**Healthy Weight FHIR Project**

**Goals**: Prevent and treat childhood obesity, especially in underserved areas.

**Method**: Develop four Healthy Weight applications (patient-facing, provider-facing, care manager, and reporting) using HL7 FHIR and SMART-on-FHIR capabilities (Figure 1). These applications will help bridge the divide between families, clinicians, community resources and public health so that all stakeholders are better able to understand and help prevent childhood obesity. This document provides the desired functional requirements for each of the applications.

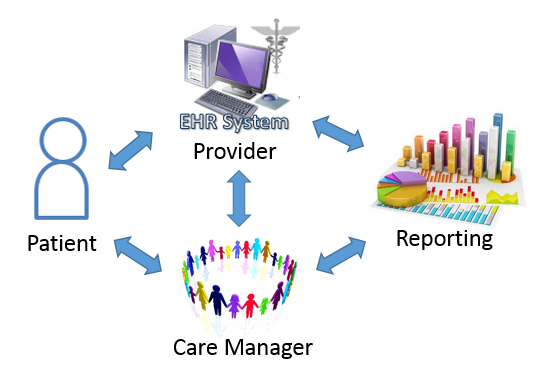


Figure 1: Healthy Weight FHIR Applications

**Patient-facing app**

Healthy weight is a lifestyle that includes healthy eating and regular physical activity. Unfortunately, doctors and nurses typically don’t have enough time to capture this information during a normal visit. The patient (or parent) facing application will help fix that.

Ideally the app would work on a tablet or phone, so that parents could use the app between visits (to track behaviors or receive appointment reminders), or at the very least in the waiting room to enter key health behavior and demographic (e.g., race/ethnicity) information. Questions for the app will be derived from <http://www.ihe.net/uploadedFiles/Documents/QRPH/IHE_QRPH_Suppl_HW.pdf> and should be written in plain language (and/or use pictures): Example questions include, “How many cups of fruits and veggies does your child eat on a typical day?” “During a typical week, how many minutes does your child walk, play tag, jump rope, play sports, swim, dance or other types of moderate physical activity?” (Note: CDC will provide subset of questions for this app on or before Feb 12th, also see attached questionnaire from Children’s Healthcare of Atlanta).

The data from the patient-facing app will flow into the electronic medical record so that the child’s behavioral data appears alongside as the Body Mass Index information, which is recorded by nurses on the way into the exam room.

The patient-facing app could be expanded to receive information from the provider-facing app and the care manager app. For example, it may be useful to alert parents to the specific behaviors and community resources near where they live that will best promote healthy weight, or could track/display a child’s growth information over time for the parent to see. Parent facing intervention materials can be found in attached document from Children’s Healthcare of Atlanta’s Strong4Life program.

**Provider-Facing App**

Several provider-facing tools already exist. Our goal here is to bring the best aspects of these tools together into one application that flags abnormal BMI values, integrates behavioral and demographic information provided by the patient, helps doctors ask the right questions to determine which behaviors parents might be interested in changing, facilitates patient-centered goal setting (see attached materials from Children’s Healthcare of Atlanta), allows doctors to order the appropriate labs electronically, and provides e-referrals to community resources. This is extremely important because under the new fee for value payment models, physicians’ reimbursements depend on whether they can prove that they assessed BMI and counseled on nutrition and physical activity for ALL children.

Similar to <https://gallery.smarthealthit.org/boston-childrens-hospital/growth-chart> the provider-facing app should plot the child’s BMI on the appropriate growth charts and flag abnormal values (e.g., overweight is BMI greater than or equal to 85th percentile for age and sex, and obesity is BMI greater than or equal to 95th percentile for age and sex; see <http://www.cdc.gov/growthcharts/clinical_charts.htm>). All features of the application should be retained, EXCEPT that the for children 0-2 years of age, the application should only plot the child’s growth on the WHO growth charts (NOT the CDC growth charts).

Similar to <http://www.hvmastarstudy.com/clinician-tools.html>, if the child is between the ages of 6-13 years with a BMI ≥ 95th percentile, the app will

* Provide instructions to help the physician document and code BMI percentile and diagnosis of underweight, normal weight, overweight or obesity for billing purposes (for children, ICD-9 Diagnosis Codes V85.51-54, ICD-10 Z68.51-54
* Guide the physician through nutrition and physical activity counseling, prompt the physician to ask questions around which behaviors parents might be interested in changing, facilitate patient-centered goal setting, as in CHOA written materials attached, and instruct the physician how to document this for billing purposes (ICD-9 V65.3 and ICD-9 V65.41, ICD-10 Z71.3 (see <https://www.nutritioncaremanual.org/vault/2440/web/files/ICD-10-CM%20Codes%20for%20RDNs.pdf> and [www.icd10.com](http://www.icd10.com) for additional important codes)
* Provide e-referrals to weight management programs or other appropriate follow-up based on options the parents select and provide documentation of the referrals
* Provide e-referrals to the Supplemental Nutrition Program for Women, Infants and Children (WIC) for potentially qualifying families (see http://www.fns.usda.gov/wic/women-infants-and-children-wic)
* Provide e-referrals to obesity-related laboratory studies if appropriate (e.g. fasting lipid profile and glucose based on AAP 2007 Expert Guidelines for child obesity clinical care - <http://pediatrics.aappublications.org/content/120/Supplement_4/S164>) and provide documentation of the referrals
* Provides printable patient education information (e.g., guidance on each behavior parents selected an interest in improving, such as each more veggies) and links to websites for additional obesity-related educational materials.

Since physicians only have a limited amount of time to spend with patients and since community resources are constantly changing, the physician facing app will send generic referrals to the care manager app, which will help determine the best resources for each child.

**Care Manager App**

The Care Manager app receives clinical referrals from the provider app, and determines optimal resources based on the patient’s location, parent’s preferences, and available community resources. In some settings a care manager may call the parent to help talk through the options, although it may be possible/desirable to automate much of this communication through emails or text.

After the family selects the resources that work best, the care manager app generates e-referrals to the local YMCA, boys & girls club, farmer’s market, etc. These e-referrals will also be sent back to the electronic medical record and become part of the patient’s clinical file.

The community resources (i.e., YMCA, boys & girls club, farmer’s market, etc.) will receive a notification with the name and phone number/email of the patient being referred and the reason for the referral. The community resource can then communicate directly with the family via the medium the family chooses (e.g., text, phone, email, or perhaps via the patient-facing app). The app could eventually be expanded to help the community resource with customer-relationship management and scheduling.

**Reporting**

The reporting app will allow physicians, community resources, public health agencies, and other interested parties (e.g., Medicaid) to better understand population health. The app will provide an analytical engine so that the data can be “sliced-and-diced” and visualized or mapped in various ways.

The physician-facing app should be able to call the reporting app to allow clinicians to track their own performance on key quality indicators, such as percent of patients in the practice that are overweight or obese, of these patients, what percent receive counseling and referrals, what referrals are most effective, etc.?

The community-facing app should also be able to call the reporting app for similar quality measures.

The main purposes of the app, however, will be to extract info to send to public health (data must be de-identified) or other entities (e.g., Medicaid—data can be identifiable). Key data of public health importance include:

* Age
* Sex
* Race/Ethnicity
* BMI
* Blood pressure
* Patient behavior info
* Laboratories (e.g., cholesterol, hemoglobin a1c)
* Counseling done (yes/no) – some drill-down ability
* Location (may need to suppressed, algorithm to send or not send on whether child can be re-identified)

Resources:

HL7 v2.5.1 message (& implementation guide) – <http://www.hl7.org/implement/standards/product_brief.cfm?product_id=315>

IHE Healthy Weight profile – <http://www.ihe.net/uploadedFiles/Documents/QRPH/IHE_QRPH_Suppl_HW.pdf>

PHIN VADS Healthy Weight value sets -  <https://phinvads.cdc.gov/vads/SearchVocab.action>

STAR trial healthy weight clinical decision support tools (evidence-based EHR-integrated CDS) – [www.hvmastarstudy.com](http://www.hvmastarstudy.com)

AAP 2007 Expert Guidelines for child obesity clinical care - <http://pediatrics.aappublications.org/content/120/Supplement_4/S164>

U.S. Preventive Services Task Force Recommendations for child obesity - <http://www.uspreventiveservicestaskforce.org/Page/Document/ClinicalSummaryFinal/obesity-in-children-and-adolescents-screening>

Boston Children’s Hospital SMART on FHIR growth app - <https://itunes.apple.com/us/app/pediatric-growth-charts-by/id617601789?mt=8>

Related innovations – US Obesity Data Challenge winners: <http://www.healthdataconsortium.org/obesity-data-winners>

Original Brief Description:

To better understand and respond to the public health need for healthy weight surveillance, clinical quality improvement, and research, CDC’s Division of Nutrition, Physical Activity, and Obesity seeks to build Healthy Weight application(s) using HL7 FHIR and SMART on FHIR capabilities. The proposed project will map key healthy weight data elements to existing FHIR resources, identify gaps and propose solutions using FHIR for healthy weight behaviors and other elements, and then use these resources to develop healthy weight applications to bridge the divide between families, clinicians, community resources and public health. These applications may include caregiver healthy weight data input to a smart device, transmission of these and clinical data between families, clinicians, community resources and public health, clinical decision support to improve uptake of expert guidelines for child obesity prevention and treatment, and enhanced structured data capture for program evaluation and research. Necessary FHIR resources will likely include individual-level identifying, demographic, height, weight, vital signs, laboratory results, and select health behavior data.