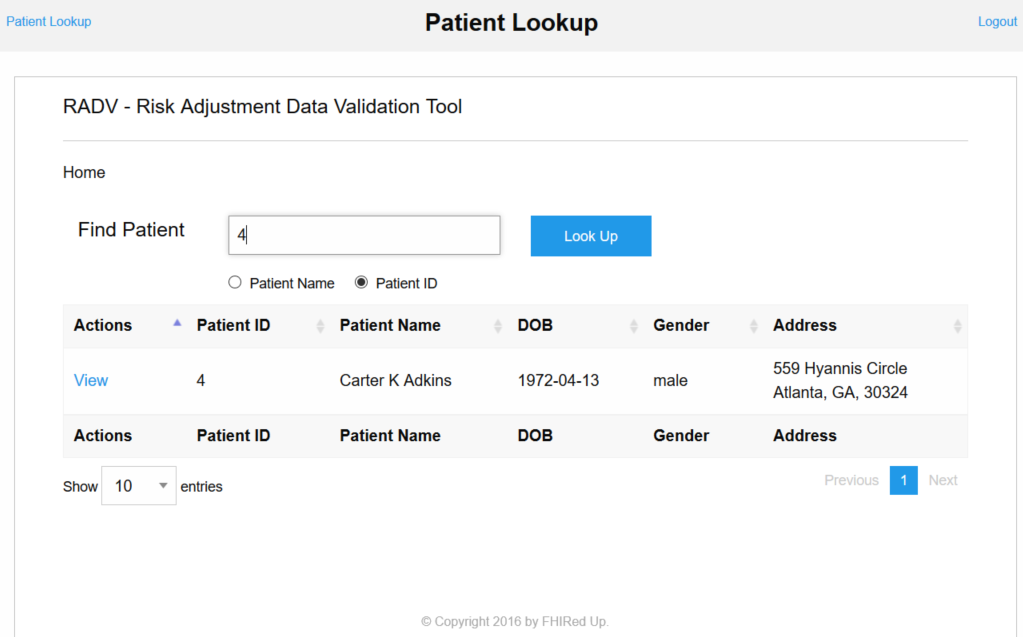
Login using username, FHIRedUp, and password, PjV7kGTD.

Patient Lookup

The Patient lookup screen should display. A user can search by patient name or by patient ID by selecting the appropriate radio button. This user guide employs patient 4 for examples.



A user can enter either the patient’s name or ID in the search bar.

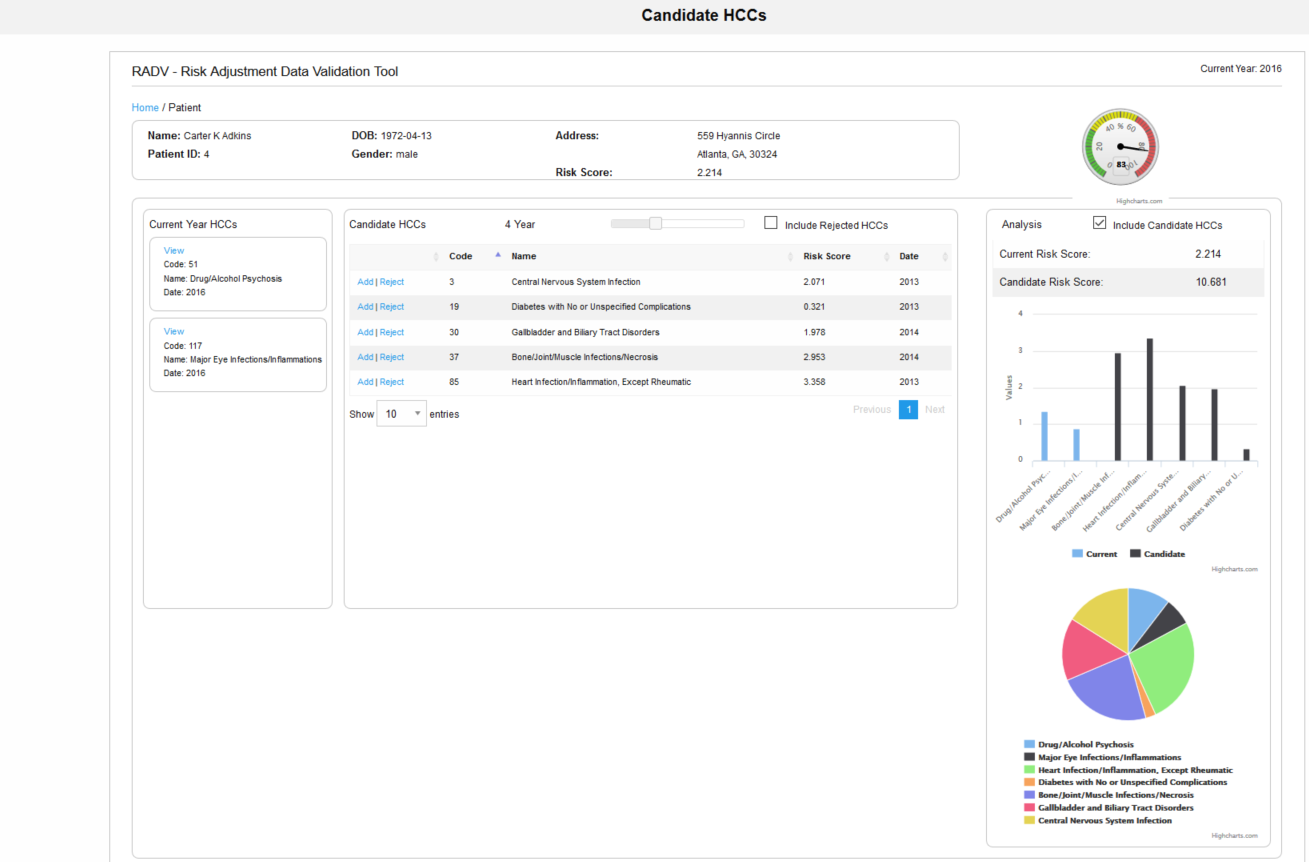


After searching for patient 4, the patient appears below the search entry field with a blue hyperlink to view the patient.

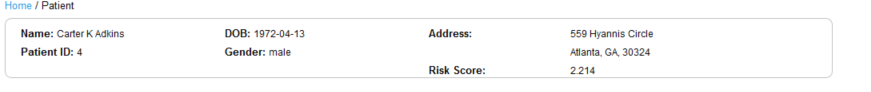
On each internal page, the Patient lookup and logout links are displayed in the top left and right corners. Any active links are displayed in blue. Selection buttons are displayed as blue buttons with white text as the look up button above.

## Patient Display

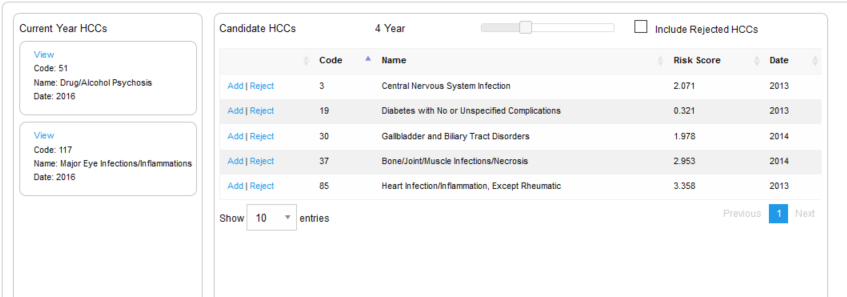
To select a patient, click on the view hyperlink. The patients record displays with their information at the top, their current year’s Hierarchical Condition Categories (HCCs) on the left pane, the candidate missing HCCs in the middle panel with each HCC’s risk score, the year in which it previously appeared on the patient’s EHR, the HCC code, and a link for adding to or rejecting from the patient’s EHR. The Risk score information and graphical display appear on the right panel with the ability to see the impact of adding the candidate HCCs. The gauge at the top of the right panel indicates the severity of the patient’s candidate risk score relative to their current risk score.



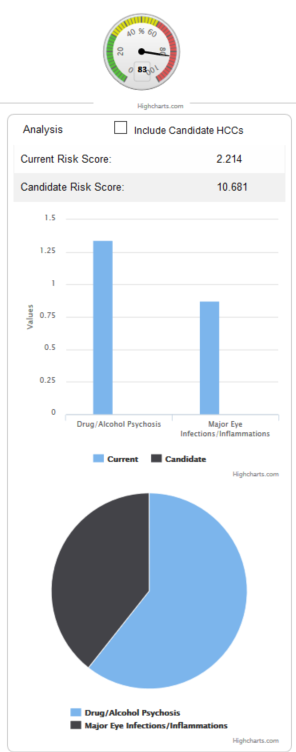
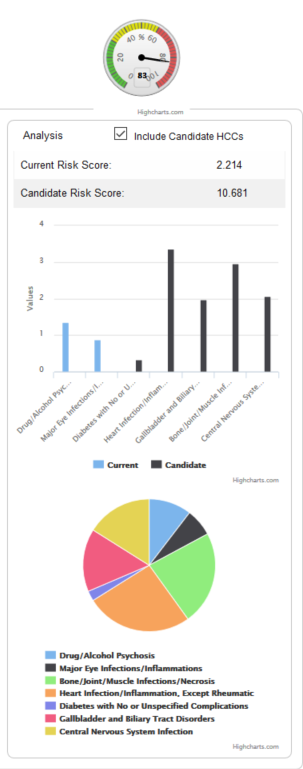
After clicking the view link, the patient’s condition record is displayed.



At the top, a patient’s information is always displayed.

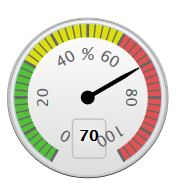


As shown above, in the left panel, the HCCs on the patient’s record for the current year display. In the center, candidate missing HCCs from previous years on the patient’s EHR display with risk score information. Information regarding the dates and SNOMED codes are shown via links or on the page. Shown below, the right panel displays graphical information about the patient’s risk score with or without missing HCCs.

## Candidate Risk Score Meter

The candidate risk score meter (or gauge) indicates the severity of the patient’s candidate risk score relative to their current risk score. It is used to quickly identify if a patient’s candidate HCCs would make a significant impact to their current risk score if they were added to the patient.

  
Candidate Risk Score Meter

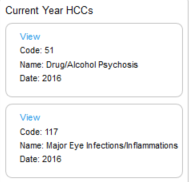
The formula for calculating this metric is:

*Example:*

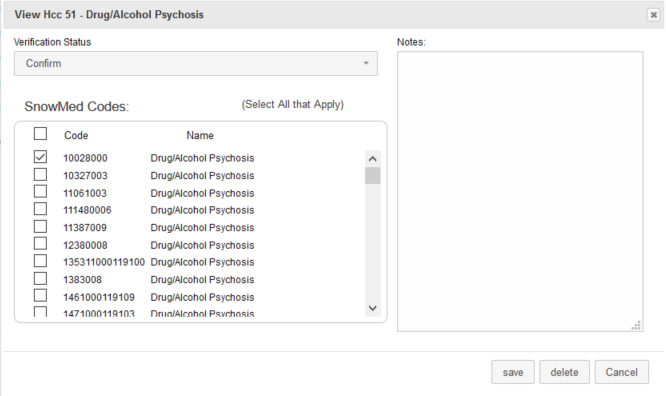
If a patient has a Current Risk Score of 0.723 and the sum of their Candidate Risk Scores is 1.687, the candidate risk score meter would register 70, indicating the patient’s current risk score is 70% less then what it would be if candidate HCCs where included.

## Viewing Current Year HCCs

To view information on a current year HCC, click on the View link for a particular condition.



A new window should open displaying the Code’s status for that patient and the related SNOMED codes which were entered and translated to that HCC.



A user may delete, but we advise that in a real-world implementation, only a doctor may perform this action while making supporting documentation.

## Viewing Candidate HCCs

The center panel displays HCCs that were entered on the patient’s EHR in previous years. Four years is the default, and a user may adjust the time by sliding the bar at the top of the panel.

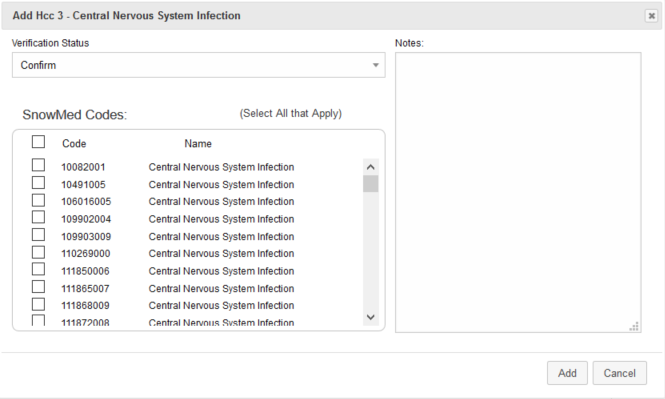


## Adding an HCC

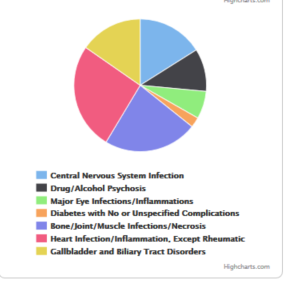
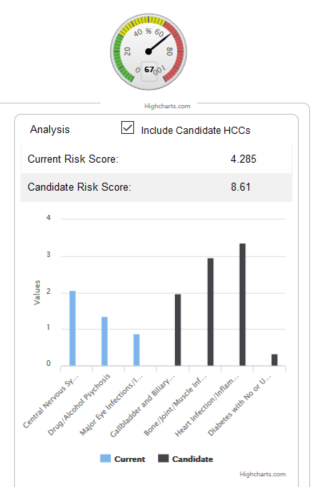
To add an HCC to a patient’s EHR, select the add link to the left of the specific HCC.



A new window should open allowing the user to select corresponding SNOMED codes, the verification status which should be confirmed by default, and to enter supporting reasons.



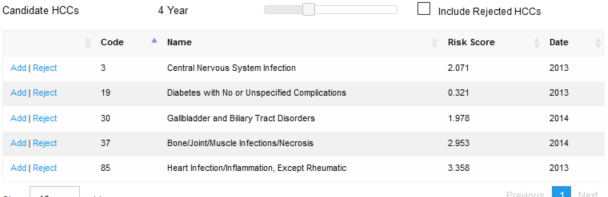
Once added, the graphical display at the right automatically updates showing the current HCCs in blue and candidate HCCs in black. The pie chart displays the percentage each HCC contributes to the total. To display the percentage, hover over the pie slice.



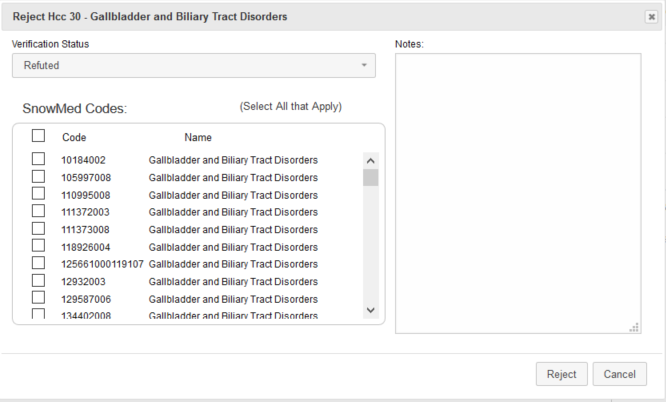
## Rejecting HCCs

A user may also reject HCCs which are not accurate or no longer affect the patient although they appear in their EHR for previous years. The user has the option of displaying HCCs which have already been rejected that year in case there was an error.

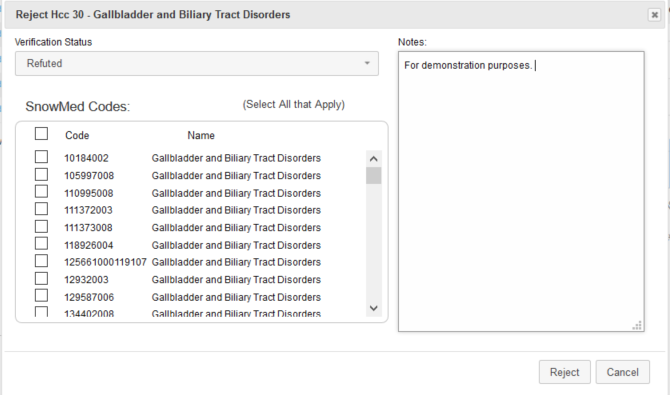
To reject, a user clicks on the reject link to the left of the HCC.



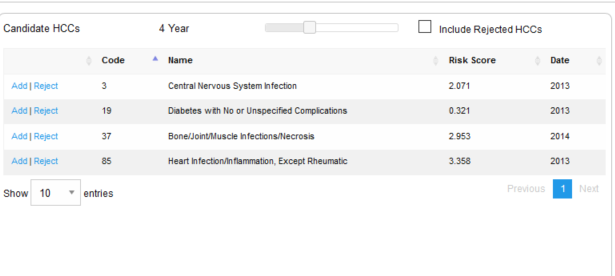
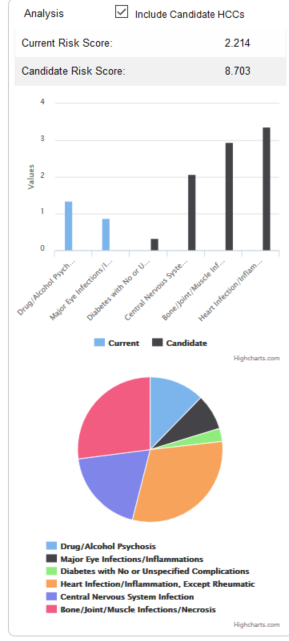
A new window opens with showing corresponding SNOMED codes, a default verification status of refuted, and a free text field for notes.



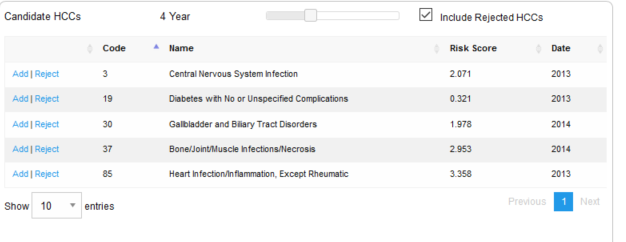
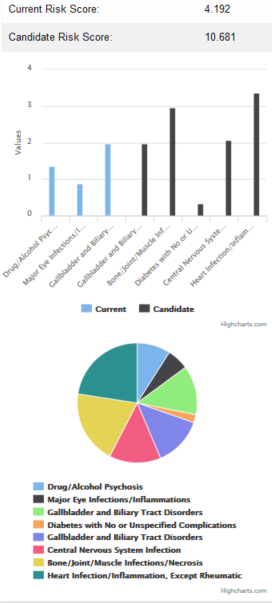
To complete rejection, enter notes and select reject.



The HCC no longer appears in the candidate HCC list unless include Rejected HCCs is displayed. The graphs at the right are updated a well.

The images show the graphical display after rejecting an HCC.

The images show the graphical display after rejecting an HCC and selecting include rejected HCCs.

## Look up another patient

To look up another patient click the blue hyperlink in the top left of the window that says patient lookup. This will return the user to the patient lookup screen.

## Logout

To logout, click the blue “logout” hyperlink in the top right of the screen.

## Data Recording

All data entries are recorded via a persistence API without additional steps from the user. As stated in constraints, a real world implementation would make changes on the FHIR server under the current encounter and be recorded in the FHIR server’s audit trail.

# **Future Improvements**

Some candidate features identified for the RADV tool include:

1. A report listing patients with a high “candidate” HCC risk score. This would help providers identify high risk patients with past medical conditions not yet recorded for the current calendar year.
2. Allow the selection of individual Candidate HCCs (instead of all Candidate HCCs listed) to review the net impact this subset would have on the patient’s calculated risk score.
3. Role-based access to control to determine which users can view, add, update and reject HCCs.

# **References**

**Information from:**

<http://www.hl7.org/>

<https://www.bcbsal.org/providers/pdfs/riskAdjustment.pdf>

<https://www.healthlawyers.org/Events/Programs/Materials/Documents/MM12/papers/EE_haley_sillman_slides.pdf>

<http://www.modernhealthcare.com/article/20150701/NEWS/150709989>

<http://kff.org/health-reform/issue-brief/explaining-health-care-reform-risk-adjustment-reinsurance-and-risk-corridors/>

**Images from:**

<http://decompressionprosmarketing.com/blogs/decompression-pros/16891112-how-to-ask-for-referrals-from-medical-doctors>

<http://www.libertynursingagency.com/>

<http://allhealthcare.monster.com/training/articles/1822-5-steps-to-becoming-a-medical-assistant>

<http://greenfieldcc.3dcartstores.com/Medical-Coding-and-Billing_p_1058.html>

**Graphing Tools:**

Highcharts (<http://www.highcharts.com/>)

**GitHub Repository**

<https://github.gatech.edu/sganas3/FHIRed_Up/>