INSULOT: A cellular-phone based edutainment learning tool for children with type-1 diabetes mellitus

Japan
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Elevator Pitch

Concise Summary: Help us pitch this solution! Provide an explanation within 3-4 short sentences.

INSULOT is a special three-window slot machine designed to teach the relationships among carbohydrate in food, plasma glucose, and insulin dosage.

About You

Location
Project Street Address
Project City
Project Province/State
Project Postal/Zip Code
Project Country

Your idea

Year work began:
2003

Focus of activity
Other

YouTube Upload
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</param>
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</embed>
</object>

Project URL (include HTTP://)

Plot your innovation within the mosaic of solutions

Which of these barriers is the primary focus of your work?
Insufficient Evidence that Games Improve Health

Which of the principles is the primary focus of your work?
Physical Health

If you believe some other barrier or principle should be included in the mosaic, please describe it and how it would affect the positioning of your initiative in the mosaic:

Appropriate initial education and continuous care delivery by pediatric diabetes specialists is quite important in preventing late complications following type-1 diabetes mellitus. Since the incidence of type-1 diabetes mellitus is relatively low in Japan, we do not have sufficient numbers of paediatric diabetic specialists or a well-organized education team, especially in rural areas.

The Japanese Study Group for Insulin Therapy for Childhood and Adolescent Diabetes (JSGIT) reported that the shortage of specialists might cause a large diversity of clinical outcomes among diabetes care facilities in Japan.

Innovation

What is your signature innovation in one sentence?
INSULOT is a special three-window slot machine designed to teach the relationships among carbohydrate in food, plasma glucose, and insulin dosage.

Describe your innovation. What makes your idea unique and different than others doing work in the field?
INSULOT uses algorithms to simulate postprandial glucose levels, while considering distributions to incorporate clinical uncertainties. The first step...
is to calculate the “carbohydrate grams” in each food using a concept of total available glucose (TAG). (2) Then, the insulin-to-carbohydrate ratio (ICR) is used to simulate the amount of carbohydrate absorbed by a one unit dose of insulin. (3) The final carbohydrate gram level is then calculated by subtracting carbohydrates absorbed by insulin from the intake of carbohydrate grams. Finally, INSULOT demonstrates various images based on the appropriateness of the postprandial plasma glucose level; and the combination of these is used to determine the final score for each play in the game. INSULOT is a JAVA 2 Micro Edition application, designed for the third-generation cellular phone systems. The application can run as a stand-alone and also be integrated into a World Wide Web environment.

What barriers exist that are creating the problem your innovation is hoping to address/change?

Children with type-1 diabetes told us that they are bored with learning more. They thought that they learned a lot in school and would not want to learn more...

Delivery Model: How do you implement your innovation and apply it to the challenge/problem you are addressing.

To provide step-by-step learning, INSULOT has three different game modes: Practice, 10-Games and Exciting (Figure 1A). The practice mode instructs patients on how to play the INSULOT game (Figure 1B). The 10-Game and Exciting modes are almost identical except for the scoring methods. In the 10-Game mode, players play slot machines 10 times and compete for the highest score. In the Exciting mode, players bet units of insulin to the slot machine and play the game until they run out of insulin units. Both the 10-Game and Exciting modes have two different levels: Normal and Expert. Whereas players focus on the relationship among plasma glucose level, food (carbohydrate grams) and insulin dosage, if the expert level is selected, they are also asked to consider an exercise that they will undertake after the meal.

How do you plan to scale your innovation?

We plan to apply national grant for randomized clinical trial to investigate clinical effectiveness of the tool.

Impact

Provide one sentence describing your impact.

INSULOT was well accepted as a learning tool for understanding the relationships among plasma glucose level, food (carbohydrate), and insulin dose.

What impact has your innovation had to date? Exactly who are the beneficiaries of your innovation?

The game was evaluated by 30 diabetic patients (12 – 24 years of age) in terms of entertainment, usability and its clinical usefulness at a summer camp in Kochi Prefecture, Japan in 2003. We used a structured survey of 13 questions with a response scale ranking from 1 to 7 (1= strongly disagree and 7=strongly agree). Generally, the type-1 diabetic young people felt the game was interesting (mean ± SEM: 5.57 ± 0.22). Approximately 80% of patients thought that INSULOT could be recommended to other type-1 patients. The overall usability of INSULOT was highly scored. Most patients were able to play the game without any instruction. More than 80% of patients agreed that the game was useful as a learning tool (mean ± SEM: 5.44 ± 0.29).

How many people have you served directly?

At this moment, we have tested with about 100 persons.

How many people have you served indirectly?

Family and relatives of above users.

Please list any other measures reflective of the impact of your innovation

Our product was published on the “Diabetes Care”, an official journal of the American Diabetes Association in 2005, and introduced on the Washington Post.

What are the main barriers to creating your impact?

One of the most difficult issues for the edutainment system is establishing a balance between education and entertainment. Many “game-like” tools are developed from “professional perspectives”, which cannot be real “games” sold on the open market. A game does not appeal to users if education is over emphasized. It can be called neither “entertainment” nor “game” if it is not fun. In contrast, it cannot be called a learning tool if the game has little appropriate learning content.

Sustainability

How is your initiative financed?

This research was supported in part by grants from the Pfizer Health Research Foundation, Tokyo, Japan.

Provide information on your finances and organization: annual budget, annual revenue, number of staff:

Our NPO consists of 10 members who has other full-time job in hospital or academics. Our annual budget is approximately $300,000.

What is the potential demand for your innovation?

Our preliminary evaluation demonstrated that the edutainment was well accepted as an efficient and enjoyable learning tool. In addition, features of the cellular phone, interactivity and portability, could enhance the effectiveness of the learning. The concept could be applied not only for initial diabetes education, but also for health education for children in the general population.
What are the main barriers to financial sustainability?

It was difficult to identify payer for the service. We need to demonstrate clinical effectiveness (evidence) of the tool.

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**The Story**

**What is the origin of this innovation? Tell us your story.**

INSULOT developers are all physicians including diabetes specialists, pediatricians and internists. All of us would like to utilize "Information Technology" to overcome restriction that patients with type-1 diabetes have.

An important message delivered in these games is the affirmation that all type-1 diabetes patients can do anything they want to do as long as they use insulin properly and maintain an appropriate plasma glucose level. The game included many options for exercise and play, so that patients can understand and learn this message.

**Please provide a personal bio. Note this may be used in Changemakers marketing material**

Dr. Aoki is a president of CHORD-J. He also has two faculty positions in the USA and Japan: University of Texas and the University of Tokyo, Japan.

Dr. Aoki is a board certified physician in Internal Medicine and Emergency and Critical Care Medicine in Japan. He has three advanced degrees: PhD in clinical epidemiology and decision science (Kyoto University, Japan), MS in Health Informatics (University of Texas), and MBA in Medical Management (University of Massachusetts ).

**How did you hear about this contest and what is your main incentive to participate? (this is confidential)**

4: Some blog introduced this competition.

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**Source URL:** https://www.changemakers.com/competition/healthgames/entries/insulot-cellular-phone-based-edutainment-learning-tool#comment-0