

The importance of nutrition care platforms for Romanian dietitians' practice

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Abstract

Background. It is essential for dietitians to have a program or software that they can connect to, and easily access data for proper assessment of nutritional status and food composition.

Aims. Our objective was to design a digital platform for nutritional intervention (named "Nutrition ARTS") to facilitate the nutritional care process and pinpoint the benefits it may bring to dietitians.

Methods. The platform has been made available on both desktop or phone, and a total of 58 undergraduate and graduate students from the university of Targu Mures (GEP UMPHST) were granted access to use all its features. As a research method, an online survey was distributed to the users through email (also made directly available from the platform).

Results. The platform's features mentioned in the questionnaire were considered helpful. All the respondents stated that they intend to use Nutrition ARTS in their professional practice and would be likely to suggest it to other colleagues.

Conclusions. Romanian dietitians have shown a significant level of interest in digital practice, and it is vital that they have access to a platform with as many facilities as possible to help them with their work and improve professional performance.

Keywords: nutrition platform, meal planner, food database, digitalization.

Introduction

In some countries, appropriate and effective use of technology in daily practice is a key competency and it is outlined in dietetics training standards (Rollo et al., 2017).

Mobile Health (mHealth) is a new and rapidly growing area of eHealth, which involves applications and mobile devices. The total number of health apps is increasing quickly, with a 284% growth since 2013. More than 25% of the 100,000 mHealth applications include some sort of weight management components (meal planner, dietary recall analyzer, weight tracking etc.). Unfortunately, the effectiveness for controlling body weight has not been extensively researched.

Both the European Commission and the Food and Drug Administration (in the United States) have published guidelines on mHealth apps in view of the rising interest in the mHealth industry. However, neither guideline offers any standards for the quality of app content (Nikolaou et al., 2017). Even though many meal planning apps try to embrace the idea of customized nutrition, these current solutions are still in the early stages in terms of evidence-based content, partly because there is a shortage of integrated nutrition information (Garcia et al., 2021).

However, the benefits of using an online platform or app are remarkable, including the reduction of time required to create a personalized meal plan, the elimination of manual calculations and increased precision using automatically executed formulas, improved patient communication outside of consultations, effective patient data collection and use of data to enhance real-time nutritional intervention. Considering the need for digitalization, it is essential for Dietitians to have a program or software that they can connect to and easily access data for proper assessment of nutritional status and food composition (Nicolae, 2017).

Our objective was to design a digital platform for nutritional intervention (named "Nutrition ARTS") to facilitate the nutritional care process and pinpoint the benefits it may bring to the Romanian Dietitians.

Material and method

Research protocol

All participants were involved based on the voluntary consent given before to the creation of the accounts. Throughout the research, data privacy was preserved.

a) Period and place of the research

The research method used was an online survey (created in Google Forms), which was distributed to the

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users through email (also made directly available from the platform). Data collection started in February 2022 and ended in May 2022.

b) *Subjects and groups*

A total of 58 undergraduate and graduate students (attending Bachelor's Degree in Nutrition and Dietetics or Master's Degree in Clinical and Community Nutrition) from the George Emil Palade University of Medicine, Pharmacy, Science and Technology of Targu Mures were granted access to use all platform features.

c) *Applied tests*

The questionnaire was divided into three sections: user information, digital competence, and Nutrition ARTS related questions. 23 open-ended or closed-ended questions with single or multiple choice were prepared. First, we collected information on the respondents' demographics and the educational activities they are currently or have previously participated in. Data on openness to technology and the usage of platforms for dietitian activity was supplied by the second set of questions. The third set of questions centered on how the Nutrition ARTS platform was utilized, the features that were useful, the level of appreciation, the challenges experienced, and suggestions for upcoming enhancements.

d) *Statistical processing*

Using the "Summary" function of Google Forms, the data collected was organized and represented graphically.

Development of the online platform

The "Nutrition ARTS" platform's initial development began in the summer of 2021. The main technologies applied were back-end (PHP, MySQL) and front-end (HTML, CSS, JavaScript) programming languages. Using Google Translate and making the required corrections, the Food and Nutrient Database for Dietary Studies 2017-2018 was completely translated into Romanian language, before being transferred to a MySQL database. It was made available on both the desktop and the phone.

Calculations were made easier using standardized formulas, the method for estimating basal metabolic rate (BMR) was the Harris Benedict equation. The BMR is multiplied by the physical activity index to obtain the estimated energy requirement. Body mass index (BMI) is calculated using the following well-known formula: $\text{Weight (kg)} / \text{Height (m)}^2$.

Several sets of questions upon lifestyle, general health, medical history, eating habits and associated diseases were used to create online patient medical records. Basic data such as age, sex, or height (from the medical history) are used for the calculations available in the nutrition fact sheets.

In the nutritional forms (intended to be filled after each session with the patient) the estimated energy requirement is calculated using the values for weight and physical activity index entered at this point. In addition, using the values obtained from a body fat scale, the interpretation of body composition is provided (such as: body fat, visceral fat, water mass, bone mass and muscle mass). Using a JavaScript library (Chart.js), data entered can be observed graphically.

In the nutritional intervention sheets, the macronutrients needs are calculated according to the estimated energy requirement. During the development of the meal plans, the information entered at the last nutritional intervention

sheet can be followed or modified. Recommended dietary allowances and tolerable upper intake levels of other nutrients (fiber, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, cholesterol, Vitamins A, B1, B2, B3, B6, B9, B12, C, D, E, K, Choline, Calcium, Phosphorus, Magnesium, Iron, Zinc, Copper, Selenium, Potassium, Sodium and water are also tracked according to the values suggested by the NIH (National Institutes of Health), depending on age and gender.

The search for foods in the database can be made by using keywords, selecting a category, or sorting in ascending or descending order by certain nutrients. In addition, new recipes, or foods (not found in the database) can be created and added.

Besides all the features implemented for patients, there are also others available for institutions (such as kindergartens). Based on the weekly food inventory and the number of children present each day, nutritional analyses can be performed in accordance with the legislative recommendations for calories, protein, carbohydrates, lipids, calcium, phosphorus, magnesium, iron and zinc.

Results

The evaluation questionnaire was completed by 48 students (Fig. 1), out of 58 users that had access to Nutrition ARTS, their ages ranging between 20 and 60 years (Fig. 2). Respondents unanimously stated that they had no problems using digital devices.

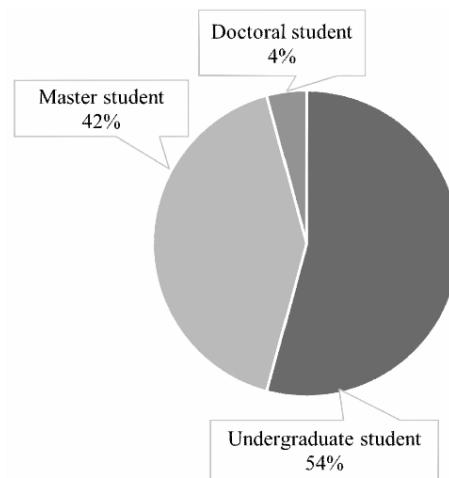


Fig. 1 – College degree levels.

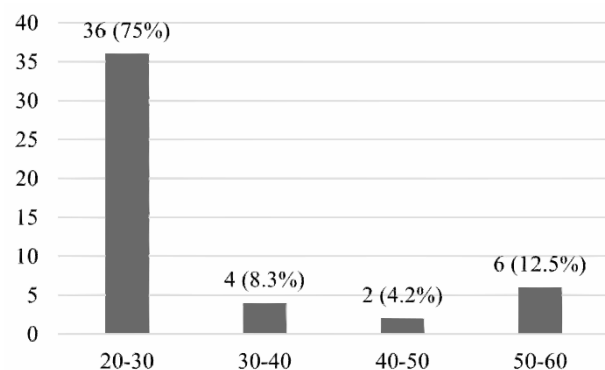


Fig. 2 – Age ranges of the respondents.

Most of them had used the Nutrition ARTS platform occasionally (79%), others reporting a frequent use (21%).

There was a significant relationship between the origin of respondents and the frequency of use of the Nutrition ARTS platform ($p < 0.05$) (Table I).

Table I
Relationship between the origin of respondents and the frequency of use of the platform.

Indicator	Frequency of use of the Nutrition ARTS platform		p-value
	Frequent	Occasional	
Origin	Urban	11	0.0442
	Rural	0	

Table II
Relationship between the understanding on how to use the website and the high school profile.

Indicator	Understanding on how to use the web-site		p-value
	Yes	No	
High school profile	Science	32	0.0270
	Humanities	9	

Most respondents believed that they were comfortable with the use of the site (87%) and assigned it an overall 5-star rating (75%).

There is a significant relationship between the understanding on how to use the website and the high school profile of the respondents ($p < 0.05$) (Table II).

All the features of the platform mentioned in the questionnaire (Fig. 3) were considered helpful, the most useful in the opinion of the respondents being the patient records (95.8%) and the meal planner (87.5%).

Regarding the development potential of the platform, the most important new function that should be implemented were considered to be the separate saving of meal plans, in order to be used on other patients (79.2%), followed by the food suggestions during meal planning (58.3%).

About the patient records (specific to certain diseases) that should be implemented, most of the respondents considered necessary to add records for obesity (79.2%), besides other conditions (in descending order of demand: cardiovascular disease, food allergies, autoimmune diseases, high blood pressure, food intolerance, dyslipidemia, cancer, postoperative complications, gastric and thyroid diseases).

The simplicity of calculating caloric requirements (91.7%) and speeding up the creation of a meal plan are two of the most significant advantages observed by the users (83.3%) (Fig. 4).

All of the respondents have stated that they intend to use Nutrition ARTS in their professional practice and they would be likely to suggest it to other Dietitians.

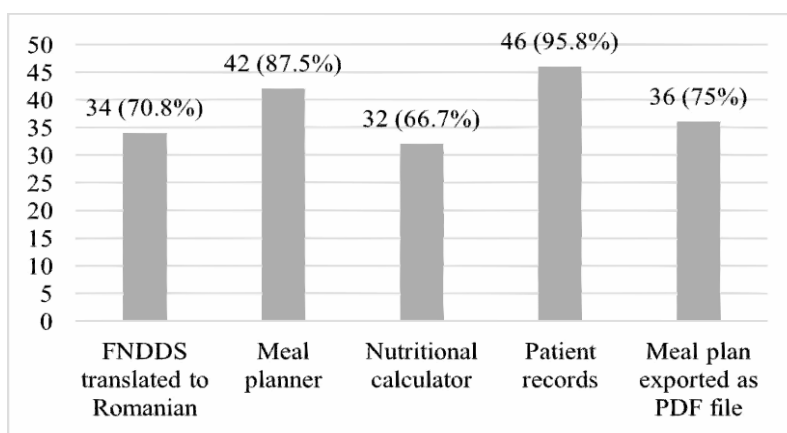


Fig. 3 – Most useful features of Nutrition ARTS.

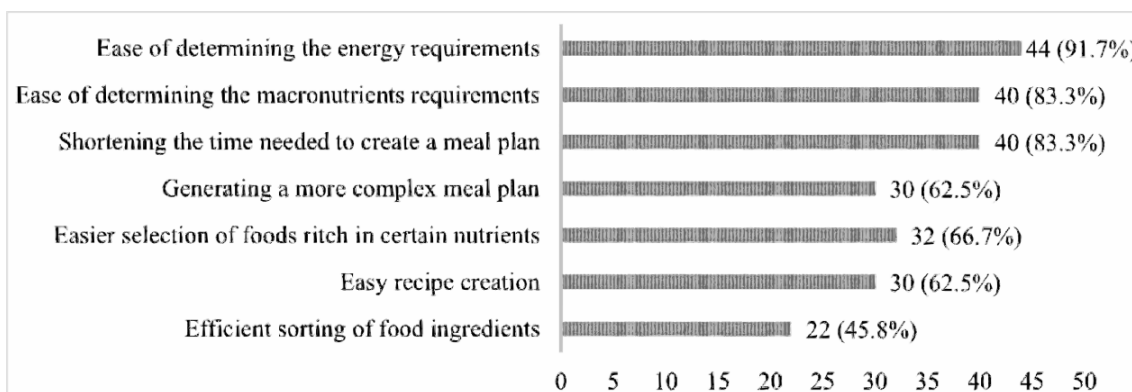


Fig. 4 - Advantages observed after using the platform.

Discussion

Limitations: We had a small sample, but we want to extend this pilot study, after platform improving. Unfortunately, the number of those who completed the evaluation questionnaire (48 people) was lower than the total number of users (58), some possible causes being the insufficient promotion of the evaluation questionnaire or the low number of practicing dietitians (most respondents were undergraduate students).

Similar studies on this topic (the advantages of using a nutritional care platform) have been conducted by other authors. In 2017 a study wanted to examine the benefits of the Nutritio platform in the work of Nutritionists / Dietitians. It was stated that there were advantages to utilize automatic calculations instead of manual ones, such as lowering the time needed to create a personalized meal plan and improving accuracy. It was concluded that software is necessary for Dietitians to easily obtain precise information on determining nutritional status and food composition (Nicolae, 2017).

A 2016 study was conducted to evaluate the MyFitnessPal application for analyzing diets in comparison to a reference method. The food diaries were completed by a group of 16 volunteers. The application MyFitnessPal has a lot of potential, but further research with a larger selection of participants is required to see whether it can be used as a tool for nutritional assessment (Al-Hassan, 2016).

In many studies, collected dietary data from food survey was analyzed in macro- and micronutrients using nutritional analysis applications, one example being the Nutritionist Pro software (Tsirimiagkou et al., 2021; Shatila et al., 2021; Kotsis et al., 2018).

Technology is advancing and new approaches to dietary assessment have been made possible by recent developments in the smartphone app industry. Users can take images of their meals and an application (called Meal Snap) will calculate the approximative number of calories. According to a research, Meal Snap and Nutritionist Pro software, version 4.4.0 indicated similar amounts of calories (Keeney et al., 2016).

However, most nutrition apps frequently require manual entry of food items, for example, by asking users to enter foods and estimated portion sizes using a sophisticated food database. Numerous users of nutrition apps reported having trouble entering data, such as issues finding the right foods in the database, entering the right portion amounts, or correctly identifying foods, because of the many alternatives. The European Union eHealth Action Plan 2012-2020 seeks to improve the efficacy, usability, and acceptance of web-based health promotion, including nutrition applications, with the hope that this will ultimately lead to the achievement of significant health outcomes (König et al., 2021).

Nowadays, gamification is a common feature of health-related mobile apps in an effort to use the motivational power of games in order to boost user engagement or promote specific health habits (Schmidt-Kraepelin et al., 2020). According to study results, using diet or nutrition apps can lead to changes in eating habits. Therefore, apps

pertaining to food and nutrition that emphasize enhancing motivation, desire, education, and self-improvement may be especially helpful. Gamification components or other similar approaches may be helpful to keep users motivated and eager to persist in their weight loss attempts. Creators should think about including relevant theoretical elements for health behavior modification into the newly created mobile apps as the number of diet and nutrition related apps keeps rising (West et al., 2017). Every year, the app store's "Health & Wellbeing" category receives over 200 new additions. Regarding their content, diet apps can be labeled as "fitness and health" or "medical" apps. Apps like EateryApp, MyFitnessPal, MyMeal-Mate or FatSecret look promising and can be utilized as supportive aids in nutritional therapy because they have features like "calorie counting" and recording meal diaries. However, some of these apps have significant limitations, such as the incorporation of inaccurate data and unresolved data safety issues (both users and manufacturers have significant challenges when it comes to data protection.). There are now hardly any set standards for app certification and review. Since many nutrition applications lack information regarding data sources and providers, for example, it is necessary to critically evaluate their authenticity (Holzmann et al., 2017).

The Eat and Track smartphone app is a new tool for gathering information on nutritional consumption that was specially created by a research team. With a specific focus on the nutrients of relevance while frequently eating out, namely sugars, saturated fat, and sodium, the Eat and Track smartphone application is a reliable technique to gather group nutritional density intake data (Wellard-Cole et al., 2019).

Another online tool for measuring nutrition and biometrics called CRON-O-Meter provides information on more than 60 nutrients and has databases with more than 7500 food items. Within a study, researchers looked at the nutritional profiles of three different diets and examined how well they met the Dietary Reference Intakes for micronutrients. Using the online nutrient tracker CRON-O-Meter, 20 micronutrients were evaluated. Authors concluded that, in order to lower the danger of micronutrient deficiency, special consideration must be given to foods high in micronutrients (Engel et al., 2018).

For nutritional intervention in Chron's disease, in 2019, the ModuLife software, developed in collaboration with Nestle, was made accessible worldwide. Its primary goal was to train specialists and spread awareness of the approach among patients. The patient application has a recipe/meal database and is highly helpful for daily diet planning. The medical personnel can encourage the patients to register to this application, at which point they can access up to 150 savory and sweet dishes for the various phases as well as a variety of dietary advice and lifestyle suggestions (Matuszczyk et al., 2021; Herrador-López et al. 2020).

For nutritional monitoring and evaluation at a national or international level, standardized procedures and internationally recognized indicators are crucial components. High rates of malnutrition (with a focus on micronutrient deficiencies), overweight, obesity, and non-

communicable diseases linked to diet are among the main public health issues in Europe. Supporting nutritional surveillance, monitoring, evaluation, and research initiatives is one of the goals of the WHO European Food and Nutrition Action Plan. In addition to strengthening and expanding their nationally representative diet and nutrition surveys, Member States should prioritize creating national food composition databases. It should be emphasized that Member States must have access to the right software and resources when developing healthy food policies and action plans to promote nutrition. There is a general lack of standardized and harmonized food and nutrition techniques for dietary assessment that follows nutritional guidelines and data on food composition and intake.

Diet Assess & Plan is a sophisticated nutritional assessment program, based on computerized versions of common food intake surveys. This software can also collect data on general and pre-screening information about patients, anthropometric and biochemical parameters, blood pressure readings, supplement intake, and physical activity. Also, it enables users to perform extensive computations by merging data from external databases and nutrient recommendation sources. It makes dietary planning, food labeling, and detailed evaluation of dietary consumption possible at the individual or demographic group levels. This program includes an electronic version of the Serbian Food Atlas (a book that is used to estimate food portions and includes photographs of various portions), it can be used when planning different diets on a personal level, where anthropometric and other personal criteria are taken into account while establishing a unique nutritional plan for a specific period. With regard to specific daily recommended intakes for population groups such as those living in elderly homes, hospital catering, elementary schools etc. it is feasible to determine the nutritional values of the complete meal or entire menus, for one day or a longer period of time. Because nutrition and exercising are closely related, the International Physical Activity Questionnaire was included into this software. The price of the scheduled and prepared meals as well as the precise amount of food required for preparation can be calculated using this tool. Based on the meals and menus scheduled for one month, as well as the food options in the public sector institutions, the purchase of foods can be applied effectively and controlled (Gurinović et al., 2018).

The large variety of platforms that dietitians use offer a sizeable portion of the tools required for their professional activity, but there are some features needed by the Romanian dietitians which are only available at the newly developed online platform Nutrition ARTS. Some of the online application's innovative features that set it apart from similar ones include patient records (with vast nutritional and medical information), micronutrient tracking according to the Dietary Reference Intakes, nutritional analyzes for institutions (performed in accordance with the legislative recommendations for calories, protein, carbohydrates, lipids, calcium, phosphorus, magnesium, iron and zinc).

Conclusions

1. Dietitians have shown a significant level of interest in digital practice, and it is vital for them to have access to

a platform with as many facilities as possible to help them with their work and improve professional performance.

2. The use of the Nutrition ARTS platform showed a significant positive impact on its users.

3. For further research, it would be favorable to carry out a similar study on a larger sample of people, involving Registered Dietitians practitioners, and to develop the interaction with practitioners and Romanian TeleMedicine network for nutritional education.

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Conflict of interests

None to declare.

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