

Dietary Supplement Use in a Pediatric Inpatient Population

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OBJECTIVES Patients are assuming responsibility for their own health by self-medicating with dietary supplements, often without physician knowledge or oversight. The objectives of this study were to determine: 1) pediatric dietary supplement use by surveying parents of children who were hospitalized in a university institution; 2) if any health care professional inquired about supplement use at the time the child was hospitalized; 3) whether the use of a supplement was documented in the patient's medical record; and 4) parents' attitudes about dietary supplements.

STUDY DESIGN Parents of 100 hospitalized pediatric patients (< 18 years of age) were randomly selected to complete a survey about their child's use of dietary supplements prior to and during hospitalization. They were also asked if they intended to use these products after hospitalization. The purpose of the study was explained, informed consent was obtained, and parents were given ample time to complete the survey.

RESULTS Fifty percent of parents reported giving their child a dietary supplement prior to hospitalization; 17% reported use of an herbal supplement. Only 24% of parents reported being asked about supplement use by a health care professional upon admission or during the hospital stay. The response to only five of these queries was documented in the child's medical record.

CONCLUSIONS Increasing dietary supplement use mandates that all health care professionals elicit this information as part of the routine History and Physical Examination at the time a child is hospitalized. This information should also be documented in the patient's medical record. Likewise, parents should be encouraged to discuss the use of these products with their physician and pharmacist.

KEYWORDS: alternative medicine, complementary and alternative medicine, complementary medicine, dietary supplements, herbals, pediatrics

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INTRODUCTION

The use of dietary supplements (e.g., vitamins, minerals, herbals) has increased from 33.8% in 1990 to 42.1% in 1997. In particular, there was a 380% increase in the use of herbal therapies and a 130% increase in the use of large doses of vitamins.¹ As many as 50% of adults use complementary alternative medication (CAM) products: 30% being herbals and about 24% megavitamins.² Dietary supplements are commonly used to prevent or "treat" several conditions (e.g., dermatologi-

cal disorders, asthma, juvenile arthritis, cancer) that occur in infants, children and adolescents.^{3,9}

The practice of self-medicating can pose numerous problems including potentiating adverse effects of prescription and over-the-counter medi-

ABBREVIATIONS: CAM, complementary and alternative medicine

cations, and drug interactions associated with the combination of these medications.² The use of supplements can also cause a missed or delayed diagnosis of disease or supplement-associated adverse effects.

Many studies have shown that caregivers or patients, for a variety of reasons, fail to disclose the use of dietary supplements to their health care professionals.¹⁻³ There is a growing trend for phy-

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sicians/pediatricians to support the integration of dietary supplements with conventional medications.^{10,11} As the availability and use of these therapies continue to increase it is imperative that health care practitioners and institutions assess the magnitude of pre-hospital supplement use in order to determine the impact on patient care, particularly among pediatric patients. During the admission process, health care professionals need to ask parents specifically about the use of these therapies. Questioning should be done in a non-threatening and non-judgmental manner in order to obtain truthful and accurate information.

The objectives of this study were to determine: 1) the general use of dietary supplements in pediatric patients prior to and during hospitalization; 2) if a health care professional asked the parent about supplement use upon admission or during the hospital stay; 3) if this information was documented in the patient's medical record; and 4) parents' attitudes about dietary supplements.

METHODS

This prospective study was approved by the Institutional Review Board for Human Subject Research of our institution and was conducted concurrently with each child's hospitalization. A list of possible supplements was compiled by reviewing the literature regarding dietary supplements that might be used in the pediatric population. For the purposes of this study, a dietary supplement was defined as a product (other than tobacco) intended for medicinal purposes, such as an herbal or other botanical, a vitamin, mineral, amino acid, extract, or a metabolite. Laetrile was included because of its potential use in individuals with cancer. Although it is not available in the United States, our institution's referral region includes Canada and Central America where laetrile is available.

Data were collected on individuals < 18 years of age whose parent or legal guardian was in the patient's hospital room and was willing to give informed consent. Only parents provided information; no patients were surveyed. Enrolled patients were admitted to an internal medicine (i.e., cardiology, pulmonary, nephrology, gastroenterology), surgery (e.g., orthopedics) or hematology/oncology service. Neonates and patients admitted to the intensive care unit, trauma burn unit, and emergency department were excluded.

To ensure that the information requested in the

survey was clear to the reader, the survey instrument was tested for validity in 10 individuals, which consisted of health care professionals and parents. The questionnaire was then modified based on reviewers' suggestions and was structured to enable responses to be easily coded for analysis (Figure 1). A pharmacy student (KAD) conducted the survey twice each week between October 2000 and April 2001, generally during the evening or on weekends. These times were selected since they were a peak period for parent visitation and also allowed for a quiet atmosphere in which to administer the survey. Patients were randomly selected from one of three inpatient care floors of the Children's Hospital and data were collected until 100 surveys were completed.

The patient's medical record was reviewed to obtain the reason for hospitalization and to determine if the use of parent-reported dietary supplements was documented. Parents were also questioned about their knowledge of supplements, specific products used, location of purchase, main source of information, and whether or not the child's physician was aware that a supplement had been given. The survey also contained questions to elicit information about parent's feelings, behaviors, and reasons for dietary supplement use.

RESULTS

One hundred seven parents were asked to participate. Seven parents refused to participate citing reasons such as "no reason," "not comfortable with the consent and fear of release of information," and "too tired and too busy to complete the survey." Table 1 describes the demographics of 100 children included in this report. Forty-three children were admitted to an internal medicine service, 16 were children with cancer, 37 were admitted to a surgery service, and 4 were on a rehabilitation unit.

Fifty percent of parents reported they had given their child a dietary supplement including an herbal, electrolyte solution, vitamin or mineral at one time in the past. Thirty-three parents (66%) who had given a supplement reported the use of vitamins, minerals, and electrolyte solutions and 17 (34%) reported the use of an herbal. Multi- or single-vitamins were among the most common dietary supplements used while aloe, echinacea, and garlic were among the most common herb-

Registration Number : _____ Patient care unit: _____
 Reason for admission: _____
 Service: _____

Patient Age: _____ Date of Birth: _____ Gender: Male _____ Female _____

Race: Caucasian _____ African American _____ Hispanic _____ Asian _____ Other _____

Parent Education Level:
 Less than high school _____ High school graduate _____ Some college _____ College graduate _____ Beyond college _____

1. a. Was your child taking any alternative supplements (e.g., herbs, vitamins, minerals, teas) before hospitalization?
 Yes _____ No _____
- b. Is your child currently taking any alternative supplements during this hospitalization?
 Yes _____ No _____
- c. Will your child continue to take alternative supplements after hospitalization?
 Yes _____ No _____
2. If you answered no, why doesn't your child use any alternative supplements?
 Feel they are not effective _____ No information about them _____ No information about them _____ Other, please specify _____
 Physician told us not to _____ Feel they are dangerous _____ Costs too much _____

Please answer the following questions if your child has used an alternative supplement.

3. Why do you feel it is necessary to use alternative supplements?
 Prescribed medicine is not working _____ We want to include a holistic approach _____
 We want to feel in control _____ Other, please specify _____
 We want to do everything possible for our child _____

4. For what conditions is your child using alternative supplements? (Circle all that apply)
 Anxiety (A) Depression (E) Headaches (K) Nausea (P) Sleeping problems (T)
 Asthma (B) Diarrhea (F) Heart problems (L) Orthopedics (Q) Sore throat (U)
 Blood disorder (C) Diabetes (H) Increase muscle mass (M) Pain (R) Strengthen bones (V)
 Cancer (D) Emotional problems (I) Infection (N) Seizures (S) Stress (W)
 Other (please specify) _____ Energy boost (J) Kidney problems (O)

5. Which supplements has your child used? (Circle all that apply)
 A. Aloe M. Dong Qui Y. Horsechestnut seed K. Shark cartilage
 B. Black Cohosh N. Echinacea Z. Kava-Kava LL. Slippery elm bark
 C. Capsicum (cayenne, chili, red or tobasco pepper) O. Evening primrose oil AA. Laetrile MM. Valerian
 D. Catnip P. Feverfew BB. Lemon balm NN. Weight loss supplement (Metabolife etc.)
 E. Cat's claw Q. Garlic CC. Licorice root OO. Witch hazel
 F. Chamomile R. Ginger DD. Ma Huang (Ephedra, Ephedrine) PP. Multivitamin
 G. Chasteberry extract S. Ginkgo biloba EE. Milk Thistle QQ. Single Vitamin Specify _____
 H. Chondroitin T. Ginseng FF. Multivitamin RR. Single Mineral
 I. Chromium picolinate U. Glucosamine GG. Peppermint SS. Specify _____
 J. Cranberry V. Goldenseal HH. Pycnogenol SS. Other, please Specify _____
 K. Creatine W. Green Tea II. Red clover TT. Other, please Specify _____
 L. Dandelion X. Hawthorn JJ. St. John's Wort (hypericum) UU. Other, please Specify _____

6. Please fill in the following table using the information from questions 4 and 5
 For example, if your child has been taking 900 milligrams of St. John's Wort per day for depression for 6 months, place 'JJ' in Column 1 '900 mg per day' in Column 2, and 'E' in Column 3, and '6 months' in Column 4

Column 1	Column 2	Column 3	Column 4
Alternative supplements	Dose	Condition Treating*	Duration of therapy
JJ	900 mg per day	E	6 months

*See question 4

7. How did you find out about these supplements? Check all that apply.
 1. Physician _____ 4. Relative _____ 7. Magazines _____ 10. Internet _____
 2. Pharmacist _____ 5. Friend _____ 8. Newspaper _____ 11. Other (please specify) _____
 3. Nurse _____ 6. Television _____ 9. Books _____

8. Where did you purchase the alternative supplements? Check all that apply.
 1. Health and beauty aids store (e.g. Kmart, Target) _____ 4. Arbor Farms _____ 7. People's (4th Street) Coop _____
 2. Pharmacy (e.g. Walgreen's, Rite Aid, CVS) _____ 5. Whole Foods _____ 8. Mail order/Internet _____
 3. Grocery store (e.g. Kroger) _____ 6. GNC or other nutrition store _____ 9. Other (please specify) _____

9. Do you feel that your child's quality of life or well being has improved since using alternative supplements? (For example does your child feel better, happier, more energetic, etc.)
 1. Yes, the quality of life has improved _____ 2. No change in quality of life _____ 3. Child's quality of life is worse _____

10. Do you believe that alternative supplements are a safe form of treatment?
 1. Yes _____ 2. No _____ 3. Some are safe _____

11. Are you aware that some alternative supplements can interact with prescription medicines?
 1. Yes _____ 2. No _____

12. Are you aware that the use of alternative supplements can have the potential for side effects?
 1. Yes _____ 2. No _____

13. Have you told your child's physician about his or her use of alternative supplements?
 1. Yes _____ 2. No _____

14. If you have not told the physician what are your reasons for not doing so?
 1. Afraid the doctor would disapprove _____ 3. Feel the physician would not be interested _____
 2. Did not feel it was necessary because alternative supplements are harmless _____ 4. Other-please explain _____

15. a. During this hospitalization, did any health care professional ask you or your child about the use of alternative supplements?
 1. No _____ 3. Yes, asked by nurse _____ 5. Yes, asked by other _____
 2. Yes, asked by doctor _____ 4. Yes, asked by pharmacist _____

- b. If yes, when were you asked?
 1. At time of admission _____ 2. Within the first day of admission. _____ 3. On or after the second day of admission _____

Figure 1. Alternative Supplement Survey: Pediatric Inpatients

Table 1. Demographic Data of Children and Their Parents and for the Children Receiving Herbal Supplements Prior to Hospitalization

Demographics	All Patients (n = 100)	Herbal Use (n = 17)
Age (yrs) [*]	10.4 ± 4.8	10.7 ± 1.2
1–5	25	3
6–10	24	4
11–15	39	7
16–18	12	3
Males (%)	50 (50)	7 (41)
Race		
Caucasian (%)	84 (84)	14 (82)
Non-Caucasian	15 (15)	3 (18)
Not-specified	1 (1)	–

^{*}Mean ± SD

als (Table 2). Two of the 50 parents reported using herbals for their child for blood disorders, cancer, or to strengthen bones. Other reasons given for the use of herbals included infection control, pain relief and insomnia.

Only 24% of parents were queried by a health professional about their child's use of dietary supplements before hospitalization, 64% of parents were not asked and 12% of parents did not answer the survey question. Physicians and nurses were the only health care professionals to inquire about supplement use. Of the 24 parents queried, 19 children had used a dietary supplement in the past and 5 of the 24 were currently receiving herbal supplements. Eleven of these parents planned on using a supplement for their child after hospitalization. Only 5 of the 24 inquiries were documented in the patient's medical record.

Seventy-eight percent of the 50 parents who had given their child a supplement reported that the child's physician was aware of its use. One parent noted that the child's physician was not interested in knowing this information; three felt that the supplement was harmless and two parents answered "other." The 17 parents whose child used an herbal supplement were supportive of these agents because they: wanted to do everything possible for their child (n = 7), wanted to incorporate a holistic approach to their child's care (n = 5), felt that conventional medicine was not effective in treating their child's disease (n = 2), wanted to feel "in control" (n = 1) or cited other reasons (n = 2).

Table 3 describes parents' perceptions of the safety of herbal supplements. All seventeen parents who reported the use of herbals responded to these questions. No parent who gave an herbal believed the products were unsafe; however, 35%

Table 2. Herbal Supplements Used

Herbal Supplements [†] (number using)	
Aloe (4)	Cat's claw (1)
Echinacea (4)	Creatine (1)
Garlic (4)	Ginger (1)
Ginseng (3)	Ginkgo (1)
Green tea (3)	Goldenseal (1)
Slippery elm (3)	Pycnogenol (1)
Chamomile (2)	Licorice (1)
Milk thistle (2)	Peppermint (1)
Capsicum (1)	Red clover (1)
St. John's wort (1)	

[†]17 children received an herbal supplement

[‡]some children received more than one herbal

of these same parents thought that only *some* of the herbals were safe. Eighty-two parents responded to the questions in Table 3. Twenty-nine percent of parents that did not use herbal supplements felt the supplements were safe, 66% felt that *some* were safe, and 5% felt that they were unsafe. Regardless of supplement use, the majority of parents in both groups were aware that dietary supplements could interact with prescription medications and possess the potential to cause adverse effects.

Sixty-two parents responded when asked why they would *not* use dietary supplements in their child. The majority of these parents (71%) reported they had never given their child a supplement. Only 29% noted the use of a supplement and the majority of those had given an herbal product (60%). Eighteen parents (31.5%) felt that there was a lack of information about these products, they were ineffective (14%), were advised against their use by their child's physician (5.2%), the cost was too high (5.2%), or that the supplements were too dangerous (3.5%). Another 23 parents answered the question, but responded with answers such as "not needed," "child eats a balanced diet," and "not FDA-regulated."

Table 4 describes the information resources and purchase locations reported. Most parents relied on friends or the Internet for information on dietary supplements. Only six parents responded that had purchased dietary supplements from a pharmacy; hence, most parents acquired these products in retail settings where there was no access to a health care professional.

Table 5 depicts the level of education for the 98 parents who responded to this question. Sixty-one percent of all parents had some form of advanced education. Seventy percent of all parents

Table 3. Parents' Perception of the Safety of Dietary Supplements

Perception	Herbal Use ^a	Non-Herbal Use
Dietary supplements are a safe form of treatment	11 (65%)	18 (29%) [†]
Some dietary supplements are safe	6 (35%)	41 (66%) [†]
Dietary supplements are unsafe	0	3 (5%) [†]
Aware of potential for drug-herb interactions	15 (88%) [‡]	54 (81%) [§]
Aware of the potential for adverse effects	14 (82%)	53 (79%) [§]

^a*n* = 17

[†]only 62 of a possible 82 parents responded

[‡]only 15 of 17 responded

[§]only 67 of a possible 82 parents responded

^{||}only 14 of 17 parents responded

responded when asked about their level of education. Within the herbal supplement group, 41.1% of parents had less than or equal to high school.

DISCUSSION

Complementary and alternative medicine has become an important part of health care in adults. In a nationally representative random household telephone survey involving 3594 individuals, 33.8% (1990) and 42.1% (1997) of adults reported the use of at least 1 of 16 therapies during the previous year.³ Likewise, there are reports that dietary supplement use is increasing in the pediatric population.^{1,3-7} Sawyer and colleagues conducted a study in which 48 parents of children with cancer completed a questionnaire regarding the use of alternative therapies by their children.³ Over a four-year period about 46% of the children had used at least one supplement as a complementary therapy. In a similar six-year population-based retrospective survey of parents whose children had cancer, 42% of the 366 respondents reported the use of CAM in their children.⁴

Fernandez et al. reported that herbal teas, plant extracts, and therapeutic vitamins were the most commonly used alternative therapies in their pediatric population.⁴ Multi- or single-vitamins were among the most common dietary supplements noted in our study while aloe, echinacea, and garlic were among the most common herbals. Cited uses for herbals were blood disorders, cancer, strengthening bones, infection control, pain relief and insomnia.

Most physicians believe that at least some of their patients have used some form of CAM. According to a study of pediatricians in Michigan, 83.5% of physicians were aware that some of their patients have used at least one form of CAM. However, this same group believed that < 10% of their pediatric patients had used CAM.¹² Contrary to these find-

ings, 50% of the children in our report had actually received at least one supplement. Our results are similar to those of Bennett and Brown who reported that almost 40% of the 135 *adult* patients in their study self-reported use of herbal therapies.²

The majority of physicians (76.1%) believe that the patients or their parents would tell them if they were using CAM.¹² However, in a nationally representative random household telephone survey in 1990 and 1997 Eisenberg et al., reported that only 38.5% of 1539 adults disclosed their use of CAM to their physicians.¹ Another study reported that less than 50% of parents whose children had cancer had discussed the use of the alternative therapies with the physician.³ Bennett and Brown also reported that < 15% of adult patients who used dietary supplements disclosed their use to either a physician or pharmacist.² Sawyer and colleagues reported that most parents of children with cancer felt that CAM therapies were not harmful and, therefore, viewed their use as a private decision.³ For this reason they felt there was no need to inform the child's physician.³ Our findings are in direct contrast to the above studies.¹⁻³ The majority of parents (78%) who had given their child a dietary supplement reported that the child's primary physician was aware of the supplement use. Only 24 parents in our study were directly questioned about the use of supplements at the time of admission. Fortunately, when a health care professional asked the child's parent about the use of supplements the parents did discuss their usage. Despite parent-disclosure of herbal use, documentation in the child's medical record occurred only 5 times.

Fernandez and colleagues reported that a prior positive attitude towards supplements had a significant impact on their use.⁴ All of the parents in our report whose child had used herbals felt that these products were either safe or somewhat safe. Surprisingly, 95% of parents who had not given herbals also held the same opinion. Spiegelblatt et

Table 4. Resources Used by Parents to Locate Information about Herbal Products and Places Where Parents Purchase These Products

Information Resources		Place of Purchase	
Source	Responses*	Location	Responses*
Friend	5	Nutrition store	7
Internet	5	Pharmacy	6
Books	4	Health & beauty aids store	3
Magazines	2	Mail order/internet	3
Pharmacist	2	Natural foods/ Specialty store	3
Television	2	Grocery	2
Physician	1	Not specified	1
Relative	1		
Newspaper	1		
Other	2		

*number of responses; some parents gave more than one response

al. investigated the use of alternative medicine (including chiropractic, homeopathy, naturopathy, etc.) in 111 children; 59% of parents noted an improvement in their child's health after using alternative medicine.⁵ Consequently, half of the parents in this study were satisfied with alternative medicine, but less than one quarter preferred it to conventional medicine.⁵

Fernandez and colleagues reported that the most common reasons cited for nonuse of a supplement were a lack of knowledge and fear of interference with conventional therapies. When asked why they would not use herbals, the majority of parents in our study cited either a lack of information about these products, a feeling that they were ineffective, or that their child's physician had advised against their use. Surprisingly, the majority of parents in our study who used herbals in their children and parents who did not had the same responses regarding their awareness of potential drug interactions and adverse effects.

One study noted that advanced education of the father or mother significantly influenced the use of supplements.⁴ The authors concluded that the parent's educational level was a predictor of increased use of supplements. These investigators suggested that advanced educational status might lead to a parent's desire to be more autonomous in choosing health care and treatment for their child. In our survey, the majority (88.2%) of parents who gave herbal supplements to their children tended to have high school and some college. Although this is an interesting finding, the sample size is too small to allow for definitive conclusions about education and the use of supplements. Regardless, it is noteworthy that our findings are similar to those described in the landmark article by Eisenberg et al.¹

A significant number of parents solicit information from family and friends or from alternative caregivers.⁴ Parents in our study reported using friends, the Internet, books, magazines, and the television more often than a health care professional. This may be due in part to where they purchase supplements. Although a pharmacy was noted as a major location, the combination of nutrition stores, natural foods specialty stores, health & beauty aid stores and grocery stores collectively exceeded purchases in that environment.

Like most studies of this nature, our report has some limitations. Some of the parents were confused about the terminology between "alternative supplements" and "herbs." This should have been explained to the parents before the survey began. Additionally, parents were asked to recall certain data such as names of dietary supplements, where they purchased the supplements, why they used supplements, and whether they had been queried about their child's use of supplements. This process of recall may have introduced bias. Finally, all surveys should have been reviewed with the parents for completeness in order to assure that all information was documented.

CONCLUSION

The use of dietary supplements for a variety of health conditions is rapidly increasing in the pediatric population. Approximately, half of the parents in our study reported that they used a supplement for their child. These items are purchased from a variety of places, which results in parents obtaining information about these products from many sources. Unfortunately these products are being given without medical supervision. One would expect that parents who are

Table 5. Education Level of Those Responding to Survey

Level of Education	All Responders (n = 98)*	No Supplements	Non-Herbal Supplements	Herbal (n = 17)
< high school	12	6	4	2
High school	26	17	4	5
Some college	27	13	9	5
College graduate	21	11	8	2
Graduate school	12	3	6	3
TOTAL	98	50	31*	17

*2 parents did not respond

giving CAM products would voluntarily divulge their usage to their health care professional as part of the routine medication history, but for a variety of reasons some do not.

All health care professionals need to actively and consistently obtain information about supplemental therapies to effectively advise patients and monitor outcomes. Parents should be encouraged to tell their health care professional that their child is taking an alternative supplement and this should be documented in the patient's medical record. The medication history process must include questions about alternative supplements that include vitamins, minerals, herbs, and teas. Complete medication histories are an essential component to quality patient care. Incomplete information could lead to drug interactions associated with the combination of a supplement and prescription or over-the-counter medication. Administration of a supplement that is not reported to a healthcare provider might also cause a missed or delayed diagnosis of a disease or supplement-associated adverse effect.

All healthcare providers in all practice environments must be vigilant in obtaining information about CAM use in their patients.

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