

## SELECTING AND USING A POCKET COMPUTER IN CLINICAL DIETETICS

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### THE PRACTICE SETTING

Today's health care environment presents unique challenges to dietitians and other health care professionals. As the age of the average American increases, and the incidence of AIDS becomes more widespread, demands on the U.S. health care system continue to mount. At the same time, the shortage of nurses and other health care workers, and the unwillingness of the nation to fund its desire for top-quality health care are creating supply-side constraints on the system. It is naive to assume that food and nutrition services will be exempt from the competition which is bound to continue for these scarce health care resource dollars. As a further complication, government regulations and an apparent cultural inclination toward malpractice suits are creating an ever increasing number of rules, regulations, policies, procedures, forms and documents which are required for defending the manner in which patient care is provided. As a result of these functions, accountability is the key word in health care today. Dietitians and other health care professionals must be prepared to justify their interventions and treatments more rigorously in terms of the results they generate. This means that dietitians must continue to conduct research on the effectiveness of dietary intervention in contributing to shorter patient stay and lower costs. They must demonstrate credibility with the medical team in recommending treatments. They must actively defend the long-term beneficial role of food and nutrition in patient care, even when the results sometimes do not immediately appear. And, at the end of the day, they must be able to account for the manner in which they used their time during the day. Dietitians must, in short, work even more effectively and efficiently than they are currently doing.

### POCKET COMPUTERS: AN EFFECTIVE TOOL

It may be an exaggeration to state that a small electronic device carried in one's pocket is the magic cure to these overwhelming issues. However, it is true that pocket computers can make a significant impact on the efficiency and effectiveness of dietetic practice. They can help dietitians complete repetitive, mechanical tasks quickly and thus spend more time on "front-line" duties requiring professional judgement and skills. They can help dietitians think quickly on their feet, providing useful input in a timely manner, and thus increasing credibility with the medical team. They can promote quick analysis of information, allowing for more rapid response to patients changing needs.

There are several characteristics of pocket computers which make them especially good tools in the clinical setting. Since they are small, they are extremely portable, and can be carried to the patient's bedside, to the nursing station, and to the dietitian's desk. Batteries are self contained, so they can be used in any of these locations. They are also relatively inexpensive for the amount of computing power provided. This makes it easy for a department to furnish one to each professional. It is also easy to acquire one or two on a trial basis before investing on a large scale in a particular product. Because many pocket computers are programmed in BASIC, an easy to use language, it is easy to learn their operation and structure. It is usually possible to adapt the programs, if necessary, to particular practice settings.

Pocket computers are, however, limited in memory capacity. This means that data-

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intensive activities are generally not well-suited to implementation on a pocket computer. (These memory limitations are somewhat relative; models exist which include as much memory as a desktop computer, and pocket computers are available for dietitians which function effectively with much less.) Where scarce memory is a constraint, developers of pocket computer programs frequently choose an algorithm to compute a value, rather than looking it up in a data table. One example of such value is Ideal Body Weight, for which a formula would be employed, as opposed to the Metropolitan Height-Weight Tables, which would occupy substantially more computer memory. Another weakness of pocket computers is their limited capability for producing printed output. Printers, when available, add to the weight and bulk of the pocket computer and usually print one thin strip of thermal paper, in a quality not considered acceptable for a permanent record.

However, substantial evidence appears in the literature to demonstrate the applicability of pocket computers to a broad scope of dietetic activity in three general categories: nutrient analysis, nutritional assessment, and protocol implementation.

### NUTRIENT ANALYSIS

Pocket computers can be used effectively for analyzing nutritional intake of hospitalized patients. It is frequently true that the patients whose intakes are most critically monitored are those on parenteral or enteral feeding, and who frequently have rather limited food intake. A pocket computer can retain nutrient values for specific nutrients of interest for products which make up the usual intake of these high-risk patients. Rich (1) described the use of a programmable pocket calculator which retained values for 62 food items and meal exchanges. At Massachusetts General Hospital, a pocket computer program is used which furnished five nutrient values for a total of forty products in five categories. The program can calculate totals for products in combination and in various levels of concentration. As a more general level of nutritional intake status, meal exchanges have been demonstrated to be an efficient and effective means of gathering intake information.

### NUTRITIONAL ASSESSMENT

The algorithms used by dietitians and physicians to measure the nutritional status of patients are quite easily incorporated into the functions of pocket computers. Plummer (2) surveyed 82 clinical dietitians in 29 community hospitals and large medical centers in the Boston area about the nutrition assessment indicators they would most frequently use if available on a computer. The list included such indicators as Basal Energy Expenditure, ratios of ideal and actual weights, serum albumin level, and nitrogen balance. Most of the 17 indicators can be easily implemented on a pocket computer. El Lozy (3) developed a pocket computer program for field assessment of pediatric nutritional status based on anthropometric data. Edwards (4) developed a pocket computer program which provided support for nutrition assessment, as well as for the planning and evaluation of hyperalimentation therapy.

### PROTOCOL IMPLEMENTATION

A protocol is a pre-established system of rules for making decision in a given clinical situation. The simplest protocols take the form of "decision trees", which define the options appropriate at the decision-making points of a situation. Where situations are well-defined, computers assist in the implementation of protocols. The advantages of computerized protocols have been cited by Simpson et al. (5) They promote consistent care, which can

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lead to more efficient decision-making by primary care providers and more confidence and consistent follow-up from alternate care providers. Care can be optimized to encourage more efficient use of scarce resources. Record of consistent treatment can deter challenges to quality of care. Education of less experienced professional can be encouraged. Several protocols for nutrition care have been implemented on pocket computers. The most commonly cited nutrition protocol discussed in the literature is that of parenteral nutrition solution formulation (6,7,8). At Massachusetts General Hospital, a computerized protocol has been implemented which supports the formulation of modular feeding for burn patients. A protocol developed by Chen et al.(9) was also programmed for the pocket computer. Several pocket computers support the formulation of diabetic meal plans. Other possibilities for the implementation of computerized protocols in dietetics might include selection of appropriate infant formulas or formulation of nutrition care plans for renal patients or other patients with specific nutritional needs.

### COST AND BENEFITS

The selection of a particular pocket computer for use in a specific practice environment should be based on the mix of tasks performed in the practice environment and a comparison of that mix with the capabilities of available systems. Conducting a simple time study can provide valuable information about the tasks which occupy the most time during the work day. A pocket computer should be selected which can expedite the most time consuming tasks. Use of the MGH Pocket Computer has demonstrated savings of 43% of the time required to calculate Basal Energy Expenditures, and 30% of the time required to calculate nutrient intakes (10). Feldman and Kizka reported time savings of 52% when pocket computers were used for neonatal parenteral nutrition solution calculations, and also reported accuracy improvements from 97 to 100 percent (11).

### SELECTION CRITERIA

In addition to comparing the adequacy and mix of pocket computer functions with a task analysis, additional factors should be considered in selecting a pocket computer. The tendency to erase programs accidentally should be avoided. Data and formula sources should be well-documented, and consistent with the standards and practices of the organization. It should be easy to learn how to use the system. The vendor should demonstrate willingness to provide ongoing service and support, and to custom-tailor the computer's functions, if necessary. The program's security when batteries are changed should be investigated. And, since return on investment will be maximized when cost is minimized, the purchase price of the system should be a prime consideration.

In conclusion, substantial evidence exists that pocket computers can improve the productivity of dietitians in the acute care setting. Specific practice settings should be studied and systems considered whose functions match the mix of tasks performed. Dietitians should, on an ongoing basis, study the environment in which they work and be aggressive in finding more consistent, efficient and effective ways to provide nutrition services.

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