

Nutrition-related Nursing Research

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To identify the contribution of nurses to the nutrition research literature between 1970 and 1984, nursing and multidisciplinary research journals were reviewed.

A total of 104 nutrition research articles with nurses as first author or co-author were identified. More than two thirds of the articles have been published since 1980; only nine had been published prior to 1977. Of the articles, 55 were primarily nursing research and 49 were the result of team research. More than half (28) of the 55 articles were found in two journals, *Nursing Research* and *The Journal of Parenteral and Enteral Nutrition (JPEN)*. Most of the articles that were the result of team research were published in *JPEN*.*

Nurses involved primarily in nursing research had higher educational levels overall than did those involved in team research. Of the 101 nurses involved in nursing research, 79% had education preparation beyond the bachelor's degree; of the nurses who served as first authors, 76% were educated beyond the bachelor's level. Of the 57 nurses involved in team research, 20% had postbaccalaureate education, and one had a doctoral degree.

Even in the nursing research studies there was an emphasis on collaboration, with 36 of the 55 nursing studies involved in collaboration with one or more nurses, physicians, dietitians, or other professionals.

The topics of the studies are shown in Table 1. As can be seen, more articles were related to nutrition support than to any other topic. (Nutrition support may be defined as "the provision of specially formulated and/or delivered intravenous or enteral nutrients to prevent or treat malnutrition.") (Committee on Standards, 1985). It was found that 19 (34%) of the nursing studies and 10 (20%) of the team studies dealt with delivery and tolerance of enteral feedings; 11% of the nursing studies and 43% of the team studies were concerned with the patient's receiving total parenteral

nutrition; and four (7%) of the nursing studies and 15 (31%) of the team studies investigated nutrition assessment methods (see Table 1).

Of the nursing studies 38 were nonexperimental, nine were quasi-experimental or preexperimental, and eight were experimental. The sample size among the studies ranged from two to 165.

Many research reports in this survey represented single, isolated investigations. Notable exceptions were the group of articles regarding enteral feeding published by the Tube Feeding Consortium (DeSomery & Walike, 1975; Hanson, 1973, 1979; Heitkemper, Hanson & Hansen, 1977; Heitkemper & Hansen, 1984; Heitkemper, Martin, Hansen, Hanson & Vanderburg, 1981; Kagawa-Busby, Heitkemper, Hansen, Hanson & Vanderburg, 1980; Walike et al., 1974; Williams & Hansen, 1975) and those on eating behaviors and appetite control by Hansen (nee Walike) and her colleagues (DeSomery & Hansen, 1978; Hansen, DeSomery, Hagedorn & Kalnasy, 1977; Martyn, Hansen & Jen, 1984; Walike, 1973).

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*A copy of the bibliography of nursing research articles identified is available from the authors.

The following summaries highlight some of the major contributions made by nurses to the nutrition research literature.

Enteral Feeding

Hansen and her associates conducted a series of multicenter studies on enteral feeding. They first established a basis for further study by conducting an extensive survey of 121 patients to identify problems associated with tube feeding (Walike et al., 1974). They then conducted studies in lower primates and healthy, paid volunteers to determine optimal flow rate, temperature and volume of tube feedings (Heitkemper et al., 1977; Heitkemper et al., 1981; Heitkemper & Hansen, 1984; Kagawa-Busby et al., 1980; Williams & Hansen, 1975). Gastric temperature and motility were measured, as were subjective complaints. Results indicated that flow rates no greater than 60 ml/min were best tolerated. They also found that adults with normal gastrointestinal function tolerated as much as 750 ml in a single feeding as long as the rate was no greater than 30 ml/min. Conflicting data were obtained regarding the effects of infusions of cold formula (Hanson, 1973; Kagawa-Busby et al., 1980; Williams & Hansen, 1975), but it appears that a wide range of temperature was tolerated if feedings were given over a period of at least 30 minutes. These studies need to be repeated in ill subjects to determine the effect of various disease states on the results.

Table 1. Topics of Study

	Number of Studies	
	Nursing Research	Team Research
Enteral tube feeding	19	10
Total parenteral nutrition	6	21
Nutritional assessment	4	15
Eating behaviors; appetite control	5	-
Lactation	5	-
Cancer	6	2
Obesity and weight reduction	4	-
Infant feeding	2	-
Nutrition education methods	3	-
Modification of urinary pH via dietary means	1	-
Elderly adults	-	1
TOTAL	55	49

Hanson (1979), a participant in the multicenter enteral feeding research group, studied methods of measuring feeding tubes to determine the length required for nasogastric intubation. Working with 99 cadavers and 5 healthy volunteers, he found that the usual method—insertion of the tube to a point coinciding with the nose-to-earlobe-to-xiphoid process measurement—resulted in proper placement in only about 72% of cases. He validated a new method, which resulted in proper placement in 91% of patients. The new technique involves insertion of the tube to a point midway between 50 cm and the nose-to-ear-xiphoid process measurement.

Another enteral feeding study evaluated the effect of a common nursing practice—offering a pacifier to a tube-fed infant (Measel & Anderson, 1979). The investigators divided 59 preterm infants into two groups. One group of infants was offered pacifiers during and immediately after tube feeding; the other group was offered pacifiers at any time other than during or immediately after tube feeding. Infants in the experimental group gained weight more rapidly, were able to advance to nipple feedings more rapidly and were hospitalized approximately four days less. Since the original article was published, the beneficial effects of nonnutritive sucking during tube feedings have been documented by the same group (Field et al., 1982) and by Bernbaum, Pereira, Watkins & Peckham (1981). These studies provide a scientific basis for a nursing action that is often so automatic that it is taken for granted.

Treloar and Stechmiller (1984) designed a study to investigate a concern of many clinicians: the incidence of pulmonary aspiration in patients with artificial airways being fed by tube. They identified 30 ventilator-dependent patients who were to begin continuous intragastric or transpyloric feedings through eight French size tubes. These patients were studied for the duration of tube feeding or until they were extubated. The patients had methylene blue added to their tube feeding formula, and any trace of blue in tracheal or oral secretions was recorded. In addition, daily chest roentgenograms were performed. During the two to 41 days that patients were studied, none had blue-tinged tracheal aspirate or any clinical or radiographic evidence of aspiration pneumonia. One patient had blue-tinged oral secretions, but his cuffed endotracheal tube apparently prevented any aspiration. One shortcoming of the report was the failure to state the number of intragastric versus transpyloric tubes employed. It is possible that a large proportion of the patients studied had transpyloric tubes and that this inhibited regurgitation with resultant pulmonary aspiration. The authors did note that tubes "wandered," that is, a tube might be in a transpyloric location one day but in an intragastric location the next. This study represents an important first step in the evaluation of the safety of enteral tube feedings in a group of patients at high risk for pulmonary aspiration.

Parenteral Nutrition

Most of the parenteral nutrition articles involved central venous catheter dressing care. For example, Jarrard, Olson & Freeman (1980) examined the effect of frequency of dressing changes on infection rates. The 15 experimental patients received daily dressing changes, while the 23 control subjects had dressing changes every other day. Patients were followed for the life of the catheter (242 patient days and 530 patient days in the experimental and control subjects, respectively). Cultures of the catheter insertion site were done each time the dressing was removed, prior to cleansing of the surrounding skin. There was no growth from insertion-site cultures of any experimental patient, while 3.5% of such cultures were positive in control subjects.

There were no positive catheter-tip cultures in the experimental group. However, there were two positive catheter-tip cultures in the control group, and the organisms isolated were also isolated from insertion-site cultures. The authors concluded that daily dressing changes were effective in eradicating skin organisms beneath the dressing. This helps to document the value of nursing care in prevention of infectious complications associated with total parenteral nutrition. The authors noted, however, that daily changes were costly in terms of labor and supplies and might best be reserved for patients at high risk for sepsis. In contrast to the findings of Jarrard et al. (1980), other investigators have observed little relationship between skin flora and catheter sepsis (e.g., Sitges-Serra et al., 1984). These disparate findings require further investigation.

The ability of lipid emulsions to support microbial growth was examined by Crocker et al. (1984). They inoculated various types of lipid emulsions with nine different gram negative and gram positive bacteria and *Candida albicans* and counted the numbers of colony-forming units/ml at zero, six, 12, 24, and 48 hours. All gram negative organisms except *Serratia* multiplied well in lipid, as did *Candida albicans*. This study demonstrated that lipid emulsions, unlike glucose/amino acid parenteral nutrition solutions, support bacterial growth. Further clinical studies are needed to document the incidence of significant bacterial growth in lipid emulsions and the incidence of sepsis related to contaminated lipid emulsions.

Nutritional Care of Cancer Patients

The effect of nursing intervention on nutrition and the performance status of cancer patients was examined by Dixon (1984) in a study of 88 nutritionally at-risk adults with cancer who were being treated as outpatients. The subjects were randomly assigned to one of five study groups.

1. Nutritional supplementation with high protein beverages or foods provided by the nurses and chosen specifically to meet the individual patient's needs and preferences.
2. Relaxation and imagery, using techniques taught to them by the nurse.
3. Both supplementation and relaxation.
4. Visits only (with discussion of eating problems and recommendations provided by the nurse but no specific supplements or relaxation techniques suggested).
5. Control (no intervention for the four-month study period).

After the initial nutrition and performance assessment of all subjects, the patients in the first four groups received home visits by a nurse biweekly for four months; they were given reinforcement, nutrition counseling and attention to other nonnutritional problems during these visits. Reassessment of the subjects at the end of four months revealed that relaxation and imagery yielded the best results in terms of Karnofsky performance score, weight gain or maintenance, arm muscle circumference and other parameters of nutritional status. Nutritional supplementation in conjunction with relaxation and imagery did not produce an additive

effect. The control subjects had the most deterioration in nutrition and performance status. Except for exclusion of breast cancer patients from the study, the investigator did not control for type and stage of tumor or for type of oncologic therapy. It is possible that a particular intervention could be effective in some types of patients but not in others. For example, patients receiving chemotherapy with significant gastrointestinal (GI) toxicity might benefit more from relaxation and imagery than from supplementation; patients receiving chemotherapy without GI toxicity might benefit more from supplementation. Nevertheless this study provides a groundwork for further study and a basis for planning nursing interventions.

Discussion and Research Agenda

Nursing research has been criticized for its fragmentary nature, with scores of isolated reports but few efforts to follow a systematic line of inquiry through several related investigations (e.g., Downs, 1979; DeTornyay, 1976). Despite the overall lack of continuity in the nutrition articles reviewed, however, there were some encouraging exceptions. Two groups of studies have already been mentioned. On a more modest scale, other investigators also pursued a line of inquiry beyond a single study. Whatley and her colleagues (Whatley, Turner, Dey & Meier, 1983; Whatley, Turner, Dey, Leonard & Guthrie, 1984) studied techniques of passing transpyloric feeding tubes, and Welch (1980, 1981) investigated the nutritional status of patients receiving radiation therapy.

An umbrella project developed by nurses involved in nutrition-related research has recently been described (Bergstrom et al., 1984). This research group was joined at various times in its history by several different graduate students, who not only learned research skills and completed their graduate research requirements but also contributed to the knowledge generated by the overall group. This research group could well serve as a model for others.

Over the past few years, nutrition-support nursing has evolved as a specialty. The recent publication of standards of practice for nutrition-support nursing (Forlaw, Crocker, Muttart & Slocum, 1985), publication of a core curriculum for nutrition support nursing (Kennedy-Caldwell, 1985), and development of a mechanism for certification of nutrition support nurses (National Board of Nutrition Support Certification, 1985) have formally demonstrated the legitimacy of the specialty. Although the number of nurses involved in nutrition support is not known, the American Society for Parenteral and Enteral Nutrition (ASPEN), a multidisciplinary organization for professionals interested and involved in nutrition support, has 510 nurse members.

Some questions that have not been addressed (or have been incompletely addressed) by nurses and other professionals include the psychologic and emotional responses and needs of patients receiving long-term artificial feedings, developmental consequences of long-term artificial feedings in infants and children, nutrition practices for the maintenance and promotion of optimal health, nutrition needs and

nutrition education needs of older adults, cost containment in nutrition support, cost effectiveness of nutrition support, effects of home nutrition support on family dynamics, reduction of complications of nutrition support, effects of nutritional care in various disease states, use of nutrition-related nursing diagnoses, nutrition education in nursing and role development of the nutrition support nurse. **1**

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The following Sigma Theta Tau members have written items for this issue of *IMAGE: Journal of Nursing Scholarship*.

Peggi Guenter, *Xi Chapter*; Edith P. Lewis, *Mu Chapter*; Janice Meisenhelder, *Theta*; Mary Moore, *Eta Gamma Chapter*; Bethel Powers, *Epsilon Tau Chapter*; Patricia Prescott, *Beta Rho*; Toni Smith, *Epsilon Tau Chapter*; Sandra Paul Thomas, *Gamma Chi Chapter*; John D. Thompson, *Delta Mu Chapter*; Ruby L. Wilson, *Beta Epsilon Chapter*.

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