

## HOSPITAL APPLICATIONS OF A NUTRIENT DATA BASE

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### INTRODUCTION

Children's Hospital Medical Center of Akron is a 253 bed acute care teaching facility providing the full spectrum of services to the pediatric age group, and providing regional services in both neonatal intensive care and burn care.

Approximately 4 years ago, the Department of Food Service and Nutrition of CHMC purchased the HVH-CWRU Nutrient Data Base for use in patient nutritional care. We purchase updates of the data from Case Western Reserve University annually, but have developed our own software due to language incompatibility between the two systems.

### DATA BASE SELECTION

The data base was selected primarily because of the flexibility built into the coding system. We utilize the NDB for both inpatients and ambulatory clients. Particularly with diet diary analysis, the availability of flexibility in measuring units allowed for data entry is critical. The HVH-CWRU coding system has arranged foods into 43 groups and all entries are made in the universal 100 gram portion, but with conversion factors that allow the entry to be made in at least 7 and up to 16 household measures or metric equivalents.

### INITIAL DIFFICULTIES

The most critical problem was the incompatibility of our computer language, RPG3. CWRU Department of Biometry offered aid in transcription of their programming, but we decided to develop our own.

The other major problem was the need for programming changes from the batch-mode used at CWRU to accommodate online input of data. The first programmer involved had little conception of our needs and failed to make these program changes. Fortunately a new programmer-analyst arrived at this time. Our department also adopted a comprehensive plan for the materials management aspect of The Food Service area incorporating the NDB as an integral part. The new analyst had a background in food service management and time was allotted for him to develop improved programming with an eye to future uses we will make of the NDB.

### USES OF THE NDB

#### Patient Care

There are special needs in our young patient population. Much individualized diet therapy must be provided, since nutritional support of hospitalized children must accommodate their high nutritional needs at a traumatic time of separation from home. We do a great deal of nutrient intake evaluation. The NDB system provides tremendous timesavings, and leaves the Registered Dietitian more time for medical and patient interaction. We are also able to provide a far greater scope of analysis than hand calculation could ever provide.

## Teaching

We also use the NDB system in teaching dietetic and medical students. We are beginning to explore use of the computer in patient education, since the patients who have tested this have been very enthusiastic.

## Ambulatory Services

Nutritional assessment includes diet diary analysis at the Physical Fitness Center of a nearby hospital, where the dietetic services are contracted from Children's.

## Research

We have submitted 4 grants in 3 years from CHMC of Akron with a nutrition component that incorporated use of the NDB system.

## Other Uses

We analyzed all diets in our newly revised 400 page Handbook of Diet Therapies using the NDB. We include a statement of adequacy on each diet. We also analyze all house menus for adequacy whenever our cycle is changed. A popular use has been the posting of kcalorie content of cafeteria food items.

## STEPS IN THE DEVELOPMENT OF THE PATIENT CARE USES

The master handbook of all items in the data base was used to code all the items on our 21 day cycle for both patients' and cafeteria items. Thus we created an efficient and handy "mini code book" personalized for CHMC. We also included all standard write-ins, special dietary products, therapeutic nutritional supplements such as tube feedings and all items available in our nourishment centers. We have then been able to analyze all the items for kcalories, grams of protein, fat and carbohydrate and milligrams of sodium.

Obviously, the subset of an entire code book provides much faster accessibility of the data base. This is essential to make the NDB appealing to the busy professional. This code book is invaluable in the writing of modified diets, and helps allow tremendous variety. Other nutrients are easily available to the dietitian upon request.

One particular problem for a Children's Hospital is the lack of a single standardized portion size. We must offer toddler, child, and adult portion sizes. When we have these worked out we will produce a new mini code book which will reflect these variations in portion size.

Another development needed was efficient coding forms. With the mini code book and these forms, our technician can code and input a patient intake in about 5 minutes. We have coding forms designed for inpatient use and for diet diaries.

Our last critical need was for program outputs which included the summarization of patient intake with a comparison to a standard (the RDA). This form is suitable for inclusion in the Medical Record and is entitled "Nutrient Intake Evaluation".

## SPECIAL CONSIDERATIONS FOR THE NUTRIENT INTAKE EVALUATION FORM (attached)

In developing the programming for this output we incorporated:

1. Meal by meal analysis. We assume that sometime in the future some nutrients availability (such as Fe) will need to be assessed by meal.
2. Averaging of nutrient intakes. This increases the applicability of the RDA for use in evaluating individual dietary intakes. It is desirable to have 5 days intake.
3. Flagging of incomplete data. This is noted with an asterisk beside the total amount reported. Knowledge of the nutrient content of all foods is far from complete, though growing continually.

Interpretation of these analysis is a critical component for which the dietitian is uniquely qualified. The dietitian must assess foods consumed against nutrient intake, reported particularly when the data is flagged and intake is below two thirds of the Recommended Dietary Allowances (RDA). Other considerations must include the patients health status, medications and other therapies. Without a NDB we could never approach the scope of evaluation we can now provide.

### The Materials Management Area

As shown in the schematic, our goal is to have a fully integrated computer system for materials management, with the NDB system at the core. The NDB will be an integrator among food service tasks and between the food service system and the patient care system.

### Our Recipe File

The data base has a food group category reserved for recipes. We can use this recipe file to enter "recipes" for vitamin and mineral supplements since individual nutrients are now items in the data base.

We are also working on standardization of recipes as an aspect of materials management.

### Future Directions

At this time we can summarize all nutrient intake from enteral sources (food, supplements, formulas or tube feedings). We will soon have the capacity to add parenteral fluids, thus we could summarize total nutrient intake from ALL sources!

We are now working on an alternative set of standards to replace the RDA in the evaluating of parenteral nutrient intake.

### The Equipment Used at Children's

The hospital system is the IBM 38, which is designed to run efficiently in an online environment. This system has 2 billion bytes of disc storage and an internal memory of 3 million bytes. We use a business communication language RPG3. Our CRT work station is an IBM Model 5251, and our remote printer is IBM 5256, which has a printing capacity of 300 characters per minute.

CHILDREN'S HOSPITAL MEDICAL CENTER OF AKRON  
 NUTRITIONAL INTAKE EVALUATION FORM

DATE- 03/24/82

PATIENT'S NAME- JOHNNY JONES

Representing 180 cc Ensure

NUMBER- 09290905  
 HEIGHT- 106.0 CM  
 WEIGHT- 15.40 KG  
 AGE- 4.75 YR  
 SEX- M

PATIENT'S IDEAL WEIGHT IS 17.4 KG 38.3 LBS  
 BASED ON A FUR HT AT 50TH %

1 DAY AVERAGE

NUTRIENT	UNIT	INTAKE AVERAGE	R.D.A. VALUE	PERCENT CF RDA %	NUTRIENT	UNIT	INTAKE AVERAGE	R.D.A. VALUE	PERCENT CF RDA %
ENERGY	KC	502.02	1700.000	29.53 %	VITAMIN B6	MG	.75	.900	83.33 %
PROTEIN	G	17.50	30.000	58.33 %	VITAMIN B12	UG	999.30	1300.000	76.87 %
VITAMIN A	IU	1250.38	2500.000	50.01 %	CALCIUM	MG	3.00	2.500	120.00 %
VITAMIN D	UG	12.50	400.000	3.12 %	PULPSPHOSUS	MG	250.01	800.000	31.25 %
VITAMIN E	MG	16.08	6.044	166.75 %	INSULINE	MG	4.50	10.000	45.00 %
ASCORBIC ACID	MG	75.02	45.000	166.71 %	IRON	MG	10.00	200.000	5.00 %
FOLIC ACID	MG	1.02	1.200	84.96 %	POTASSIUM	MG	100.00	10.000	1000.00 %
NIACIN	MG	10.00	11.000	90.91 %	ZINC	MG	7.50	10.000	75.00 %
RIBOFLAVIN	MG	.65	1.000	65.00 %					

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NUTRIENT UNIT INTAKE AVERAGE STANDARD

CARBOHYDRATE	G	68.58	80-95 % CF KC
FAT	G	17.00	15 % OF KC
ALCOHOL	G	.00	< 300 MG PER DAY
CHOLESTEROL	MG	.00*	
POLYUNSAT FAT	MG	.00*	
SATURATED FAT	MG	349.99	1350 mg/day
SODIUM	MG	900.05	2200 mg/day
POTASSIUM	MG	502.02	1300 = 2300 mg/day
ENERGY	KC		

SIGNATURE

8: Patient admitted to ICU for multiple trauma, fractures.

0: Adm. wt.: 15.4 kg (10%/age, 15%/ht.) Adm. ht.: 106 cm (30%/age)  
 Current wt.: 14.1 kg (1 wk. post adm.) Wt. loss of 1.3 kg since adm.  
 Ideal wt.: 17.4 kg (based on wt. for ht. @ 50%)

Current nutrient support: Protein Kcals  
 Ensure @ 60 cc q 3 hrs. 17.6 502  
 D5 @ 30 cc/hr. 17.6 122  
 TOTAL 624

Estimated nutritional requirements:

Kcals: BMR x 1.5 + (25% for metabolic stress/fractures)  
 = (725 x 1.5) + 272  
 Protein: 30 gm/day (based on RDA for age)

CALCIE SUPPLY

CARBOHYDRATE	=	54.43 %	CF CALORIES
FAT	=	31.55 %	CF CALORIES
ALCOHOL	=	14.02 %	CF CALORIES
PROTEIN	=		

\* POSSIBLY AN ADDITIONAL AMOUNT.  
 % BASED ON 1980 U.S. DIETARY GOALS.  
 % BASED ON 1980 RECOMMENDED DIETARY ALLOWANCES.

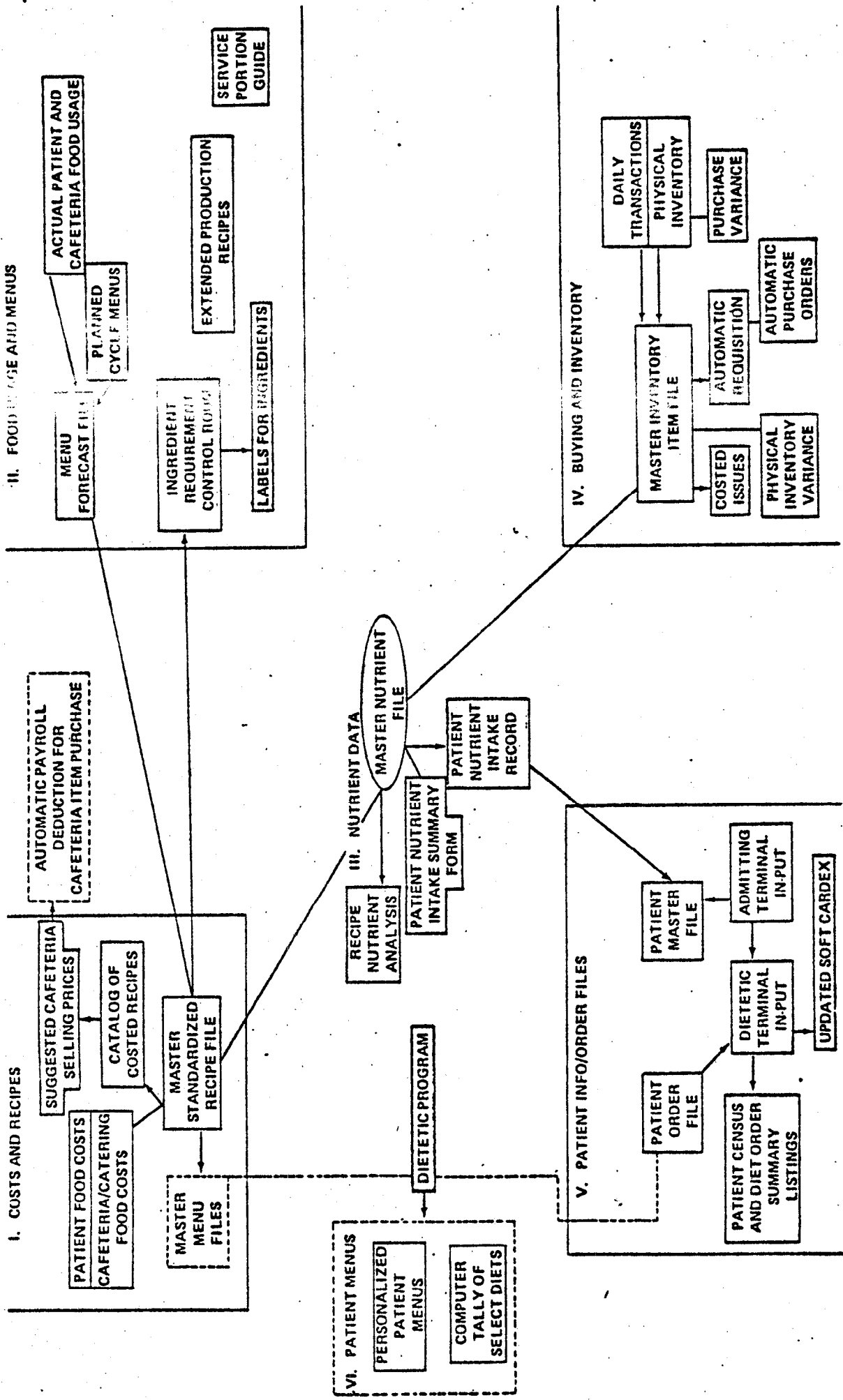
A: Current nutritional support provides inadequate Kcals, protein, vitamins, minerals (with exception of Vit E, Vit C, Niacin, Riboflavin, Thiamin, B6, B12, Zinc) to meet estimated requirements. Pt. requires approx. 1280 cc Ensure/day (160 cc q 3 hrs.) This amt. of tubefeed will meet or exceed nutrient needs evaluated according to RDA for age and estimated Kcal needs based on weight and increased metabolic needs for stress. The RDA does not incorporate all known nutrients needed. This tubefeeding is not adequate for long term use.

- P: 1) Suggest gradual increase in amt. of tubefeed according to pt. tolerance until desired volume is achieved.  
 2) Will post calorie count 3 x weekly and monitor intake, weight and toleranc  
 3) Weekly follow up note to update nutritional status, discuss any current problems, etc.  
 4) If long term use of tubefeeding is necessary, a blenderized tubefeeding should be ordered.



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# MASTER PLAN FOR COMPUTERIZATION OF THE FOOD SERVICE AND NUTRITION DEPARTMENT



1/80  
3/82

Children's Hospital Medical Center of Akron  
Department of Food Service and Nutrition