Project: Development of a web-based system based on the Personalized Health Care Initiative with personalized decision support

Introduction

The Personalized Health Care Initiative of the US Health and Human Services will improve the safety, quality and effectiveness of healthcare for every patient in the US (see: http://www.hhs.gov/myhealthcare/). The purpose of this project (Healthy Choices system; http://nucri.org/healthychoices/) is to provide users, particularly to those who are overweight/obese and suffering from related complications, such as, cardiovascular diseases and diabetes, with the tools and information necessary to make healthier decisions. Relevant software tools will be the essential components of the *Healthy Choices* system. These tools will allow the users to input their health records including data on BMI and BMR, nutrition, and physical activity. These data can be analyzed to generate reports, which can be visualized and accessed anytime using multiple devices including smartphones and tablets. This information will become the key to support the user's decision on how to control their weight and remain healthy by taking appropriate daily nutrition intake and physical activities.

Scope of the project

The *Healthy Choices* system would provide users with the basic web-based tools and educational contents necessary for them to make healthy decisions throughout their lives. The tools will include BMI and BMR calculators for calculating a person's body-mass-index and metabolic rate. The system will also be able to display the nutritional standard daily values based on a 2000 calorie diet. The system will include a USDA-supported database containing nutritional values for over 7,000 food items and MET values for over 300 physical activities. The system would allow the users to search more than 7,000 food items to view their nutrition values. The system will allow the users to select and record their daily nutrition intake. Furthermore, the user will be able to search, select, and record their physical activities based on the 300+ physical activities stored in the database.

This system should have the following features and functions:

1. *Security*:

a. This system will provide an user to store health records. Therefore, it needs to be HIPAA compliance.

b. This system will be available to the school children who will enter their school health data, so needs to be FERPA compliance.

c. Authentication will be required for accessing the system and web-based forms will be available to insert/view/edit based on the roles (role-based accessibility). Users will be needed to create an account to access to this system and this system will provide support, such as, providing 'password' if the users forget.

2. *Upload*ing function: HHS is encouraging the users/patients to obtain their own health records generated from their EMR and save it in an EHR for sharing with the healthcare providers and other stakeholders within or out of their health system networks. This system will provide an 'Upload' function (through an API) for uploading their records into this *Healthy Choices* System,

once they obtain the data by downloading from their health network, similarly as 'Blue Button' of VA System does.

3. This system will provide software tools including *calculators* for BMI and BMR that could be saved with date and time stamped.

4. Web-based forms should be available to enter daily nutritional items, based on recommended amounts of carbohydrates, fats, proteins, and water that users should take with his or her daily meals. USDA database will be utilized for this functionality. Users will be able to save those data and should be able to visualize the reports.

5. Web-based forms should also be available to enter daily physical activities, following the Metabolic Equivalent Task (MET) method. Users will be able to save those data and should be able to visualize the reports as both numerical and graphical charts. The Healthy Choices system will utilize the MET-values for each physical activity to display the user's calories burnt. The calories represented in the physical activity chart would provide users easy visualization to compare daily nutrition intake.

6. Based on metabolic profile of an individual, the *Decision Support* (DSS) of this System will provide guidelines on diet (Charts, etc.) and physical activities. The system will also graphically display the user's daily nutrition intake compared with the recommended Daily Value (DV). The compared result will be displayed through a simple stacked bar chart and summarized table. The users will also be able to view a detailed DV-chart that will display the recommended DV for essential macronutrients and micronutrients. The bar chart and the table will help users understand their problem areas so that they can focus on the areas of concern and will be guided by this system for nutrition intake and physical activity based on recommendations from medical, nutritional, and physical education experts.

7. This system will provide relevant content materials to the users for health and physical education and training.

8. *Report*ing function: Reports can be generated based on the input data. Users will be able to monitor changes in BMI, nutrition intake, and physical activity that will guide them controlling their weights. These results will also be represented in the graphical charts. Alert system will be imbedded into this monitoring that will provide the users an alert to the current health condition if the BMI becomes higher than a previously monitored value, and provides historical data of the user's nutrition intake.

9. This system will provide tool(s) for visualization of the data. The system would display the user's overall health profile through an easy to understand figure(s) and graph(s). For example, when a user would select to visualize their personal health profile based on BMI, they will receive feedback through a graphic picture indicating the bulging of the belly representing whether they are normal, at-risk, or obese. Similarly, visual representation will indicate whether their organ(s) are at-risk (colored), if they have diabetes, for example. The visual representation will be a picture of the human torso which will highlight the organ(s) that are at-risk.