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Original Article

Updating the DietAdvice website with new Australian food composition data

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ABSTRACT

DietAdvice is an Australian self-administered dietary assessment website initially developed in 2003–2005. The website allows patients to enter their dietary information and dieticians to remotely access and interpret the data. DietAdvice is presently being updated with new Australian food composition data. This study aims to describe the update process for moving from 1995 to 2006 food composition data. The database for the website was developed using grouped food data from the NUTTAB 1995 database. All food groups were cross-matched with the food from the NUTTAB 2006 database using the food ID codes. Rules were applied to determine the suitability of the food for inclusion in the database. New, ungrouped foods were considered individually and added to existing groups or grouped together as new groups. Foods within each group were statistically weighted to determine the nutrient profile for each group. The NUTTAB 1995 data was used to develop 19, 103 and 422 first, second and third level groups, respectively. From the NUTTAB 2006 data, an additional 623 foods needed to be individually considered. The final database contained 23, 123 and 430 first, second and third level groups, respectively. Ensuring the most recent food composition data is incorporated into the database of the website will maximise the accuracy of the dietary advice provided by the dieticians.

1. Introduction

Dietary assessment is a vital component of clinical practice in nutrition and has changed significantly since its early beginnings. Traditional forms of dietary assessment include the food frequency questionnaire, diet history interview, 24-h recall and food record or food diary. These methods are traditionally conducted using a paper and pen format, although in recent years, new technologies have been used to streamline the process. Computers were used for dietary assessment as early as the 1970s, with the diet history interview (Medlin and Skinner, 1988).

More recently the EPIC study developed EPIC-SOFT, a program modelled on the 24-h recall including 17–23 food groups, 1500–2200 foods and 150–350 recipes. (Menisink et al., 2001; Brustad et al., 2003; Slimani and Valsta, 2002; Slimani et al., 2002, 1999). Foods are entered in the program as prepared or as eaten, then automatically converted into the amount eaten. Although this program is interviewer-administered and does not contain any food portion information (each country had a different portion book), it provides a standardised process of collecting dietary information for a large population group in Europe.

DietAdvice is an Australian self-administered dietary assessment website utilising a combination of diet history and food frequency questionnaire methodologies. The website allows patients to enter their dietary information and dieticians to remotely access and interpret the data. The website was initially developed between 2003 and 2005 using 1995 Australian food composition data (NUTTAB). This data was matched with the food group intake data from the 1995 National Nutrition Survey (NNS). The level of error associated with using food groups as opposed to using individual food items was determined. A 5–10% level of error was found when grouped foods were used (Burden et al., 2008) which was felt to be comparable to the error associated with face-to-face dietary assessments. It was then decided that all future analyses would be performed for grouped food data rather than individual food items. Statistical analyses to identify common foods consumed in each meal were performed and results were related back to the original food groups from NNS.

The NNS food groups were developed for research purposes, hence, they needed to be adjusted for self-administered dietary assessment. Cluster analyses were performed using three different hierarchical clustering algorithms: average linkage, complete linkage and Ward's method for each group (Johnson and Wichern, 2002). Cluster analyses have been used for organising foods into

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groups (Akbay et al., 2000; Windham et al., 1985) but often require professional interpretation of the outcomes. Professional judgement was applied to the results to re-group the foods based on both nutritional and conceptual similarities (Probst and Tapsell, 2005). The final developmental stage was face-validity testing by a group of dieticians. The database was then uploaded to a dynamic web-design using a multiple-pass approach (Probst et al., 2007).

In 2007, new food composition data for Australia (NUTTAB 2006) was released (Food Standards Australia New Zealand, 2007b,c). A number of differences between the 1995 and 2006 databases were identified including the addition of new food items and product reformulations (Food Standards Australia New Zealand, 2007a). As a result, the DietAdvice website needed to be updated. The aim of this study is to describe the process for updating the DietAdvice website from 1995 to 2006 food composition data. The initial DietAdvice database only included macronutrient data for each of the food groups hence this update also included the incorporation micronutrient data into the database.

2. Materials and methods

2.1. The review process

A review of all new foods was required by comparing the NUTTAB 1995 and the 2006 datasets to determine the number of new foods to be included (Fig. 1). This process was based on the comparison of food codes, in the database, which was performed using Microsoft Excel (2003, Microsoft Corporation, USA) lookup tables (Fylstra et al., 1998). Although the comparison had been partially completed by Food Standards Australia New Zealand prior to the database release (Food Standards Australia New Zealand, 2007a). The partial comparison showed the progressive change of Australian food composition data and where new foods were added or old foods were matched with new food codes. The website update also required all macro- and micronutrient data to be considered as well, hence the repeated review process.

The DietAdvice database contains categories (first level groupings, e.g. breads and cereals), sub-categories (second level groupings, e.g. bread and toast) and food types (third level groupings, e.g. wholemeal bread) for the multiple pass approach used by the website. The NUTTAB database included individual food information while the DietAdvice database contained food groups only, therefore, foods that were not new to the NUTTAB database and had a matching identification code were automatically sorted into the DietAdvice website food group database. The 'new' (completely new or re-formulated) foods in the NUTTAB 2006 database were then further compared with the DietAdvice website database. Rules were applied to all groups to determine the suitability of the food (summarised under Creating grouping rules) and foods were only included in their 'as consumed' form. Where there was a $<20\%$ difference between the macronutrient data, foods were grouped into their closest food group. A 20–40% difference required the use of professional judgement of each individual food item, and a $>40\%$ difference warranted the development of a new food group in the DietAdvice database. Decisions requiring professional judgement were made by a team of Accredited Practising Dieticians who had previously been involved in development of the DietAdvice database.

As the original food groups were based on the NNS food grouping hierarchy, all foods from NUTTAB 2006 needed to be linked back to the NNS food groupings in order to apply statistical weighting to the new groups. Since the new foods incorporated in the database were not directly matched to NNS food groups, additional rules were created. These new foods were related to the most conceptually similar food types (third level groupings).

As the NNS is the most recently available population food intake data obtainable for Australia, foods within each food group could then be weighted to determine the nutrient profile for each new group. The popularity of these 'new' food items were also compared with data from a clinical trials database developed by the Smart Foods Centre, University of Wollongong (see Developing a clinical trials dataset), to determine whether large shifts in intake patterns needed to be considered when applying the weighting. The final stage of this process involved matching each of the NNS food items back to the closest NUTTAB 2006 food to recreate the DietAdvice database through statistical weighting. Completion of this process resulted in a hierarchical food grouping system which encompassed all foods from NUTTAB 2006.

Upon completion of the statistical weighting, the portion size of each food needed to be considered due to the self-administered nature of the website. Portion sizes for new groups were compared with existing portion size options. Where a relevant portion size was found, it was added to the database. Where no portion sizes were suitable, a new portion size needed to be determined. To assist with the cognitive process of reporting dietary data, food portion photographs were created for the majority of portion sizes (Probst et al., 2008).

2.2. Developing a clinical trials dataset

Baseline diet history data was collected from all clinical trials conducted at the Smart Foods Centre until 2007. The clinical trials dataset was used to shape the weighting of new categories in the DietAdvice database. All data was available in Foodworks (2008, v5.1367, Highgate Hill QLD) database. As the clinical trials were conducted prior to the release of the NUTTAB 2006 dataset, all food data needed to be converted to NUTTAB 2006 food data manually. In Foodworks, a local copy of each trials dataset was created and saved as a separate folder. The data contained in the database was updated to include NUTTAB 2006 data only. The clinical trials data was primarily from the 2001 Australian branded foods database (AUSNUT) with some additional food items added from food labels and recipes submitted by the participants. For this reason some foods could not be matched appropriately as NUTTAB only contains generic food items. Notes were made against each individual food match to track the change process. These steps were repeated for all foods in each of the local copy folders. The final database ($n = 284$ clinical trial participants) was exported to Microsoft Excel.

3. Results

3.1. Creating grouping rules

The NUTTAB 2006 database contained approximately 3000 foods of which 1350 foods could be considered 'new'. Of these 'new' foods 531 were specific indigenous foods. As the food items were considered on an individual basis, the following rules and professional judgement decisions needed to be applied.

3.2. Inclusion and grouping criteria

- Macronutrient similarities and conceptual similarities, e.g. salted pork crackers grouped into the savoury snack foods > pretzels and other snacks > other snacks grouping hierarchy.
- Commonly eaten foods and those available to the general public in major retail outlets such as Milo formulated beverage.
- Foods consumed in greater quantities today than 15 years ago such as raw vegetables and fruits.