Guide to the Healthy Weight Care Assistant

1. Introduction

The Healthy Weight Care Assistant (HWCA) was developed to assist pediatricians in providing evidence-based care to children with overweight or obese body habitus who were at risk for developing complications of obesity. The goal was that by early identification and early intervention we could influence weight trajectories. A clinician’s needs assessment was completed prior to the development of the HWCA and the results of this internal survey were used to target areas of clinician interest and gaps in knowledge surrounding pediatric obesity. We additionally focused on several efficiency improving techniques drawn from the field of human-computer interaction as a method for driving clinicians to use the system.

Use of the Care Assistant Framework allowed our project team to design and develop an obesity module using a web-services approach and not limited to CDS tools provided by our institution’s EHR. The module includes a click-through documentation template, guided support for relevant screening questions, diagnosis and evaluation support that is updated in real time in response to answers to screening questions, and direct access to patient handouts and instructions developed by the nutrition department.

1. Overview of Repository Structure

Care Assistant CDS interventions are modularized. The ‘Assistant Repository’ contains the user-facing information. This typically includes JavaScript files, patient handouts/resources, and associated files for compiling these resources. The ‘Service Repository’ contains the server backend. The server backend is typically responsible for data manipulation, object formatting, connections with other modules, transmission of information, and any time consuming tasks. By using a server for these tasks, we are able to offload some of the strain on the Care Assistant and decrease the likelihood of an unintended consequence occurring within the EHR. Bother the Assistant and the Service are required to run an intervention.

1. HWI-Assistant Repository
	1. Notes
		1. All Care Assistant modules contain a set of required folders and files. This allows for programmatic deployment to the EHR. These include Compilation, CSS, Data, HTML, Images, JS, Node\_modules, Release, Resources, and test
	2. Build
		1. Contains a single JavaScript file used to support the conversion of an xml file containing the intervention into a webpage. The initial idea was to have this intervention highly adaptable using the xml backend in an attempt to develop a process for quickly updating CDS in response to changes in the evidence. However, in the EHR creating the page on demand was not sufficiently responsive and a static html template was ultimately used. We relocated all functions from the ‘intervention.js’ file to this file. A new process was designed for updates to the CDS which included updating the XML, running the intervention with build.js enabled to generate the raw HTML, compiling the raw HTML with Node.js to develop an HTML template (which allowed for patient material to be seamlessly incorporated), and finally inserting the compiled HTML template within the JavaScript. This process change resulted in massive speed improvements.
	3. Compilation
		1. As previously noted, the HTML using the HWCA was ‘compiled’ using node.js. This folder contains the JavaScript used to convert the raw HTML into the HTML template. The hwiAssistSnakeTwo.html file is the raw HTML and the compiled\_template.js file is a HTML template. Compiler.js runs the conversion.
	4. CSS
		1. This folder contains a CSS file used to format the intervention. Of note, EPIC EHR CSS contained certain format statements that impacted the HWCA intervention. Other organizations may run into CSS interference from their institutional EHR that would need to be accounted for,
	5. Data
		1. This folder contains the xml and xsd information for the source data for the CDS intervention. As previously noted, we ultimately decided to use HTML templates rather than work directly from the xml. Supplemental data files were also included here including a ‘dorun.txt’ file, which could be used to quickly turn off/on the HWCA (a kill switch inserted in case something went wrong in the EHR and it was potentially related to the CDS). Inclusion a file of this type in each Care Assistant module provides our team with ultimate control over the display of interventions upon the detection of an unintended consequence.
	6. HTML
		1. In the HWCA the hwi\_assistant.HTML was used to provide only the overall structure of the intervention. All other display decisions were developed using the HTML templating sequence previously discussed.
	7. Images
		1. Contains the images used within the HWCA.
	8. JS
		1. The intervention.js file within this folder is required for all Care Assistant Interventions. It is the main file, containing the JavaScript functions for page rendering and the compiled template HTML. The intervention.js file is called by the Care Assistant framework when it attempts to determine if a CDS module should be displayed.
	9. Node\_modules
		1. This folder contains the Node project information required to develop an HTML template and some testing software used to inspect the intervention.js code.
	10. Release
		1. Developed for deployment, contains the intervention JavaScript.
	11. Resources
		1. Contains PDFs and other handout materials that can be accessed through the HWCA. These were prepared by the Healthy Weight Program at the Children’s Hospital of Philadelphia and are free to distribute but not to alter in any way. CHOP holds all rights to the intellectual property rights for these files.
2. HWI-Service Repository
	1. This repository contains the python-based web service that extracts the incoming information from the Care Assistant engine and reformats that information for use in the HWCA. The relevant file is hwi/resourses.py and the required class is ProcessPatient.
	2. Other CA modules have a more robust Service Repository due to requirement for external data, a reference database, or other reasons.
3. Future Work
	1. The Healthy Weight Care Assistant was retired in 2016 due to an update in EPIC and last of funding for maintenance. We would be interested in collaborating with other organizations looking to adapt our work or progress it further. Use of the HWCA drove change in identification of weight status AND appropriate laboratory investigations, however, these improvements were not maintained after discontinuation of the intervention. These improvements came despite the fact that this intervention was passive and may support a more active intervention in the future.
4. Acknowledgements
	1. Authors: Michel JJ, MD, MHS; Mui M, MD; Herman A, MeD; Khan S, MD; DeRusso P, MD
	2. We would like to give thanks to other contributors integral in the development of the HWCA including Dean Karavite, Jeffrey Miller, Jeritt Thayer, and Robert Grundmeier
	3. The HWCA was developed and evaluated at the Children's Hospital of Philadelphia
	4. Te HWCA was indirectly funded by the American Beverage Foundation through an unrestricted grant to the Healthy Weight Program at The Children’s Hospital of Philadelphia.