PRACTICES OF PEDIATRIC HOSPITALS REGARDING DRUG-NUTRIENT INTERACTION COUNSELING PROGRAMS

A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF MASTER OF SCIENCE

IN THE GRADUATE SCHOOL OF THE

TEXAS WOMAN'S UNIVERSITY

DEPARTMENT OF NUTRITION AND FOOD SCIENCES

COLLEGE OF HEALTH SCIENCES

BY

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AUGUST 1995

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May 3, 1995

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I am submitting herewith a thesis written by Gretchen Wise entitled "Practices of Pediatric Hospitals Regarding Drug-Nutrient Interaction Counseling Programs." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

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ACKNOWLEDGEMENTS

I extend my sincere appreciation to the members of my thesis committee: Rose Bush, M.S., R.D., L.D., Chairman, Linda Cashman, M.S., R.D., L.D., and Dr. Doris Wright, PhD., R.D., L.D. for their time, guidance and support throughout the development of this project. This survey would not have been possible without the valuable information provided from Registered Dietitians across the country who participated in this endeavor.

I would also like to thank Dr. Mary Watson for her helpful suggestions during the development of my survey instrument. The completion of this thesis would not have been possible without the support and encouragement of my colleagues, Gene McKelvey and Dayna Zeringue.

I am especially grateful for the motivation provided by my husband, Brett, and by my parents to complete my Masters Degree. Both provided me with the strength and determination to finish this project.

ABSTRACT

Practices of Pediatric Hospitals Regarding Drug-Nutrient Interaction Counseling Programs

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August, 1995

In recent years, the Joint Commission for the Accreditation of Healthcare Organizations has focused on assessment of needs, both educational and medical, with emphasis on drug-nutrient interactions. Registered Dietitians (R.D.s) were surveyed at forty-five freestanding, acute care pediatric hospitals to determine who performs inpatient and outpatient counseling, how patients are identified, and the drugs chosen. Seventy-eight percent (n=35) of the surveys were returned. Nurses (38.2%) were the primary educator for inpatient counseling and pharmacists (32.3%) for outpatient counseling. The most common means of identification for inpatient counseling is the R.D. scanning charts (n=19), and the pharmacist noting the interaction (n=16). Outpatients were screened by pharmacists (n=18) and R.D.s (n=10). The top drug categories targeted for counseling include: anticonvulsants (n=35), antibiotics (n=33), diuretics (n=26), bronchodilators (n=19), and anticoagulants (n=16). This survey provides insight into mechanisms employed for education and the targeted drugs most significant for this specialized population.

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CHAPTER 1

Introduction

Prompted by the enormous inventory of drugs available, health care providers are continuously trying to understand how drugs interact in the body. Simply taking a drug at the wrong time or with the wrong foods may render the drug ineffective or potentially cause harm to the consumer. Certain drugs may alter the absorption, transportation, utilization, metabolism, and excretion of nutrients and vice versa (Trovato, Nuhlicek & Midtling, 1991). Specific drugs may cause side effects such as nausea, vomiting, diarrhea, or may act as appetite stimulators or appetite depressors, which may have serious consequences in children (Garabedian-Ruffalo & Ruffalo, 1986). Combining drugs, even with over-the-counter medications, can have detrimental effects that the patient may not be aware of. The nutritional status of the patient should be considered when prescribing medication, but may be overlooked by the physician.

Reports cited in the medical literature have almost exclusively studied adult subjects regarding drug-nutrient interactions. With so much information and attention focused on adults and drug utilization, questions are posed relating to pediatric pharmacology research. Pediatricians are constantly faced with the dilemma of whether to use therapeutic drugs that have been approved for adult use (with a disclaimer on them that states that the drug has not completed testing with children) or not to use the drug at all (Yaffe & Aranda, 1992). New pediatric drugs

can be found through clinical drug trials, but many researchers remain skeptical about using children as subjects. Another concern that pediatricians and researchers studying drug administration have is that there are numerous ongoing physiologic changes in children which make it difficult to measure the effects of drugs.

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO), formed in 1951, is a non-profit organization whose members include the American Hospital Association, the American Medical Association, the American College of Physicians, and the American College of Surgeons (Coe & Louviere, 1986). The JCAHO sets accreditation standards for efficient and quality care of patients. In the 1984 Accreditation Manual for Hospitals, a standard was developed for dietetic services to educate patients on potential drug-nutrient interactions (JCAHO, 1994). JCAHO is in the process of revising the focus of the 1994 Accreditation Manual for Hospitals to reflect the facilities' performance and outcomes, rather than to define the hospital's capability to deliver care. One of the goals of this revision

> is intended to make accreditation a more powerful catalyst for continuous improvement by focusing on the organization as a complex system, by creating consistent expectations across departments/services, and by giving the organization more flexibility and choice in setting priorities and devising strategies to improve - strategies that respond more closely to the real needs of the patients and the community the organization serves (JCAHO, 1994).

One of the new chapters that has come from these changes is Education of Patient and Family, which includes the standard for drug-nutrient interaction counseling. The standard has been revised, and responsibility has shifted from primarily dietetic services to a multi-disciplinary approach in which nursing and pharmacy participate in the education process. The most current standard reads:

> The patient and/or, when appropriate, his/her family are provided with the specific knowledge and/or skills required to meet the patient's ongoing health care needs. Such instruction is presented in ways understandable to the patient and/or his/her family and includes, but is not limited to... instruction on potential drug-food interactions and counseling on nutrient intervention and/or modified diets, as appropriate (JCAHO, 1994).

It is up to each hospital/facility to interpret for itself how this standard should be implemented.

Research Questions

This survey will address three research questions:

1. Who is performing drug-nutrient interaction counseling in pediatric hospitals?
2. Which drugs are chosen for drug-nutrient interaction counseling?
3. What are the practices of pediatric hospitals regarding drug-nutrient interaction counseling?

CHAPTER II

Review of the Literature

Drugs and Legislation

Prior to the beginning of the twentieth century, there existed a limited number of rules and regulations governing the sale of any type of drugs in the United States. In 1906, the *Federal Food and Drug Act* was enacted largely to prohibit mislabeled or misbranded food and drugs from interstate commerce (Nielsen, 1992). It soon became apparent that unsafe products were not addressed in this act. In an attempt to clarify and strengthen the law with respect to safety and to add additional safeguards, the *Food, Drug, and Cosmetic Act of 1938* was enacted. The new act required that all food and drugs be tested for safety prior to being released to the public, and that products be labeled with adequate instructions for use. The act was amended in 1962. The amendment, designated the Kefauver-Harris amendment, required that drugs be subjected to rigorous clinical investigations to prove effectiveness prior to marketing. In the late 1970's, additional regulations were imposed that required independent clinical studies be performed in children before a drug could be designated for use in the pediatric population (Wilson, Kearns, Murphy & Yaffe, 1994). In 1992, the Food and Drug Administration proposed that clinical trials may not have to be duplicated in the pediatric population if sufficient information demonstrated similar reactions in adults and children (Federal Register, 1992).

Some of the difficulties with using adult drugs for the pediatric population include: 1) many drugs come in a form that is not suitable for young children (solids as opposed to liquids); 2) inadequate information exists on dosage levels for children of various age groups; 3) possible adverse effects have not been clearly identified; 4) the risk of calculation errors when extrapolating adult doses into pediatric doses; and 5) the effect of drugs on organ maturation during childhood, a period of rapid growth, are not always clear (Wilson et al., 1994; Zenk, 1994; Roberts, 1994). A possible reason drug manufacturers may not provide additional information about drugs that are used in the pediatric population could be the obstacles associated with pharmokinetic studies. Studies conducted with humans require informed consent prior to testing. Parents or guardians may not be willing to subject their children to drug trials or extensive testing. To assist with resolving this issue, drug manufacturers can work with the Food and Drug Administration to identify drugs which can be used for children that may need further investigation or clarification.

Cost may be yet another consideration why more drugs have not been adequately tested on children. The incremental expense of clinical investigations can be exorbitant compared to the anticipated financial return if a drug is approved (Zenk, 1994). Pharmokinetic studies can be performed with a small sample size and furnish significant insight into drug mechanics that may prompt additional investigations.

Pediatric medications frequently are accompanied by a disclaimer that states "safety and effectiveness in children have not been established" (Zenk, 1994). Often, pediatricians and pharmacists are confronted with the difficult decision of using a drug that is approved for use in adults, but not in children, or utilizing drugs approved but intended for other uses. If a physician prescribes a drug used in adults without knowing the effects the drug may have on a developing child, the child may be at an increased risk of an adverse reaction.

Drugs

The drugs discussed below are a few of the most commonly prescribed drugs for diagnoses or diseases that affect children. A brief synopsis of the drugs action is included, along with information that may be presented in the drug-nutrient interaction counseling.

Anticonvulsants. The anticonvulsant, Phenytoin (Dilantin), is one of the more common anticonvulsants used to treat seizure disorders. An estimated two percent of the general population are affected by seizures (Berkow & Fletcher, 1987). Although the mechanism is still under investigation, it is hypothesized that phenytoin works to decrease the electrical impulses within the cerebral cortex (Shannon, Wilson & Stang, 1992). Anticonvulsants, namely phenytoin and phenobarbital, expedite the metabolism of Vitamin D by inducing P-450, a hepatic microsomal enzyme, to inactivate 25-OH Vitamin D (Hamilton-Smith & Bidlack, 1984). Once Vitamin D is inactive, the body must obtain it from other sources, such as food or ultraviolet light

exposure.

The drug may be administered orally or intravenously and dosage is adjusted individually according to blood concentration levels. If the patient is receiving continuous nasogastric enteral feedings and a phenytoin suspension, a recent report suggests that the tube be flushed with sterile water two hours before and after phenytoin administration prior to restarting the feeding. The reasoning behind this recommendation is that the bioavailability of a phenytoin suspension may be reduced if it does not get into the gastrointestinal tract. Sterile water helps assure the suspension will not stick to the nasogastric tubes (Bauer, 1982).

Patients taking phenytoin should be instructed on good eating habits, on food sources of Vitamin D, and/or obtaining sufficient exposure to sunlight to assure an adequate availability of Vitamin D. This drug should be taken with meals to decrease gastric irritation. Adverse side effects of phenytoin may include: nausea, vomiting, weight loss, headaches, cardiovascular collapse, acute renal failure, gingival hyperplasia (in children), megaloblastic anemia, and agranulocytosis (Shannon et al., 1992). Other drugs used to treat seizure disorders include: Carbamazepine, Phenobarbital, Valproate, Trimethadione and Primidone (Berkow & Fletcher, 1987). See Appendix A for a list of foods high in Vitamin D.

Antibiotics. Tetracyclines are commonly administered to children as broad-spectrum antibiotics. Patients should be instructed to avoid taking this drug within two to three hours of any food, but especially milk or dairy products. The

effectiveness of tetracyclines are reduced by 70 - 80% when consumed with milk or dairy products because the drug binds with calcium ions. Tetracyline is contraindicated in children under the age of eight because the drug is known to cause discoloration of the tooth enamel and abnormal calcification of bones (Berkow & Fletcher, 1987). The therapeutic effectiveness of tetracycline is markedly reduced in the gastrointestinal tract with the ingestion of iron because the drug also binds to iron ions. Side effects to observe for include: nausea, vomiting, diarrhea, gastrointestinal upset, and dysphagia (Shannon et al., 1992).

Penicillin and ampicillin are other forms of broad-spectrum antibiotics which are commonly administered to children. In both cases, patients are instructed to space food and drug ingestion because the rate of absorption falls to about 50%. Although still under investigation, it is hypothesized that the reason for this interaction is because gastric emptying is slowed with food, and there is more time for the drug to be broken down (Stockley, 1994). Adverse side effects encountered with these drugs may include: anorexia, nausea, vomiting, diarrhea, rash, pruritis, and nephrotoxicity (Shannon et al., 1992). Other antibiotics prescribed include: Penicillin G, Penicillin V, Amoxicillin, and Methicillin (Berkow & Fletcher, 1987).

Diuretics. Furosemide (Lasix), a loop diuretic, is often prescribed both to children and adults for ailments such as congestive heart failure, hypertension, and edema (Shannon et al., 1992). Loop diuretics work to lower blood pressure by decreasing sodium and water reabsorption in the kidneys. In addition, loop diuretics

promote the urinary excretion of potassium, chloride, calcium, and magnesium.

For diuretics to achieve maximum effectiveness, patients are instructed to consume a diet low in sodium. Patients should also be educated on foods that are high in potassium to avoid hypokalemia, a potential adverse effect of loop diuretics. See Appendix B for foods high in potassium. A few of the other adverse effects that may be encountered with furosemide include: nausea, vomiting, gastrointestinal distress, dehydration, and hypocalcemia. Thiazide diuretics can cause the opposite reactions, hypercalcemia, because they decrease the urinary excretion of calcium and hyponatremia, because they increase the urinary excretion of sodium (Berkow & Fletcher, 1987).

Bronchodilators. Theophylline is one of the bronchodilators prescribed for asthma attacks. According to the National Heart, Lung, and Blood Institute (1991), asthma affects nearly four million children in the United States. Asthma attacks are spasms of the bronchial smooth muscle which cause the airways to narrow. Theophylline may be prescribed when other therapies are ineffective. Its mode of action remains under investigation. Theophylline relaxes the bronchial smooth muscle and may act as a anti-inflammatory agent or adenosine antagonist (Berkow & Fletcher, 1987). Dosages and intervals must be carefully individualized because of the delicate serum balance between efficacy and toxicity. Symptoms to observe for toxicity include: nausea, vomiting, dizziness, headache, arrhythmias and central nervous system stimulation.

Patients are instructed to limit caffeine-containing beverages and foods (which may increase adverse effects), avoid charcoal-broiled foods (which may increase the elimination and reduce the half-life of the drug), and avoid changes in the amount of carbohydrates and proteins consumed. Carbohydrates are known to reduce the metabolism of the drug and proteins increase the metabolism of theophylline (Shannon et al., 1992). Timing of the drug is crucial; the drug must be administered at the same time every day for maximum effectiveness. Other bronchodilators used are: Albuterol, Terbutaline, and Metaproterenol (Berkow & Fletcher, 1987).

Anticoagulants. Anticoagulants are prescribed to thin the blood and prevent it from clotting. Vitamin K, an anticoagulant antagonist, can be consumed from plant sources and be synthesized by the intestinal bacterial flora. One of the most commonly prescribed anticoagulants, warfarin (Coumadin), depresses the hepatic synthesis of Vitamin K factors II, VII, IX and X (Berkow & Fletcher, 1987). When Vitamin K and warfarin meet in the gut, they compete for synthesis of the blood clotting factors. Dosages are monitored using prothrombin times. If the patient consumes large quantities of Vitamin K sources, prothrombin times can be decreased and return to normal levels, rendering the drug ineffective. See Appendix C for foods high and low in Vitamin K.

Side effects of warfarin therapy may include: anorexia, nausea, vomiting, steatorrhea, stomatitis, and abdominal cramps (Shannon et al., 1992). Patients are instructed to maintain a consistent level of Vitamin K sources and to limit caffeine

sources which shorten prothrombin times. Other anticoagulants include Dicoumarol and Panwarfin.

Insulin. The most common endocrine disorder in children in the United States is Diabetes mellitus, with the incidence occurring in one per 600 children (Connell & Thomas-Doberson, 1991). Diabetes mellitus is a disease characterized by the body's inability to secrete insulin or utilize it efficiently. Insulin is a hormone normally produced in the beta cells of the islets of Langerhans in the pancreas. Insulin is responsible for transferring glucose, the body's primary energy source, to tissues and cells around the body. When insulin is unavailable, the body utilizes proteins and lipids for energy. The catabolism of lipids causes ketone production. If ketones are allowed to build up in the blood, ketoacidosis can occur (Berkow & Fletcher, 1987).

Insulin is available in a variety of forms (in descending order of usage): synthetic human insulin, pork insulin, and beef insulin, and is separated into three categories: short-acting insulin, intermediate-acting insulin, and long-acting insulin. Depending on the regimen prescribed, each category has a unique onset, peak time, and duration (Mahan & Arlin, 1992).

The focus of drug-nutrient interaction counseling for insulin emphasizes a constant carbohydrate intake consumed at the same time every day to keep blood sugar levels as normal as possible. Patients are instructed to observe for symptoms of hypoglycemia or hyperglycemia. Hypoglycemia may occur when there is a greater than normal amount of insulin in the bloodstream. This reaction may occur

if a patient does not time insulin administration with food appropriately or has irregular meal or snack times, if too much insulin is injected, or if the patient changes his/her exercise or activity levels without adjusting the amount of insulin (Peragallo-Dittko, 1993). Patients are instructed to consume a small amount of a fruit juice or sips of a regular soft drink to combat the low blood sugar. Hyperglycemia may occur when a patient does not take enough insulin.

Pancreatic Enzymes. Enzyme therapy is used in the treatment of Cystic Fibrosis. Cystic Fibrosis (CF), a disease caused by an autosomal recessive gene, affects one in 2000 live births in caucasians (Cowing-Cannella, Bowser, Guyer & Borum, 1993) and one in 17,000 live births in the black population (Berkow & Fletcher, 1987). The disease is characterized by chronic respiratory tract infections with thick, sticky mucus and pancreatic insufficiency leading to fat malabsorption. Studies have shown that with enzyme therapy and aggressive nutritional management, normalization of growth can occur which may help to lengthen life expectancy (Cowing-Cannella et al., 1993).

Pancreatic enzymes are used as one treatment modality to decrease the amount of fat lost in the stool. These preparations: 1) aid in the digestion of carbohydrates, proteins, and fats; 2) compensate for pancreatic insufficiency to increase the absorption of fat and fat-soluble vitamins that otherwise would be lost in the stool; and 3) potentially improve the nutritional status of the patient by maintaining more normal rates of growth. Recent enzyme preparations are enterically coated to protect

from acidity breakdown in the stomach. Eventually, the enzymes are released and utilized in the duodenum (Mahan & Arlin, 1992). Administration of enzymes must be individually determined according to the amount of food consumed, the fat content of the foods eaten, the type of enzyme taken, the appearance and frequency of the stools and the extent of pancreatic insuffiency (Michel & Mueller, 1987). A few of the pancreatic enzymes currently on the market include: Pancrelipase, Creon, Pancrease, Cotazym, and Ultrase (George & Mangos, 1988). Common side effects seen in inadequate pancreatic enzyme supplementation include: weight loss, abdominal pain, diarrhea, and colonic strictures (Oades, Bush, Ong & Brereton, 1994). Cystic Fibrosis patients are advised to increase energy needs to 120% to 150% of the Recommended Daily Allowance to compensate for malabsorption, to fight infections, and to allow for optimal or catch-up growth (Cowing-Cannella et al., 1993; Pencharz & Durie, 1993).

Monoamine Oxidase Inhibitors. Monoamine Oxidase Inhibitors (MAOI) are typically prescribed to patients as antidepressants. Patients on MAOI's are instructed to avoid foods that have large amounts of tyramine because in the gastrointestinal tract, monoamine oxidase inactivates tyramine before it reaches the systemic circulation. When a patient takes the MAOI and consumes large amounts of tyramine, norepinephrine may be released from sympathetic nerve endings and epinephrine from the adrenal gland which may result in an elevated blood pressure. When enough of these pressor compounds are released, palpitations, sweating,

occipital headaches, and bradycardia or tachycardia can potentially occur. Although in children the incidence of clinical depression is rarely seen, the significance of an adverse reaction is important to note, therefore, this class of drugs are often included in pediatric drug-nutrient interaction counseling programs (Berkow & Fletcher, 1987). Drug effects on children are not substantiated.

In addition to the tyramine interaction, patients are instructed to avoid large amounts of caffeine (which act like tyramine) because it can increase the heart rate and the chance of arrhythmias (Rizack, 1985). The tyramine diet restriction should continue for at least two weeks after discontinuation of the drug to allow the body to regenerate the enzyme monoamine oxidase. For a list of the tyramine content in certain foods, see Appendix D. The MAOI's often prescribed include tranylcypromine sulfate (Parnate), phenelzine sulfate (Nardil), isocarboxazid (Marplan), furazolidone (Furoxone), and pargyline hydrochloride (Eutonyl) (Rizack, 1985).

Drug-Drug Interactions

In the early 1970's, the literature on drug-drug interactions began to flourish. A drug interaction has been defined as existing "when two or more drugs administered at the same time or in close sequence may act independently, interact to increase or diminish the intended effect of one or both of the drugs, or may cause a new and unexpected reaction" (Ford, Rivers & Wood, 1977). Pharmacists developed systems such as checklists (Block, 1970) and wall-charts (Hansten, 1970) to aid other

pharmacists in detecting possible interactions. Computerization soon became the vehicle to handle the immense amount of drug information. The use of computers has proved to have both advantages and disadvantages. Advantages include rapid accessibility to data, quick retrieval of information, and infinite storage capacity. Among the disadvantages of automated systems are the amount of time it takes to update the system for new drug interactions, the volume of drug interactions documented, and reliance on electronic capabilities.

In the mid 1970's, Greenlaw and Zellers (1978) developed Pharmacy Automated Drug-Interaction Screening (PADIS), a program that screens patient records for drug-drug interactions daily. This system, which contained over 26,000 known drug interactions, found that only 9.5% of the interactions detected were potentially clinically significant. This study was conducted in adults only. Although the authors found this system to be effective, they did not measure accuracy to see if other possible drug-drug interactions occurred.

Jankel and Martin (1992) compared six commercial computerized drug-drug interaction screening programs to evaluate each one's abilities to detect drug-drug interactions, their accuracy, and efficiency. None of these programs were judged to be perfect, although some programs provided worthwhile data. Shortfalls encountered by some of the programs included: incomplete databases, the computers inability to distinguish between previous and present drugs taken by the patient, and the operators inability to block minor drug interactions from coming online. This

finding suggests that if the system provides information on too many interactions, the clinically significant interactions may be lost among the many that are therapeutically insignificant.

The acceptance rate of computer programs depend on a number of factors. The programs should be easy to learn to operate. Not only must the program be able to convey the necessary information, but the user must be able to apply the data to benefit the patient. It does no good to have a computer that no one can use. Financial considerations may also play a part of whether computerized drug interaction programs are appropriate.

Drug-Nutrient Interactions

In an effort to comply with JCAHO standards, many hospitals have developed drug-nutrient interaction counseling programs that are used either when a patient begins certain medications or upon the patient's discharge. Since the JCAHO standard does not specify who does the actual counseling, Registered Dietitians, pharmacists, and nurses have all shared this responsibility.

Studies have been conducted to ascertain who is doing the drug-nutrient interaction counseling. Wix, Doering, and Hatton (1992) mailed questionnaires to teaching hospitals to investigate how hospitals fulfill this JCAHO standard and who was performing the drug-nutrient interaction counseling. The researchers found that most often the Registered Dietitian (42.8% of the responses) counseled patients on drug-nutrient interactions. Patients were identified most frequently by reviewing

medication lists and physician orders. The most common drugs for which patients received counseling were: Monoamine Oxidase Inhibitors, Warfarin, Tetracycline, Theophylline, Digoxin, Penicillin, Antacids, Metronidazole, Erythromycin, Cyclosporine, Ciprofloxacin, Rifampin, and Penicillamine.

Jones and Reddick (1989) conducted a survey in upper Midwestern hospitals to determine how many hospital programs performed this educational service to patients and for which drugs. Forty-nine percent of respondents stated that the Registered Dietitian was involved in the counseling process and the dietitian most often identified patients for counseling by scanning charts. The authors stated that scanning patient charts was not a convenient or efficient method of identifying patients for counseling. In this study, the ten drugs for which patients most frequently received drug-nutrient interaction counseling were: Monoamine Oxidase Inhibitors, Diuretics, Anticoagulants, Tetracycline, Oral hypoglycemic agents, Insulin, Antihypertensive agents, Antibiotics, Lithium, and Corticosteroids.

With a new health care era approaching, health professionals are looking for ways to reduce hospital stays. Spacing drugs apart so that they do not react with other drugs or nutrients may be a possible solution. Further research should be conducted on drug-nutrient and drug-drug interactions and the counseling process, especially in the pediatric population. These studies should clearly define parameters and definitions for other researchers to know what interactions are clinically significant so that future studies can be compared.

CHAPTER III

Methods

Subjects

The participants in this study are members of the National Association of Children's Hospitals and Related Institutions (NACHRI). NACHRI is the only national organization of children's hospitals in the United States. Its membership has flourished to over 100 institutions since its inception in 1968. Most hospitals in the association are freestanding hospitals; many are teaching facilities (Andrulis, Weslowski, Hintz, Parrott & Brady, 1990). From this group, all of the forty-five freestanding, acute care pediatric hospitals were chosen to participate in the mail survey. Freestanding hospitals were selected to decrease the likelihood that policies were adapted from their affiliated institutions; acute care was chosen as opposed to tertiary care or long-term facilities to secure homogeneous results. Addresses were researched and obtained from the 1994 American Hospital Association directory (American Hospital Association, 1994). Prior to mailing the surveys, each hospital's nutrition department was contacted by telephone to obtain the name and title of the individual responsible for or the coordinator of the drug-nutrient interaction policy. The purpose of this strategy was twofold: to personalize the survey and to increase the likelihood that the instrument would be returned.

Design

A computerized literature search served as a foundation for the questions in the survey. Mail surveys were selected as the instrument of choice for convenience. Prior to sending the survey, it was reviewed by a panel of three experts to examine the content of the survey instrument. The experts indicated which questions needed to be altered in order to obtain accurate responses. A cover letter accompanied the survey explaining that all responses will be kept confidential and that participation in the survey will be considered informed consent. Surveys were coded to determine which surveys were returned. Each survey included a return addressed, postage-paid envelope.

The survey consisted of 10 multiple-choice questions concerning inpatient and outpatient counseling programs. Most questions included an "other" option to give the respondents an opportunity to answer the question more completely. The last section of the survey included four questions on demographic data of the hospital for comparison purposes.

CHAPTER IV

Results

Response Rate

Surveys included for analysis were required to be at least 75% complete. A total of forty-five surveys were mailed out, and respondents were given four weeks to return the survey. For the first mailing, 73.3% (n=33) were returned. To increase the number of responses, a postcard reminder (see Appendix E) was mailed, and a two week allowance was given for returning the surveys. Two additional surveys were returned; all surveys returned were accepted for a total response rate of 77.8% (n=35). All 45 freestanding, acute care hospitals surveyed were divided by the National Association of Children's Hospitals and Related Institutions into four groups according to annual average adjusted admissions and annual average inpatient days. Surveys were returned as follows: Group 1 included hospitals with 11,000 or more average adjusted admissions and 45,000 or more average inpatient days with 80.0% (n=12 of 15) responding; Group 2 had hospitals with 7,000 to 10,999 average adjusted admissions and 35,000 or more average inpatient days with 76.5% (n=13 of 17) responding; Group 3 had hospitals with 5,000 to 6,999 average adjusted admissions and 25,000 or more average inpatient days with 75.0% (n=6 of 8) responding; and Group 4 had hospitals with less than 5,000 average adjusted admissions or less than 25,000 average inpatient days with 80.0% (n=4 of 5) responding. A good response was received, probably in part due to the telephone

call made prior to mailing the survey (see Table 1).

Health Care Professionals who perform the Drug-Nutrient Interaction Counseling

The health care professionals who perform inpatient drug-nutrient interaction counseling included nurses 34.3% (n=12) and Registered Dietitians (R.D.s) 25.7% (n=9). In some facilities, a combination of health professionals performed the drug-nutrient interaction counseling; 14.3% (n=5) of the facilities had all three health care providers participate in the process. The nurse and R.D. participated in 8.6% (n=3), a combination of pharmacists and R.D.s participated in 5.7% (n=2), the pharmacist in 5.7% (n=2), and the nurse and pharmacist in 2.9% (n=1). One hospital selected not applicable, 2.9% (n=1)(see Table 2).

Outpatient drug-nutrient interaction counseling was provided by pharmacists in 37.1% (n=13), followed by the nurse in 14.3% (n=5). The nurse and the R.D. counseled patients at 8.6% (n=3) of the facilities reporting, followed by the nurse and pharmacist in 5.7% (n=2), the R.D. 5.7% (n=2), concluding with all three health professionals in 2.9% (n=1) of facilities. Not applicable was chosen by 25.7% (n=9) of respondents (see Table 2).

Practices of Pediatric Hospitals regarding Drug-Nutrient Interaction Counseling

To ascertain the primary method for identifying patients for counseling, respondents were asked to select all methods used to identify patients and to note the primary method. Patients were identified for counseling by a variety of methods.

Table 1

Freestanding, Acute Care Pediatric Hospitals Surveyed in the United States

Group No.	Annual average adjusted admissions	Annual average inpatient days	No. Surveyed	No. Returned
1	11,000 or more average adjusted admissions	45,000 or more inpatient days	15	12
2	7,000 - 10,999 average adjusted admissions	35,000 or more inpatient days	17	13
3	5,000 - 6,999 average adjusted admissions	25,000 or more inpatient days	8	6
4	less than 5,000 average adjusted admissions	less than 25,000 inpatient days	5	4

Note. Total number of returned surveys =35

Table 2

Health Care Professionals who Perform Drug-Nutrient Interaction Counseling in Pediatric Hospitals

Health professional	Inpatient n	Inpatient %	Outpatient n	Outpatient %
Nurse	12	34.3	5	14.3
R.D.	9	25.7	2	5.7
Pharmacist	2	5.7	13	37.1
Pharmacist & R.D.	2	5.7	0	0
Nurse & R.D.	3	8.6	3	8.6
Nurse & Pharmacist	1	2.9	2	5.7
Nurse, Pharmacist, & R.D.	5	14.3	1	2.9
Not applicable	1	2.9	9	25.7

Note. Percentages are based on a total of 35 responses.

The two most frequently cited mechanisms for identification of inpatient counseling were the R.D.s scanning charts 27.1% (n =19), followed closely by pharmacists noting possible drug-nutrient interactions 22.8% (n =16). Computer identification was selected 18.6% (n=12), followed by nurses noting the interaction 15.7% (n=11), the physician ordering the counseling 8.5% (n=6), and the diet technician scanning charts 4.3% (n=3). Other mechanisms accounted for 4.3% (n=3): one program counseled all patients upon admission, one program counseled all patients when discharged on any medication, and one did not list a response (see Table 3).

Outpatient programs reported pharmacists as the primary health professional who identified patients 30.6% (n=15), followed by the Registered Dietitian 20.4% (n=10). Nurses identified outpatients at 14.3% (n=7), computer identification 14.3% (n=7), the physician 4.1% (n=2), the diet technician 2.0% (n=1), and 2.0% (n=1) chose "other" but did not list the person responsible. Six respondents selected not applicable for outpatient counseling at 12.2% (see Table 3).

Time when Drug-Nutrient Interaction Counseling is Performed

Timing of drug-nutrient interaction counseling was varied. Respondents were given three choices plus an "other" option and were asked to indicate one time frame. Two responses had two different time frames for a total of 37 responses. Fifty-one percent (n=19 of 37) of responses counseled patients/families both at the time of discharge and during hospitalization, 27.0% (n=10) educate patients/families at the time of discharge, 10.8% (n=4) instruct during hospitalization, 5.4% (n=2)

Table 3

Mechanism Used to Identify Patients for Drug-Nutrient Interaction Counseling

Mechanism	Wise inpatients (1995)	Wise outpatients (1995)	Wix, Doering & Hatton, (1992)	Jones & Reddick, (1989)
Computer identification	12	7	70	18
Physician orders it	6	2	116	23
Nurse notes interaction	11	7	161	32
Pharmacist identifies it	16	15	207	20
Dietitian scans chart	19	10	285	38
Diet Tech scans chart	3	1	-	-
Other	3	1	31	-
NA	0	6	87	-
No. of surveys returned	35	35	425	217

Note. (-) indicates no response. Respondents could indicate more than one mechanism to identify patients.

counsel patients in clinics, 2.7% (n=1) of patients are instructed upon admission, and 2.7% (n=1) of facilities provide counseling when a physician orders it. Only 20.6% of survey respondents reported that a physician's order was required to educate patients/families (see Figure 1).

Drugs chosen for Drug-Nutrient Interaction Counseling

JCAHO advocates education for patients/families regarding drug-nutrient interaction counseling, but does not specify which drugs and/or the number of drugs for counseling. Survey respondents were asked to select all answers that apply from four choices plus an "other" option to determine how institutions select drugs for counseling. Respondents reported drugs were selected on the basis of the following: the drugs potential impact on the patient 35.9% (n=28), high risk drugs 30.8% (n=24), frequency the drug is prescribed in the hospital 19.2% (n=15), high census of patients receiving a drug 9.0% (n=7), and other 5.1% (n=4). "Other" responses included: in one facility, a Nutrition Committee selects the drugs for counseling, one hospital gives all patients a booklet on drug-nutrient interactions upon admission, one hospital chooses drugs based on the severity of the drug's side effects, and one respondent checked "other" but did not list a response. Previous published surveys on drug-nutrient interaction counseling did not report how drugs were chosen for education.

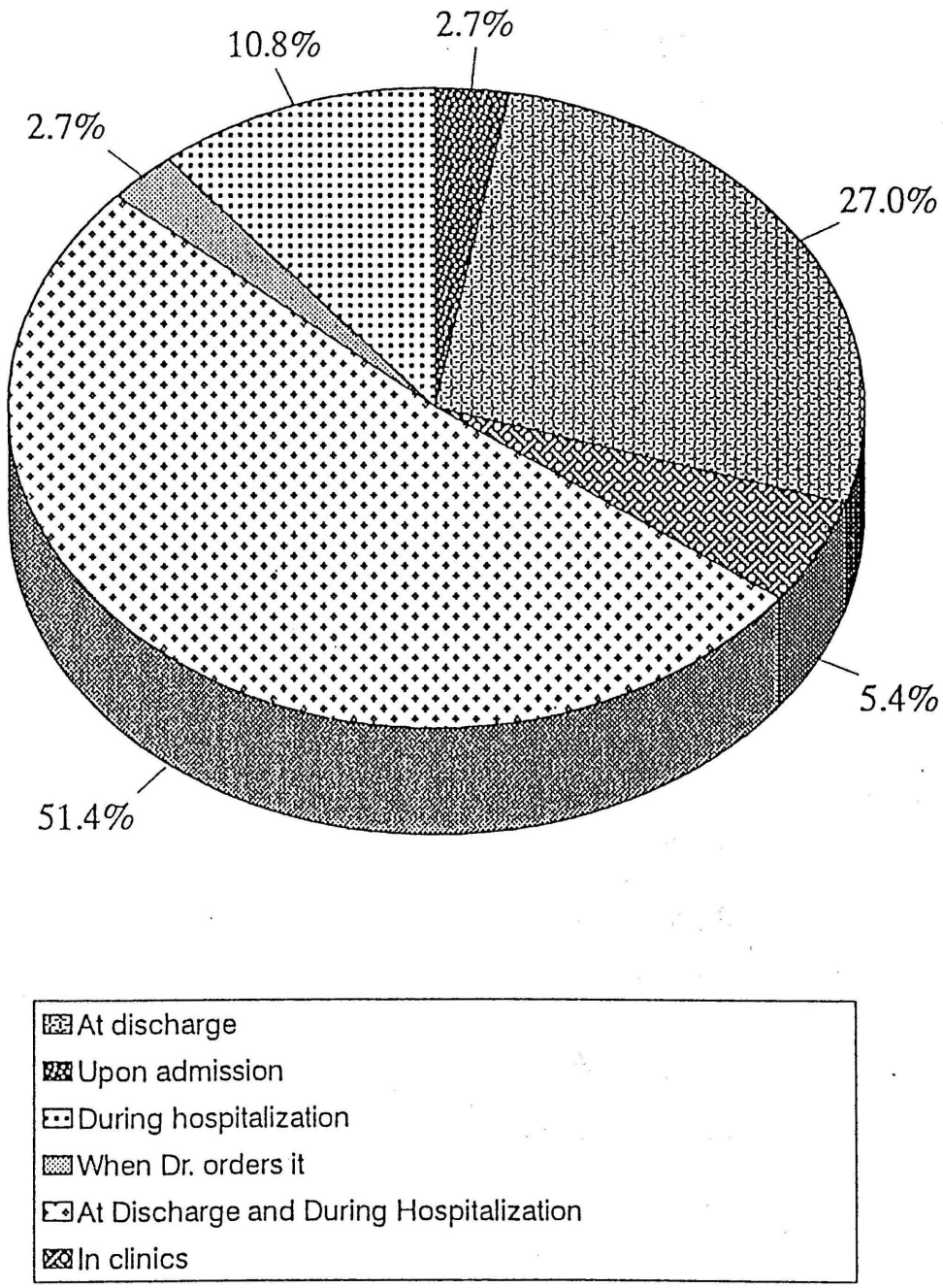

Figure 1. Percentages of respondents conducting patient counseling at the designated times.

The drugs chosen for the survey were selected and summarized from previous adult drug-nutrient interaction surveys. The order in which drugs were positioned on the survey was random. The most frequently reported drug categories targeted from this survey for counseling included: anticonvulsants (n=38), antibiotics (n=34), diuretics (n=28), bronchodilators (n=22), anticoagulants (n=17), corticosteroids (n=15), insulin (n=14), MAO Inhibitors (n=12), pancreatic enzymes (n=12), and antihypertensives (n=11)(see Table 4). From this group, the five most frequent individual drugs selected were in descending order: phenytoin (n=13), insulin (n=13), warfarin (n=11), pancreatic enzymes (n=11), and theophylline (n=9). One-third of the surveys were returned with only the drug categories column checked off, therefore, the top five individual drugs may reflect inaccurate numbers.

Of 35 responses, 77.1% (n=27) indicated both oral and written information is provided to patients/families on drug-nutrient interactions. Oral counseling only was provided in 14.3% (n=5), 8.6% (n=3) gave written information only, and no one uses electronic education (television or video). Although this form of education has its limitations, a hospital may save time with this technology. Written information sheets were included in a few responses, but was not requested from respondents and, therefore, not analyzed for content.

A necessary component for completion of each education session is the assessment of the comprehension of information. To assess the comprehension, respondents reported the nurse 37.5% (n=15) or the R.D. 42.5% (n=17) question

Table 4

Drugs Ranked in Order of Response

Wise (1995)		Wix Doering & Hatton (1992)		Jones & Reddick (1989)	
Freestanding acute care pediatric hospitals nationwide, 45 surveyed		Teaching adult hospitals nationwide; 792 surveyed		General-surgical adult hospitals with ≥175 beds in 5 upper Midwest states; 289 surveyed	
(1995)	n	(1992)	n	(1989)	n
Anticonvulsants	38	MAOI	314	MAOI	104
Antibiotics	34	Warfarin	232	Diuretics	60
Diuretics	28	Tetracyclines	232	Anticoagulants	51
Bronchodilators	22	Theophylline	104	Tetracyclines	38
Anticoagulants	17	Digoxin	97	Oral Hypoglyc.	33
Corticosteroids	15	Penicillin	87	Other	32
Insulin	14	Antacids	78	Insulin	26
MAOI	12	Metronidazole	75	Antihypertens.	23
Pancreatic enzymes	12	Erythromyacin	74	Antibiotics	15
Antihypertensives	11	Cyclosporine	58	Corticosteroids	14
Antiarrythmics	7	Ciprofloxacin	43	Lithium	14
Antiulcer	5	Rifampin	39	Antabuse	13
NSAI	4	Penacillamine	32	Levadopa	12
Other	33	Other	150	Anticonvulsants	10
				Chemo. drugs	10

Note. Respondents were able to select all the drugs for which counseling is provided.

the patient/family when the education is complete. Seventeen percent of respondents (n=7) reported that no policy existed for assessing patient understanding. An "other" option was chosen by 2.5% (n=1) of respondents and declared that the person educating the patient/family assesses understanding. Five respondents chose two answers for this question for a total of 40 responses. Documentation of the education in the patient's medical record was reported by 94.2% (n=33) of surveys. Six percent (n=2) of respondents commented that documentation is usually placed in the chart, but not consistently.

Six respondents did not have a formalized counseling program in place at the time of the survey. Some of the reasons for this included: the hospital lacks a system for screening patients (n=3), the hospital has a shortage of clinical staff to deliver the education (n=2), and the hospital was still deciding on the drugs for counseling (n=1).

CHAPTER V

Discussion

This survey attempted to answer three research questions. The first research question asks about the health professional who performs both inpatient and outpatient education. Is there a health professional who is more qualified than others to advise patients and families? The second research question attempts to discover the drugs specifically chosen for the pediatric population. Are the same drugs chosen for counseling for children and adults? The third research question probes into specific procedures hospitals set for themselves to fulfill the JCAHO standard for patient education regarding drug-nutrient interactions.

Since there is no published research on pediatric drug-nutrient interaction counseling, the ten questions for this survey were selected to obtain preliminary data. A short list of questions was chosen rather than an extensive list to minimize any intimidation of hospitals who have small drug-nutrient interaction counseling programs or are currently developing a program. A cover letter accompanied the survey to reassure the respondents that the information received would not be linked to any hospital and that it would be used for comparison purposes only.

The first two questions were strategically placed at the beginning to establish a framework for the survey. Previous research has shown that a combination of health professionals participate in the counseling process. Among the nurse, pharmacist, and Registered Dietitian, the health professional with the potential for the most

inpatient contact is the nurse. The nurse may administer the medication and educate patients/families on potential drug-nutrient interactions. The pharmacist is the likely choice for outpatient counseling because patients go to the pharmacy for their medications as they leave the hospital. Registered Dietitians may not see every outpatient that comes in, so it is more effective for the pharmacist to take this responsibility. Wix, Doering, and Hatton (1992) reported that the dietitian (42.8% n=177) most often counseled patients. Jones and Reddick (1989) did not discuss the health care provider who performs the drug-nutrient counseling.

A critical decision made prior to implementing a drug-nutrient interaction counseling program is the identification of inpatients and outpatients at risk. A computer program to target patients at risk may not be affordable for every hospital. The nurse and physician may know the patient's current medications, but may not be knowledgeable about all of the potential drug interactions. Pharmacists are often located away from acute care areas. Registered Dietitians may not have easy access to all patients medication sheets and, therefore, have a difficult time with this task. The multi-disciplinary team approach can be effective at this point. Communication among these health care providers is essential if an effective and efficient education service to patients and their families is to be provided. Wix et al. (1992) and Jones and Reddick (1989) both reported that the health professional who identified patients for counseling was the Registered Dietitian (refer to Table 3).

There are advantages and disadvantages in the timing of drug-nutrient

interaction counseling. An advantage of drug-nutrient interaction counseling at the time of discharge may be that the patient is feeling a sense of relief that he/she is going home so they may concentrate on the education, whereas a disadvantage could be that the patient/family is ready to leave and may not pay attention to the information presented. Advantages of instruction during hospitalization include time for the instructor to prepare the patient/family for the education, a captive audience who may be more focused on the disease and its implications, time for the patient/family to process the information and have questions answered by experts, and monitoring of the patient for compliance and drug effectiveness. A potential disadvantage of hospital instruction is that the patient may be discharged on a different medication and could be confused about whether to follow the counseling provided. Wix et al. (1992) found that 22.9% (n=89) hospitals counseled just prior to discharge and 28.4% (n=110) educated patients the day of discharge. Thirty-four percent of hospitals reporting in this survey did not have a specific time designated for drug-nutrient interaction counseling. Jones and Reddick (1989) did not report the time frame when drug-nutrient education is provided.

As the new standards of JCAHO regarding quality patient care are implemented, more health professionals will become involved in the team approach to direct patient care. Question four attempts to clarify the physician's involvement in the drug-nutrient interaction counseling process. The findings of Wix et al. (1992) are closely aligned with the results of this survey; they found that a physician's order

was needed in only 11.4% of facilities surveyed. This patient-focused care philosophy of JCAHO may coerce facilities to reevaluate the mechanisms currently in place regarding physician initiation of drug-nutrient counseling. It is to the health care teams advantage that the patient and family are informed about every facet of treatment and consequences of the treatment. If the health care industry is being forced to decrease the length of stay and as the team-approach to patient care catches on, the percentage of facilities requiring physicians' orders for drug-nutrient interaction counseling potentially could be lowered.

One of the initial decisions made regarding the design and implementation of a drug-nutrient interaction counseling program is the drug selection process. JCAHO allows each facility the freedom to follow the standard on the number of drugs and how drugs are chosen for counseling. Although all drugs potentially can interact with other drugs and/or foods, it would be virtually impossible to educate every patient on all possible combinations of both prescription drugs and over-the-counter medications. Question five strives to determine the manner in which drugs are chosen.

Each survey respondent was asked to check all the categories of drugs on which their facility educated patients/families and to list the individual drugs selected for counseling. Respondents were given an "other" option to obtain a complete list of drugs. Some hospitals only checked off the drug categories listed which make comparisons among hospitals questionable. Some similarities were seen in the drugs

chosen by Wix et al. (1992) and Jones and Reddick (1989) and pediatric hospitals, although the drugs were ranked differently according to usage.

An example of this is monoamine oxidase inhibitors. They are ranked as the number one drug in the studies by Wix et al. (1992) and Jones and Reddick (1989), but are ranked 8th in this survey because these drugs are not commonly prescribed to children. They are often included in pediatric drug-nutrient interaction counseling programs because of their potentially dangerous side effects.

Educational materials are an integral component in the counseling process. It comes as no surprise that the majority of institutions develop and distribute materials in both the oral and the written form. One medium enhances the other and vice versa. Results in this survey are closely aligned with the findings of Wix et al. (1992) of oral and written education 77.1%, for oral only 13.7%, and providing written information only 9.2%. Jones and Reddick (1989) did not discuss educational materials.

It is important for the counselor to finish the education with an assessment of the patients/families understanding of the information presented. Seventeen percent of respondents reported no policy regarding assessment. This aspect of the education process could give the counselor an idea of how the patient would use the information presented. If the patient seemed uninterested or confused by the information, this could be documented in the patient's medical record.

Documentation in the medical record is the final step in the drug-nutrient

interaction counseling process. Without documentation in the medical record, it is difficult for other health care providers to know that the counseling was provided. Almost all of the respondents documented the education in the patient's chart. This question did not address outpatient medical record documentation.

At the time of the survey, six respondents did not have a formalized program in place. All of these respondents were working on various aspects to either initiate a program or enhance their current program. A reliable screening method and an inadequate number of staff to counsel patients were two aspects that were mentioned.

Questions that were not asked on this survey that may warrant further research include:

1) How many drug-nutrient interaction counselings are performed monthly by pediatric hospitals?
2) Are drug interaction computer programs used to identify patients? If so to what extent?
3) Would more guidelines by JCAHO be helpful?
4) What kind and how much information is included in the written education materials?

CHAPTER VI

Conclusions and Implications For Further Study

Results of this survey demonstrate that most freestanding, acute care pediatric hospitals are effectively finding the means necessary to comply with the JCAHO standard for drug-nutrient interaction counseling. Since the JCAHO makes no recommendations regarding the ideal number of drugs for which patients should be counseled, health care professionals are encouraged to communicate with one another to obtain information necessary to develop effective programs. Dietitians, pharmacists, nurses, and other health care providers should advocate for federal support, from such agencies as the Food and Drug Administration, for resources to initiate public education programs. Additional research with and for children should be conducted by specialists in pediatric pharmacology to provide meaningful data for submittal to the Food and Drug Administration to insure that the drugs administered are safe and effective. It is crucial that health professionals be knowledgeable of potential drug-nutrient interactions prior to initiating any patient counseling process.

Continuing studies should compare freestanding, acute care pediatric hospitals and pediatric hospitals that are affiliated with adult institutions to evaluate if drug counseling programs are similar, and if different, what are the benefits and concerns of such programs. Studies may also follow to investigate the drug counseling policies of community hospitals to identify similar practices. Research published to date describe practices in adult facilities. It is difficult to compare the drugs and

programs chosen by pediatric hospitals with adult hospitals since the diseases encountered with each population may be different.

When patients eat certain foods with certain drugs or take two or more medications concurrently, the interactions that may occur can potentially have harmful effects or reduce the efficacy of the drug or nutrient. The Registered Dietitian, a valuable member of the multi-disciplinary team, brings important information regarding nutrient interactions in the body. The nurse participates in the drug-nutrient interaction program by identifying and educating patients on potential interactions. The pharmacist plays an important role in the dissemination of information since they receive the most training in drug administration. To be more effective, pharmacy computer programs can be employed to enhance the pharmacist's ability to detect possible interactions. These computer information systems should be designed or reengineered, if necessary, to detect only significant interactions to provide the user with useful information. If the computer programs are not easy to apply or if they regurgitate information that is insignificant or voluminous, pharmacists will tend not use them. In a period where health care reform is viewed in political, legal, and economic contexts, consumers are demanding that research related to drug-nutrient interactions should not be delayed, denied, or ignored.

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APPENDICES

Appendix A

Vitamin D content of certain foods

VITAMIN D CONTENT OF CERTAIN FOODS

FOODS HIGH IN VITAMIN D

Fish - Herring, Salmon, tuna and Fish oils

Cod Liver Oil

Fortified Cow's Milk and milk products

FOODS LOW IN VITAMIN D

Calf's Liver, Chicken Liver

Chicken eggs

Unfortified Cow's milk

Butter, Cheese, Light Cream

Mahan & Arlin (1992); Ensminger, Ensminger, Konlande, & Robson (1994)

Appendix B

Potassium content of certain foods

POTASSIUM CONTENT OF CERTAIN FOODS

FOODS HIGH IN POTASSIUM

Avocado, Bananas, Oranges, Dates, Apricots, Melons, Nectarines, and Strawberries

Broccoli, Carrots, Mushrooms, Potatoes, Spinach, Tomatoes, Vegetable juices

Large amounts of milk or milk products

Beef, Poultry, Sardines, and Veal

Nuts

FOODS LOW IN POTASSIUM

Apples, Cranberries, Blueberries

Corn, Cauliflower, Green beans, Onions, Peas

Cooked rice, Cornmeal, Sugar, Honey

Fats, Oils, Olives

Mahan & Arlin (1992); Ensminger, Ensminger, Konlande, & Robson (1994)

Appendix C

Vitamin K content of certain foods

VITAMIN K CONTENT OF CERTAIN FOODS

FOODS THAT ARE HIGH IN VITAMIN K

Egg yolks, Mayonnaise

Fish, fish oils

Vegetable oils - Canola, Soybean, and to a lesser degree Olive oil

Leafy, green vegetables - Turnip Greens, Collard Greens, Mustard Greens, Kale, Spinach, Broccoli, Lettuce, Cabbage, Brussel Sprouts, Parsley, Scallions

Cucumber peel, Watercress

Green tea

FOODS THAT ARE LOW IN VITAMIN K

Bread and Cereals

Fruits - Apple, Banana, Cantaloupe, Grapes, Oranges, Peaches

Turkey, Beef, and Chicken

Vegetables - Carrots, Cauliflower, Celery, Mushrooms, White Onions, Green Peppers

Butter, Cheese

Black Tea

Mahan & Arlin (1992); Ensminger, Ensminger, Konlande, & Robson (1994)

Appendix D

Tyramine found in food and beverages

TYRAMINE FOUND IN FOODS AND BEVERAGES

FOODS HIGH IN TYRAMINE

Aged cheese (unpasteurized) - such as Swiss, Cheddar, and Blue cheese

Aged, smoked, fermented, or pickled meats, poultry, fish, and shrimp

Yeast extracts (yeast baked in bread is okay)

Italian Fava beans (Broad beans) - contain dopamine

Sauerkraut

Banana peels

Chianti wines

USE THESE FOODS IN MODERATE AMOUNTS (1/2 CUP OR LESS)

American cheese, Mozzarella cheese

Bouillon, Consomme

Chocolate, Caffeine - both are weak pressor agents

Avocado, Figs, Grapes, Oranges, Raisins, Raspberries

Soy sauce, Teriyaki

Yogurt, Sour Cream (cottage cheese is okay)

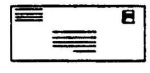
Skaar (1991); Rizack (1985)

Appendix E

Postcard Reminder

Appendix E

Just a Reminder...

It's  **to**  **your completed survey.**

Your response is the  **to my research and will**

shed  **on Drug/Nutrient interaction counseling.**

If you need an additional survey, please contact me at (713) 770-5087.

Appendix F

Survey

SURVEY OF PEDIATRIC HOSPITALS REGARDING DRUG-NUTRIENT INTERACTION COUNSELING PROGRAMS

1. Who primarily performs the inpatient drug-nutrient interaction counseling?

INPATIENT	OUTPATIENT
___ A. Nurse	___ A. Nurse
___ B. Pharmacist	___ B. Pharmacist
___ C. Registered Dietitian	___ C. Registered Dietitian
___ D. Combination _____	___ D. Combination _____
___ E. Not available	___ E. Not available

2. Method to identify patients who require drug-nutrient interaction counseling: (check all that apply and * the primary method)

INPATIENT	OUTPATIENT
___ A. Computer identification	___ A. Computer identification
___ B. Doctor orders counseling	___ B. Doctor orders counseling
___ C. Nursing notes possible interaction	___ C. Nursing notes possible interaction
___ D. Pharmacist notes possible interaction	___ D. Pharmacist notes possible interaction
___ E. Registered Dietitian scans chart	___ E. Registered Dietitian scans chart
___ F. Diet Technician scans chart	___ F. Diet Technician scans chart
___ G. Other _____	___ G. Other _____
___ H. Not applicable	___ H. Not applicable

3. When is drug-nutrient interaction counseling provided? (check one)
   - ___ A. At the time of discharge
   - ___ B. During hospitalization
   - ___ C. Both times
   - ___ D. Other _____
   - ___ E. Not provided

4. Is a doctor's order required to educate patients/families?
   ___ Yes ___ No

5. How are drugs chosen for drug-nutrient interaction counseling? (check all that apply)
   - ___ A. Drug's potential impact on the patient.
   - ___ B. Frequency that the drug is prescribed in the hospital.
   - ___ C. High census of patients receive drugs.
   - ___ D. High risk drugs.
   - ___ E. Other _____

6. Drugs for which drug-nutrient interaction counseling is performed? (check all that apply)
   ___ Bronchodilators (list)_____
   ___ Diuretics (list)_____
   ___ MAO Inhibitors (list)_____
   ___ Anticoagulants (list)_____
   ___ Anticonvulsants (list) _____
   ___ Antineoplastics (list) _____
   ___ Antihypertensives (list)_____
   ___ Antibiotics (list) _____
   ___ Insulin
   ___ Pancreatic enzymes
   ___ Other _____
   _____

7. Method of providing instruction to patients and/or families?
   ___ A. Oral
   ___ B. Written
   ___ C. Video/Television
   ___ D. Combination
   ___ E. Not applicable

8. How is patient/family understanding of the education assessed?
   ___ A. Nurse questions the patient/family after the education.
   ___ B. Dietitian questions the patient/family after the education
   ___ C. Other _____
   ___ D. There is no policy for assessing if patient/family understands the information.
   ___ E. Not applicable

9. Is documentation of the drug-nutrient counseling recorded in the patient's medical record?
   ___ Yes ___ No

10. Do you currently have a formalized drug-nutrient interaction counseling policy in place?
    ___ Yes ___ No If no, the reason is: (check all that apply)
    ___ A. Do not have a screening method to locate patients.
    ___ B. Do not have the clinical nutrition staff to educate patients/families.
    ___ C. Unable to determine which drugs to counsel on.
    ___ D. Other _____

DEMOGRAPHIC DATA:

1. Number of licensed beds _____
2. Average number of patients per day _____
3. Average length of stay _____
4. Number of FTE's in clinical nutrition staff: Registered Dietitian _____ Diet technician _____