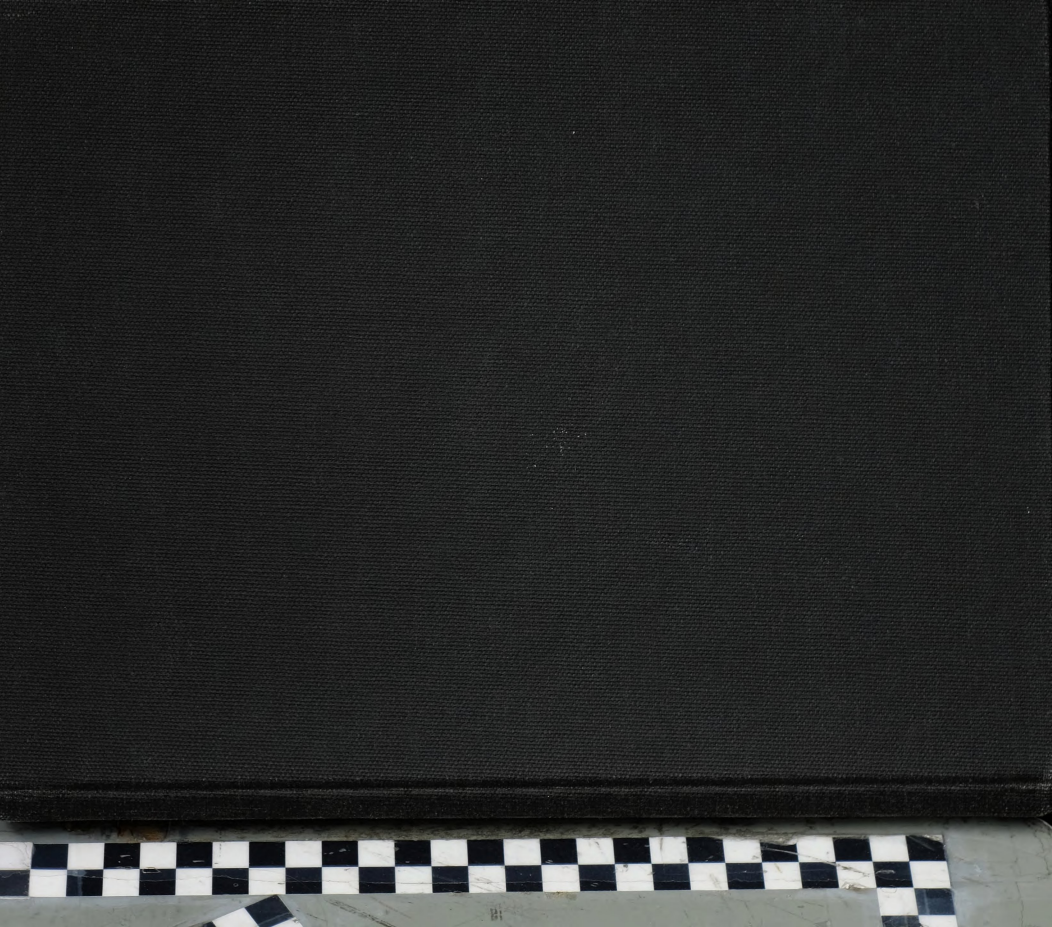

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The Impact of a Nursing Intervention on Parental Knowledge and Behavior in Relation to Childhood Fever

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Barbara Given

Major professor

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The Impact of a Nursing Intervention on Parental Knowledge and Behavior in Relation to Childhood Fever

by

Patricia Ann Baumgartner

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ABSTRACT

The Impact of a Nursing Intervention on Parental Knowledge and Behavior in Relation to Childhood Fever

by

Patricia Ann Baumgartner

A quasi-experimental study was designed to determine the impact of an educational nursing intervention on parental knowledge and self-reported behavior in relation to childhood fever and fever management. A convenience sample of 80 parents with children between the ages of two months and four years were recruited from an ambulatory care department and health department immunization clinic. The intervention consisted of a home visit during which time the significance of childhood fever and safe and effective methods for managing childhood fever were discussed with the parent. Parents receiving the intervention scored higher on the knowledge posttest than the parents in the control group, a finding which was statistically significant. Parents in the control group scored higher on self-reported fever management than those in the experimental group. This difference was not statistically significant. Although the nursing intervention resulted in improved parental knowledge, a corresponding change in self-reported behavior was not demonstrated.

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The completion of this research project would not have been possible without the support of several people. I would like to take this opportunity to acknowledge their special contributions.

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My most heart-felt thanks are reserved for my family -- husband Martin, daughter Holly Diane, son Adam Andrew, and my mom Mildred Sheeler. Their patience, understanding and love sustained me through this challenge.

TABLE OF CONTENTS

CHAPTER V: Data Presentation

LIST OF TABLES

Page

LIST OF FIGURES

CHAPTER I

The Problem

Introduction

Fever is the most common reason parents bring their children to
cal attention (Casey, McMahon, McCormick, Pasquariello, Zavod, &
, 1984; Cushing, 1984). Despite the fact that fever was identified
response to infection by Hippocrates (Atkins, 1984; Kluger, 1980)
he fifth century and has continued to be associated with a number
hildhood illnesses, parents frequently become alarmed when a child
lops a fever. This alarm may result in overly aggressive and/or
propriate management of childhood fever. Parental anxiety is
only related to concerns about the subsequent development of
ures and brain damage. Schmitt (1980) labels this unjustified
ntal concern "fever phobia".

Health care providers may actually be contributing to parental
nceptions regarding the significance and treatment of childhood
(Casey et al., 1984; Schmitt, 1980, Weiss & Herskowitz, 1983).
ugh there is evidence in the past decade that moderate fever is a
se mechanism and is beneficial in the disease process, many
cians still use vigorous means to lower body temperature (Weiss &
owitz, 1983). Reasons given for treating fever include to make
ild comfortable, prevent febrile seizures, and satisfy parents
et al., 1984; Long & Henretig, 1987; Wagner, Stapleton, Stein,
na, 1984; Weiss & Herskowitz, 1983; Younger & Brown, 1985.

Background

veral issues and concerns regarding parental knowledge and behavior
lated to childhood fever are cited by parents and health care
ofessionals. In a study of 81 parents bringing their children to a
spital-based pediatric clinic, Schmitt (1980) found the following
racteristics.

> Most parents were unduly worried about low grade fever with temperature of 38.9°C or less. Most parents (52%) believed that moderate fever with a temperature of 40°C or less can cause serious neurological side effects. Hence, most parents treated fever aggressively: 85% gave antipyretics before the temperature reached 38.9°C and 68% sponged the child before the temperature reached 39.5°C (Schmitt, 1980, p.176).

In a 1985 article in Pediatric Nursing, Younger and Brown,
gnizing the incongruity between the understanding and treatment of
r, challenged health care providers with the following
iderations about fever management. "Why do we treat fever?
ures for fever reduction are often automatically recommended. Are
rational and scientific, or simply ritual" (p.26)?

In discussing guidelines for counteracting "fever phobia" Schmitt
) implies that physicians' and nurses' behavior may serve as a
for parental behavior around illness. Schmitt suggests that, in
to help parents gain a realistic perspective on fever, physicians
rses must assume a calm approach to fevers and avoid the use of
rm "fever control" that may imply that if parents to not act
y the fever may get out of control.

n an attempt to relieve the unnecessary burden of "fever phobia"
rents and perhaps educate health care providers, Schmitt (1980)

reviewed the literature on three related areas of concern: the maximal levels of fever reported in children with acute infectious diseases, the harmful level of fever, and what those harmful effects are. Hyperpyrexia, a temperature of 41.0°C or greater, is rare in ambulatory patients. "An emergency regulatory mechanism exists that sharply limits the temperature at a level of about 41.0°C" (106°F) (Schmitt, 1980, p. 178). Although discomfort associated with fever usually begins when the temperature reaches 39.5°C (103°F) or 40.0°C (104°F), temperatures under 41°C are relatively harmless. Dehydration can result from fever, but it is both a preventable and treatable consequence which does not cause permanent harm. Febrile status epilepticus and heat stroke are uncommon complications of fever that can result in permanent harm.

Fever measurement is a controversial and confusing issue. A variety of temperature measurement devices, available to parents commercially, are advertised as efficient and accurate. Plastic strip thermometers have been found to be unacceptable substitutes for the mercury glass thermometer (Lewitt, Marshall & Salzer, 1982; Polefield, Gerber & Dwyer, 1982). Differences in opinion exist between and among physicians and nurses regarding the safest and most accurate location for temperature measurement (Eoff & Joyce, 1981; Rich, 1984). Despite associated risks, psychosocial considerations, taking into consideration the individual situation, the rectal site continues to be preferred by physicians because it is thought to be the most accurate.

Routine use of antipyretic medications, aspirin and acetaminophen, has come under criticism in the last few years. The Reye's Syndrome Working Group was convened by the Center for Disease Control to study Reye's Syndrome in Ohio and Michigan. Following a review of these studies, the Committee on Infectious Diseases discouraged the prescription of aspirin "under usual circumstances for children with varicella or those suspected of having influenza on the basis of clinical or epidemiologic evidence" (American Academy of Pediatrics, 1982, p. 812). Acetaminophen, which has been increasing in popularity, is not without potential risks. High doses of acetaminophen are known to cause liver and renal damage (Done, 1983).

Fever in children is most often caused by infection, usually due to self-limiting viruses such as respiratory viruses: rhinoviruses, influenza viruses, parainfluenza viruses, and respiratory syncytial viruses (Cushing, 1984; Wright, Thompson, McKee, Vaughn, Sell & Kaezon, 1981). Bacterial infections such as otitis media and pharyngitis as well as more severe, life-threatening infections (meningitis) may also cause fever.

Fever in the pediatric group represents a significant concern in primary care practice. McCarthy (1979) found that 20% of children brought to emergency rooms had fever. In private practice, 26% of all office visits by sick children less than age two were for fever (Fekelman, Lewin & Shapira, 1979). More than 20% of after hours telephone calls to a pediatric resident group practice were about fevers (Berman, Groothius, Villarrea et al., 1984). "Another 30% of

the calls in the above study concerned children who had fever as one of their symptoms" (Schmitt, 1984, p. 929).

According to the U.S. National Center for Health Statistics (1980-81) children from birth to five years of age account for 7.2% of the 381,710 office visits made to family and general practitioners. Children under three years represented 90.2 visits per 100 population and children three to five years 48.8 visits per 100 population. Children between the ages of zero and five years represent a significant proportion of the population receiving primary health care services (Patterns of Ambulatory Care, 1980-81).

Out of 20 Reasons for Visit Classification for Ambulatory Care (RVC) codes, fever was the fourth most frequent principal reason for patients younger than 15 years of age (Patterns of Ambulatory Care, 1980-81). According to Rosenblatt (1983), acute upper respiratory infection was the most frequent diagnosis made in the majority of ambulatory visits to U.S. physicians in selected specialties in 1977 and 1978. Acute upper respiratory infection represented approximately 1% of all visits in general and family practice and 18.5% of all visits in general pediatrics. Across all specialties acute upper respiratory infection ranked second in frequency exceeded only by general medical examinations. Considering these statistics, fever by itself or in relation to acute upper respiratory infection in children between the ages of two months and four years is frequently encountered by the primary care provider.

Statement of the Problem

Fortunately, fever, which has survived technological advances to control it, has evolved as an adaptive host response to infection. Unfortunately, childhood fever is still misunderstood by parents and mismanaged by parents and health care providers. There is a need for primary health care providers to begin to reverse parental "fever phobia", to facilitate parental understanding of fever as an adaptive response to childhood illness, and to assist parents in managing childhood fever safely and effectively. The problem addressed in this research study is to determine the impact of a nursing intervention on: 1) parental knowledge regarding the significance and treatment of childhood fever; and 2) self-reported behavior in the management of childhood fever.

Purpose

"Fever phobia" is well documented in both medical and nursing literature. With one exception (Casey et al., 1984), little evidence can be found that health care providers have attempted to respond to and intervene in this particular health care problem.

The goal of this study is to attend to this health care problem from a Family Clinical Nurse Specialist (FCNS) perspective to facilitate self-care and enhance parental self-efficiency. The specific purpose of this experimental study is two-fold: 1) to educate a small group of parents about the adaptive nature of fever in childhood illness; and 2) to inform a small group of parents about safe

and effective methods to use in the management of episodes of childhood fever.

This study is guided by social learning theory, Bandura's model of reciprocal determinism, and King's theory of goal attainment. In a sense, these theories have been tested as a result of this study.

Hypothesis

This study is quasi-experimental in nature. Analysis of the findings will be used to accept or reject the following hypotheses.

1. Parents receiving the nursing intervention will demonstrate greater knowledge about childhood fever and fever management than parents not receiving the intervention. This compares differences between the means of the two groups.
2. Parents receiving the nursing intervention will report more appropriate fever management behavior than those parents not receiving the intervention.
3. There is a positive relationship between parental knowledge of childhood fever and reported behavior in fever management.

Definition of Concepts

The following are definitions of concept identified in the earch problem and used throughout the study.

ent

For the purpose of this study, parent is defined as the biological legal mother, father, or guardian responsible for the care of the d.

Knowledge

According to Webster, knowledge is "the fact or condition of knowing something with familiarity gained through experience of association" and "the range of one's information or understanding" (Webster's Seventh New Collegiate Dictionary, 1965, p. 469). In this study, parental knowledge is defined as the understanding the parent has regarding the significance of fever in childhood illness and the methods used in fever management as evidenced by correct answers to questions on pre and posttests.

Fever

Fever is defined as "the regulation of body temperature at an elevated level, or more precisely, an elevated thermoregulatory set point" (Kluger, 1980, p. 723). Many authors add that fever is a response to a variety of infections (Casey et al., 1984; Cushing, 1984; Kluger, 1980; Wagner et al., 1984). In an article published in 1948 (DuBois), standards of fever were cited as $\geq$ 100.4^{o}F rectally, 100^{o}F orally, or 99^{o}F axillary. These standards are still accepted in current literature (Schmitt, 1980, 1984). For the purpose of this study, the level for an elevated axillary temperature has been changed to 99.6^{o}F. This change was based on the mean difference found in a study comparing rectal and axillary temperatures in toddlers and schoolers (Eoff & Joyce, 1981).

For inclusion in this study, some parents were seeking treatment for an ill child from an ambulatory care emergency department. Fever was stated either as the chief complaint by the parent or identified in

relation to the chief complaint by the health care provider. Specific identification of the cause of the fever was not necessary for inclusion in this study.

Childhood

Childhood is defined for this study as between the ages of two months and four years. Although fever in newborns and infants under six months of age with severe infections such as pneumonia or sepsis is usually absent or only moderate due to poor thermoregulatory ability (Kluger, 1980), the lower age limit of two months was decided upon to insure inclusion of children that are predisposed to fever development in response to the initial diphtheria, pertussis, tetanus immunization series. By the time a child reaches the age of four, the family has usually experienced at least one episode of febrile childhood illness with the temperature ranging from 100°F - 104°F (Schmitt, 1984). Both male and female children are included in the study.

arental Behavior

Parental behavior includes the common measures used by parents to tect and reduce elevated body temperature in children. The mponents of fever management are: 1) temperature measurement; supportive physiologic measures; 3) use of antipyretic medication; use of sponging; and 5) seeking medical advice. The mechanisms of prescriptive measures for fever treatment are: 1) lower the othalamic set point; 2) facilitate heat loss; and 3) prevent ydration. Parental behavior was determined by a self-reported ount of which measures were carried out during an actual febrile ode.

Limitations

The following limitations were identified in this study:

1. Subjects in this study participated voluntarily. For that reason, the sample may be different from the population of those subjects who did not volunteer and the findings may not be generalizable to the population of parents coping with febrile childhood illness at large.
2. A number of factors such as age, sex, past experience, education, socioeconomic status, and social support may influence parental knowledge and behavior. These variables may result in confounding the findings.
3. Parents who were approached and who participated in the study were seeking medical treatment for a child with a fever or preventive health measures that may result in the development of fever. The parents were given pretests and posttests to complete at home. Self-reported subject responses could have been affected by the stress of the child's illness, patient education information provided at the time of treatment, and/or the desire to provide acceptable answers, thus posing a threat to the validity of the results.
4. The specific parent was not defined in the study. The family was instructed to decide who the primary care giver was for the episode of fever and to have that designated person complete the questionnaire. Reliability of responses may then be brought into question.

5. The instruments used in data collection, although piloted, were not tested for validity or reliability.
6. The limited size of the sample drawn from one community prohibits the generalization of findings to different samples from different communities.
7. Self-reported behavior may not reflect the actual behavior.

Assumptions

This research study is based on the following assumptions:

1. Although knowledge does not necessarily result in a change of behavior, a relationship does exist between parental knowledge of fever and the behaviors used to manage the problem.
2. Subjects possess the capabilities necessary to complete the questionnaires unassisted.
3. The instrument is sensitive enough to measure parental knowledge regarding fever and the methods of fever management.
4. Answers to the questionnaires are based on the subjects own knowledge and behavior.

Overview of the Thesis

The thesis is organized into six chapters. In Chapter I, an roduction to the nature and importance of the study, problem ement, purpose, statement of the research hypotheses, definition of epts, limitations, and assumptions are presented.

The conceptual framework for the illustration and organization of concepts and theories used to guide this study is presented in Chapter II. In Chapter III, literature relevant to the major concepts of the study is reviewed.

The methodology, research design, and procedures used in conducting this study are described in Chapter IV. Information in this chapter includes a description of the sample, instrument development, data collection, scoring and method of data analysis. In Chapter V, the analysis of the data collected in the study is reported.

Finally, in Chapter VI, the summary and interpretation of the research findings are presented. Conclusions and recommendations for application of the findings and implications for advanced nursing practice, research, and education in primary care are proposed.

CHAPTER II

Conceptual Framework

Overview

The concepts inherent in this research problem, body temperature regulation, fever, and fever management, will be discussed in detail in this chapter. Two theoretical frameworks provide the organizational structure from which the research hypothesis can be studied. The relationships between the research variables will be explained using Bandura's social learning theory, analyzing behavior in terms of reciprocal determinism. King's theory of goal attainment will be used to propose and describe the interpersonal interaction between the client and nursing systems and the impact of nursing intervention on parental knowledge of fever and behavior in fever management. Schematic representation of the conceptual framework are provided.

Delineation of Concepts

Body Temperature Regulation and Fever

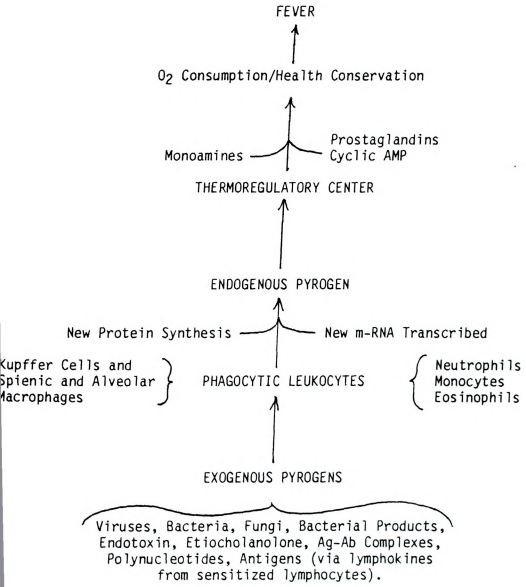
In order to appreciate the fact that fever is truly an adaptive response of the body to infection rather than a dangerous symptom to be vigorously treated, it is helpful to understand body temperature regulation and the mechanisms responsible for temperature elevation. Body temperature is the result of an equilibrium between heat production, which is largely the by product of metabolic activity in striated muscle in the awake child, and heat loss, much of which occurs at the body's surface" (Levi, 1984, p. 166).

Body temperature regulation is one of the many functions of hypothalamus accomplished through a complex feedback system. Information from the external environment is brought to the hypothalamus via the afferent nervous system indicating the need to raise or lower the body temperature. A thermostat in the hypothalamus also monitors the temperature of the blood entering the brain. This combined information is then transmitted to a set point in the hypothalamus where a temperature setting is established, usually at 98.6°F (37°C). The efferent nervous system uses this setting to determine heat loss or gain (Fruthaler, 1985; Lovejoy, 1980; Younger & Brown, 1985).

Fever in children is most often caused by infection, usually self-limiting viruses such as respiratory viruses: rhinoviruses, influenza viruses, parainfluenza viruses, and respiratory syncytial virus (Cushing, 1984; Wright et al., 1981). Bacterial infections manifested at otitis media and pharyngitis also cause fever.

When neutrophils, monocytes, eosinophils, or Kupffer cells, which are phagocytic white blood cells, come in contact with foreign substances such as viruses or bacteria, the phagocyte is activated. It produces and releases small molecular weight protein substances called endogenous pyrogents (EP) (Kluger, 1980; Price & Wilson, 1982). Interleukin (IL-1) has recently been identified as the endogenous pyrogen that circulates in the blood causing the hypothalamus to secrete prostaglandin E which results in resetting the body's thermostat to a higher set point. The body begins to produce more heat

than it loses and fever eventually develops (Dinarello & Wolff, 1984). Dinarello and Wolff (1978) proposed a model of the mechanism of fever production (Figure 1).



gure 1: Proposed Mechanism of Fever Production

Small elevations in body temperature enhance the host defense response to infection in a number of ways. Leukocyte mobility, bactericidal activity of leukocytes, lymphocyte transformation, leukocyte migration inhibition factor production, and Interferon's effects are stimulated and lysosome stability is decreased by increased body temperature. In addition to these effects, it has been demonstrated in laboratory studies that a reduction in plasma iron levels occurring during infection and associated with normal fevers results in a significant decreases in the growth rate of certain pathogenic bacteria (Kluger, 1980).

"Studies with bacteria and viral infected animals have shown that oderate fevers increase survival rate" (Kluger, 1980, p. 720). ehavioral mechanisms are used by lower vertebrates, such as fish and eptiles, to raise their body temperature (Kluger, 1980). Similar indings were obtained from studies or human beings (Cabanas & ssonnet, 1974). Therefore, fever serves an adaptive and therapeutic rpose.

ver Management

The fact that fever serves a therapeutic purpose is supported by search studies of the last decade. Traditional interventions to liscriminately reduce fever can no longer be justified. In light of most recent research findings, health care providers are valuating their approach to fever management to facilitate the y's natural defense mechanisms. Communicating this new information parents and convincing them of its value may be more difficult than

it initially seems, especially when the provider is dealing with parents who consider treatment of fever absolutely necessary (Levi, 1984).

Despite the fact that fevers in children are usually benign and self-limiting responses to viral infections that do not require treatment, there are two legitimate reasons for treating childhood fever (Done, 1981; Levi, 1984). One reason for treating fever is to promote comfort. Treatment should not be withheld at the expense of the child's comfort. However, discomfort does not usually begin until the temperature level reaches 103°F or 104°F (Schmitt, 1980). The relationship between fever and symptoms of discomfort has not clearly been established. It can be presumed that whatever is causing the fever is also responsible for the associated discomfort. Therefore, the rationale for treating fever to alleviate discomfort remains equivocal. When discomfort truly results from fever, simple environmental measure such as increasing fluid intake and removing clothing are as effective as a pharmacological intervention (Levi, 1984).

A second reason for treating a fever is a clear history of febrile seizures (Done, 1981; Levi, 1984). A major parental concern and misconception is that uncontrolled fever can result in convulsions and brain damage. Approximately 4% of children experiencing a fever will have a febrile seizure and it is very unlikely that neurologic damage will result (Fruthaler, 1985; Schmitt, 1984). The peak incidence of cases where a first seizure is considered febrile in origin occurs at

ne to two years of age. After age three, a child is unlikely to xperience a seizure as a result of fever (Done, 1981; Schmitt, 1984).

The relationship between fever and seizure is also somewhat nclear. Some children may experience a seizure at relatively low emperatures during the first phase of the illness, but not on ubsequent days when the fever spikes. In some situations, parents re not aware their child has a fever at the onset of the seizure Fruthaler, 1985). The first febrile seizure is not predictable or reventable, therefore, prophylactic measures to reduce temperature are ot indicated. However, once a febrile seizure begins or has occurred, easures to reduce temperature should be initiated immediately.

When fever management is indicated, a variety of methods are vailable to lower body temperature. In order to identify the propriate intervention, the underlying mechanisms of fever must be derstood.

mperature Measurement

Assessment of body temperature is the first step in fever nagement. This seemingly simple health care practice is influenced a number of factors. The type and availability of a thermometer, site of measurement, and the ability to read and interpret the rmometer reading are all variables that affect the identification of elevation in body temperature. Temperature assessment is initially primarily a parental responsibility and is subject to any number combination of the variables mentioned.

In recent studies, approximately two-thirds of families were found to own thermometers but only a little over one-half actually use them (Scholefield, Gerber, & Dwyer, 1982; Wagner et al., 1984). In a quality assurance study of the management of children with fever, Wagner et al. (1984), found that 31% of the adults were unable to read the thermometer correctly, 71% were unable to state the correct normal temperature, and 67% used touch as an additional means for determining the presence of fever. Although temperature readings are influenced by uncontrollable variable, including environmental factors and diurnal variation, measurement is still advocated for the diagnosis and differentiation of disease (Cunha, Diagmon-Beltran, & Gobbo, 1984).

Safety and accuracy are the criteria for determining the appropriate method for temperature measurement. Upon comparing advantages and disadvantages of rectal, oral, and axillary sites and types of thermometer according to these criteria, the axillary site using a mercury-glass thermometer, is considered the method of choice for infants, toddlers, and preschoolers (Blainey, 1974; Eoff & Joyce, 1981).

Supportive Measures

Two measures should be considered initially in the management of childhood fever. Increasing the oral intake of fluids beyond the normal 750-1000cc/day requirement (McFarlane, 1986) helps prevent fluid depletion that may accompany fever (American Academy of Pediatrics, 1982; Schmitt, 1980; Younger & Brown, 1985). Management of environmental factors is another important consideration. Dressing a

ebrile child too warmly and keeping the environmental temperature too arm will prevent heat loss and should be avoided. These measures lone may be effective in keeping the body temperature at 102°F or less ithout compromising the body's natural defense mechanism.

ntipyretic Medications

Antipyretic drugs, such as aspirin and acetaminophen, are known to educe fever by acting at the level of the anterior hypothalamus, nhibiting the synthesis of prostaglandin E from arachidonic acidotic cid (Griffin, 1986; Kluger, 1980; Younger & Brown, 1985). The result s a lowering of the hypothalamic set point and activation of hysiologic mechanisms for heat loss, including vasodilation and weating (Fruthaler, 1985; Lovejoy, 1980).

Routine use of aspirin and/or acetaminophen in the treatment of ever has come under criticism in the last few years. For practical urposes, there are no substantial differences when comparing the fficacy of aspirin and acetaminophen in reducing elevated temperatures on, 1982; Lovejoy & Done, 1980). Use of antipyretics must be weighed ainst their potential for adverse effects.

Widespread usage of aspirin, once the pharmacologic treatment of oice in reducing fever, has resulted in the recognition of several erse effects. Higher than recommended doses or correct doses inistered too frequently may result in toxicity - salicylate soning. The use of aspirin is also associated with an increased k of gastrointestinal bleeding because of the effect aspirin has n the integrity of the gastric mucosa and platelets (Lovejoy & Done,

1980). Asthma may also be aggravated in some patients by the use of aspirin (Fruthaler, 1985; Lovejoy & Done, 1980). Most recently, the use of aspirin in the treatment of certain viral illnesses has been associated with the development of Reye's Syndrome. Following a review of the 1980 summaries of epidemiologic studies of Reye's Syndrome in Ohio and Michigan, the Committee on Infectious Disease recommends that "aspirin should not be prescribed under usual circumstances for children with varicella or those suspected of having influenza on the basis of clinical or epidemiologic evidence" (American Academy of Pediatrics, 1982, p. 812).

The use of acetaminophen has been increasing in popularity. Although the frequency of adverse effects from acetaminophen appears to be less than with aspirin, the use of acetaminophen involves potential risks. High doses and overdosage of acetaminophen are known to cause nephro and/or hepatotoxicity. Liver damage is dose related and occurs in the two to three year old at doses of two to three grams (Lovejoy & Done, 1982). Acetaminophen appears to be much more toxic when animals are fasted than when they are not. This is an important consideration when prescribing acetaminophen for the febrile child who is probably fasted to some extent as a result of their illness (Done, 1981).

The choice of the antipyretic agent should be based on the relative risk of side effects, therapeutic toxicity, and overdose toxicity. Because of the fewer side effects and reduced risk of

toxicity, acetaminophen should be recommended when antipyretic therapy is indicated (Temple, 1983).

Sponging

In circumstances under which fever control is considered necessary but when antipyretic medications is contraindicated or ineffective, sponging is often used to reduce elevated body temperature (American Academy of Pediatrics, 1982). Sponging with tepid water is considered effective only in situations in which the hypothalamic set point is normal such as in excessive health production and defective heat loss (Lovejoy & Done, 1980; Younger & Brown, 1985). Sponging cools the body surface by evaporation (Swanson, 1981). Attempts to lower the body temperature with cool or cold water will lower the body temperature only briefly and will be followed by shivering which increases the metabolic rate, body temperature, and physical discomfort (Fruthaler, 1985; Lovejoy & Done, 1980; Schmitt, 1984; Younger & Brown, 1985). Schmitt (1984) recommends sponging the child with lukewarm water one-half hour after antipyretics have been given if the temperature remains greater than 104°F. Sponging with alcohol should be discouraged because the fumes are noxious and alcohol can cause skin irritation, seizure, or coma if inhaled (Levi, 1984; Schmitt, 1984; Younger & Brown, 1985).

In a study conducted to evaluate the efficacy of sponging as a way to reduce body temperature in febrile children, Newman (1985) reported no difference in temperature reduction between the antipyretic and

ponging group and the antipyretic alone group. Newman recommended bandoning sponging as a method of temperature reduction.

eeking Medical Advice

Although the majority of febrile childhood illnesses are self-imiting and parents, with the proper knowledge and skills, can manage he fever independently, there are certain situations in which the arent should seek medical advice and/or treatment. The guidelines for onsulting a physician are based on the harmful causes of fever. chmitt (1984) has proposed guidelines for seeking medical advice.

Call immediately if: (your child has a fever and...)

Your child is less than two months of age.
Temperature is greater than 105°F.
Your child cannot be comforted.
Your child is difficult to awaken.
Your child is confused or delirious.
Your child has had a seizure.
Your child has a stiff neck.
Your child has purple spots on the skin.
Breathing is difficult.
Your child is acting very sick.
Your child has underlying medical problems.

Call during office hours if: (your child has a fever and...)

Your child is two to four months old (unless due to DPT).
Fever is 104°F - 105°F, especially if child is less than two years old.
Burning or pain occurs with urination.
Fever has been present for more than three days.
Fever has been present for more than 24 hours without an obvious cause.
Fever went away for more than 24 hours then returned.
Your child has a history of febrile seizures.
You have any other questions.

mitt, 1984, p. 934).

Fever management should not be engaged in automatically. It is rtant to recall the therapeutic purpose of fever in childhood

illness and the mechanisms of body temperature regulation and elevation prior to initiating fever therapy. Promoting comfort and facilitating the body's natural defense mechanism should be the goals of fever management. Safe and effective measures are available to use in achieving these goals. For these measures to be safe and effective, health care providers must understand the scientific basis of these measures and educate parents accordingly.

Conceptual Framework

Behavior, the manner in which one acts, functions, or reacts (Webster, 1965) can be attributed to a number of theories depending on which assumptions about human nature one subscribes to. Those who support the behavioral theory, such as B.F. Skinner (1953, 1972), believe that environment, conditions, or events cause behavior. In other words, behavior results from sociocultural learning and conditioning (DePastino, 1984).

Bandura (1978) describes the most extreme form of behaviorism as unidirectional environmental determinism and gives it the following formula: B = f (P,E) in which B is behavior, P is cognitive events which can affect perceptions and actions, and E is the external environment. Emphasis is placed on the objective, measurable aspects of behavior. Behavior changes or learning occurs as a result of altering environmental variables.

Environmental factors influence cognitive processes such as knowledge, values, and perceptions which in turn influence the

perception, evaluation, and regulation of behavior (Bandura, 1978). Environment is the force to which individuals react.

Cognitive theory explains behavior as a function of cognitive elements including thoughts, beliefs, attitudes, values, perceptions, fantasies, and questions (DePastino, 1984). What people think and believe influence the way they behave. Behavior is changed by correcting inaccurate through patterns as suggested by Ellis (1977) or restructuring the cognitive thought processes as suggested by Ausubel (1968, 1969) and Brunner (1961). Another cognitive strategy that facilitates learning and change in behavior is to provide information. Bandura (1978) suggests that information and, therefore, knowledge is necessary but not sufficient for accomplishing a change in behavior.

Because human behavior is complex and is not a result of isolated independent events, theories previously mentioned do not seem adequate in explaining how behavior can be changed. Personal behavior is a holistic experience influenced by biophysical, psychological, and social factors (King, 1971). Nursing, the art and science of caring for the whole person (Rogers, 1970), requires a frame of reference for dealing with behavior that integrates both environmental and cognitive variables. Social learning theory is a comprehensive framework from which to understand human behavior.

According to social learning theory, behavior is analyzed in terms of reciprocal determinism. Determinism means that effects produced by events occur probabilistically rather than inevitably. When people interact with the environment, they do not simply react to external

stimulation. A person's cognitive processes help determine how the environmental stimuli will be observed, interpreted, responded to and used in the future. People can exercise some influence over their own behavior by altering their immediate environment and engaging in reflection, anticipatory preparation, and the use of symbols. Psychological functioning involves a continuous reciprocal interaction between behavioral (B), cognitive (P), and environmental (E) influences (Bandura, 1978, p. 345) (see Figure 2). Bandura represents reciprocal determinism in the following way.

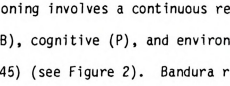


Figure 2: Reciprocal Determinism

In this study, the behavior of interest is parental fever management. Parental behavior influences cognitive processes and the environment, which are concurrently influencing each other.

Cognitive content, such as what the parent knows and believes from past personal experience or what he/she reads or is told about fever, will to some extent determine the methods he/she will use to treat the fever. Human thought is characterized by the ability to represent information and experiences in symbolic form. This information is

synthesized, stored, and recalled for use under certain circumstances. Because parents receive a variety of information about fever and fever management form a variety of sources, the information will be selectively retained and recalled for use in the management of future febrile episodes.

One of the goals of this study is to add to the cognitive dimension of parental knowledge about fever and fever management. It is anticipated that the new information will either reinforce correct knowledge or replace inaccurate knowledge and will be recalled and applied in the future management of fever. Thoughts and beliefs will either be validated or modified as a result of the success of the behavior.

Many environmental cues such as advertisements, health care provider's instructions and actions, and advice from family and friends influence parental behavior in treating a febrile child. In the present study, it is anticipated that the nursing intervention will serve as a strong environmental cue to modify or validate parental behavior.

In the present study, the environmental factor of Bandura's triad will be manipulated. An educational nursing intervention will be introduced and become the environmental cue which will influence parental knowledge about fever and behavior in fever management. Since other environmental cues are not controlled it can be deduced that the nursing intervention made the difference in knowledge and behavior.

Using Bandura's model of reciprocal determinism the dependent and independent variables of this study are put into perspective (see Figure 3). Behavior, cognitive events, and environmental stimuli interact reciprocally to determine what the parent knows, how the parent behaves, and what the outcome may be.

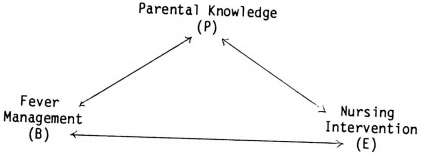
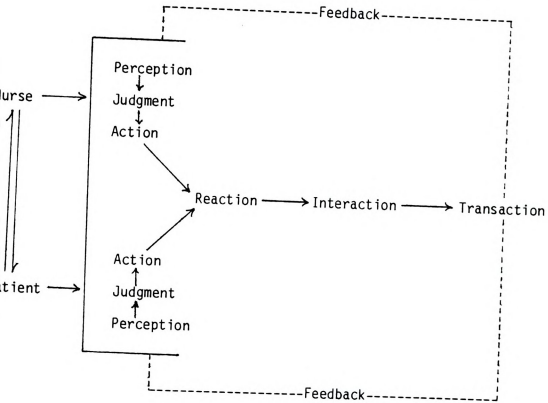


Figure 3: Study Variables Conceptualized in Terms of Reciprocal Determinism

Bandura would agree with the behaviorists that behavior is influenced by the environment. Furthermore, Bandura proposes that the environment is, in part, determined by the symbolizing, forethought, vicarious self-regulatory, and self-reflective capabilities of human cognition. Through their social behavior, people influence their social environment (Bandura, 1978, 1985).

Relationship to Nursing Theory

King's (1971) dynamic interacting systems model and theory of goal attainment is based on the interpersonal system - the interaction between the nurse and client (see Figure 4). The interaction is



ure 4: Process of Human Interaction adapted from King, I.M. (1972). Toward a theory for nursing. New York: John Wiley & Sons, Inc.

influenced by two major concepts, perception and communication. Perception is the process of organizing and interpreting information. It is the representation of one's image of reality. Communication is the process of sending, receiving, and validating the information between participants.

Elements of the nurse client interaction include action, reaction, disturbance, mutual goal setting, explore means to achieve goal, agree or means to achieve goal, and transaction. Action is the initiation of the interaction and reaction is the response. Disturbance is the concern or problem identified by the client and/or nurse. A goal, which is aimed at resolving the identified disturbance, is mutually agreed upon. The means to achieve the goal are also explored and agreed upon mutually. Action, reaction, and interaction lead to transaction which is behavior that indicates movement toward or achievement of the goal. Nursing assessment and intervention addressing the problem of parental knowledge of fever and behavior in fever management will be based on King's model and theory.

Parents assume, at least initially, the responsibility for the identification and treatment of fever when their children are ill. The accuracy of their perceptions as to the presence and nature of fever is a critical determinant in how they will proceed to treat or seek assistance for treatment of the febrile episode. In the case of childhood illness, it is common for the parent to interact with a nurse to obtain assistance or information regarding the treatment of fever. For this interaction to proceed effectively, the nurse must have an

accurate perception of the significance of fever and fever management based on scientific data, the current situation, the child's condition, and the parent's understanding of the situation.

According to King's role, a nursing situation is the immediate environment in which the nurse and the client establish a relationship to cope with health states. Nursing is a process of action, reaction, and interaction whereby the nurse and client share information about their perceptions in the nursing situation (King, 1981). Nursing assessment of a parent's knowledge of childhood fever and intervention to facilitate goal attainment of appropriate fever management is within the domain of nursing which according to King is the maintenance and restoration of health and care of the sick.

The problem of fever can be appropriately considered within King's definition of health and illness.

> Health is defined as dynamic life experiences of a human being, which implies continuous adjustment to stressors in the internal and external environment through optimum use of One's resources to achieve maximum potential for daily living. Illness is defined as a deviation from normal, that is, an imbalance in a person's biological structure (King, 1981, p. 5).

Fever is defined as both an elevation of body temperature above mal and as an adaptive response mechanism to infection. Although ses must constantly be aware of the implications of fever in ness, nursing practice should focus on the adaptive aspect of fever response to illness.

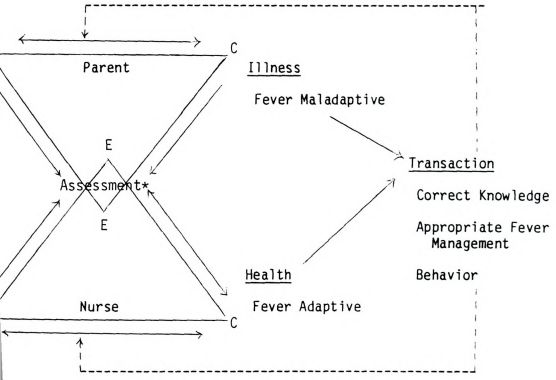
The person in King's model is described as being a controlling oseful, and action-oriented being. In the situation of childhood

fever, the parent must be considered the client as the child's care provider.

The nurse-client interaction takes place in an open systems environment which allows for the exchange of matter, energy, and information. The environment plays an important role in the problem of childhood fever and fever management both psychosocially and physiologically. Environmental factors such as the presence of disease, environmental temperature, and the state of hydration influence body temperature. Parental knowledge of childhood fever and behavior in fever management are also influenced by environmental cues such as information obtained through the media, press, personal contacts, and past experience with the problem.

The nurse collects and analyzes information processed during the interpersonal interaction which includes action, reaction, and disturbance which is the febrile childhood episode. Based on the assessment, the nurse determines whether the client's cognitive perception of fever is adaptive or maladaptive (see Figure 5).

Nursing intervention is supportive and/or educative in nature depending on the client's perception of fever and reported behavior in fever management. If the parent's perception is that fever is a normal, adaptive response to childhood illness and behavior in fever management reflects this perception, nursing intervention will serve primarily as a reinforcement. If, on the other hand, fever is considered by the parent to be maladaptive and fever management is inappropriate, the nursing intervention will become an educative



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process in which an attempt is made to increase knowledge and change behavior. From both perspectives, the overall objective is to promote self care in the management of childhood fever.

The transaction, or goal achievement, of nursing intervention for this particular problem is appropriate parental fever management based on the current knowledge of the significance of fever rather than on misconceptions. The results of the transaction will be fed back to both the client and nurse influencing future interactions and the knowledge and management of febrile illness.

Summary

Many physiological facts are essential to the understanding of the significance of fever in illness. This scientific knowledge should be used to emphasize the adaptive role fever plays in the body's response to illness and guide the treatment of fever.

Assuming that behavior, knowledge and the environment are involved in a continuous reciprocal process that influences learning, an attempt will be had to effect a change in parental knowledge and behavior utilizing an interactive systems approach and manipulating the environmental variable. Evaluation of the effectiveness of the nursing intervention will be measured in terms of an increase in knowledge and the appropriateness of parental self-reported behavior in managing febrile childhood episodes. In combining the principles of reciprocal determinism, and the theory of goal attainment, it is anticipated that

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the CNS practicing in the primary health care system can facilitate self-care of childhood fever.

In Chapter III, a review of the literature will be presented. Articles pertaining to the pathophysiology of fever, parental misconceptions regarding fever, temperature assessment, antipyretic therapy, sponging, and the outcome of educational interventions will be reviewed.

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CHAPTER III

Literature Review

Overview

During the last decade, renewed attention has been given to the subject of fever and fever management. Literature pertaining to the pathogenesis of fever and specific management techniques can be found in both medical and nursing publications. Currently, the emphasis is on fever as an adaptive response and management that facilitates that response. A great deal of the literature is based on research studies involving the beneficial effect of fever on infected hosts, temperature measurement, antipyretic therapy, sponging, and parental knowledge regarding childhood fever.

In this chapter, medical and nursing literature concerning: 1) pathogenesis of fever; 2) parental knowledge about childhood fever and behavior in fever management; 3) specific methods of fever management such as temperature measurement, use of antipyretics, and sponging; and 4) educational intervention for parents will be reviewed. A discussion and interpretation of the literature concerning the implications for the present study will be included.

Pathogenesis of Fever

Fever is probably the oldest and best known sign and symptom of disease. Even before the invention of the thermometer, an elevation in the body temperature was recognized as a response of the body to

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disease. History has provided modern scientists and health professionals with a great deal of knowledge in relation to the pathogenesis of fever. The understanding of normal body temperature regulation is based on discoveries made in the late eighteenth century. Measurement of body temperature began in 1868. Increasingly sophisticated information has been contributed to the knowledge of the pathogenesis of fever through scientific study during the last two centuries. However, the last 30 years has been a period of rediscovery in the study of the pathogenesis of fever (Atkins, 1984; Dinarello & Wolff, 1978; Kluger, 1980).

Experimental studies reported by Atkins (1984), Dinarello & Wolff (1978), and Kluger (1980) support the fact that fever has evolved as an adaptive host defense response to infection. Atkins (1984) reports that in 1953 a fever-inducing factor, endogenous pyrogen (EP), was discovered in leukocytes and was present in the circulation of animals injected with various microbial antigens.

Metabolic and vascular responses leading to fever following experimental injections of a pyrogenic agent in man are reported by Dinarello & Wolff (1978). Physiologic changes included an increase in metabolic activity, peripheral vasoconstriction, shivering, and an increase in core body temperature regardless of the pyrogenic agent used. In addition, Dinarello and Wolff (1978) reviewed established concepts and presented new information on the pathogenesis of fever in human beings. The endogenous pyrogen, it's sources, clinical nature, and detection as the common mediator of infection were discussed in

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detail. In subsequent experimental studies, a single hormone, the monokine, interleukin-1, has been identified as the endogenous pyrogen responsible for stimulating special receptors on or near thermosensitive neurons in the thermoregulatory center of the anterior hypothalamus (Dinarello, 1984).

Special credit is given to Kluger (1980) for presenting the most striking evidence for the role of fever in promoting host defenses against infection (Atkins, 1984). Kluger (1980) reported that moderate fevers increase survival rates in studies with bacterial and viral infected animals. Kluger et al. (1975) infected small desert lizards with a gram-negative bacterium. The lizards, regulating their temperature behaviorally, elevated their body temperature from the normal to febrile range by continuously seeking out spots near an externally controlled heat source. The survival rate for the infected lizards maintained at a normal temperature was less than 25%. For those maintained at a febrile temperature, the survival rate was 80%. Studies of mammals, including humans, that also regulate body temperature behaviorally support the idea that fever is an adaptive response in man (Cabana & Massonnet, 1974).

The concept of fever has evolved historically. There was a time when an increased body temperature was precipitated to treat infections such as syphillis (Cunha et al., 1984). In the 1880s, philosophy changed when antipyretics first became available to reduce fever. At the present, a period of rediscovery exists in which "as adherents to the theory of evolution, we now see in fever perhaps the single most

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dramatic effect of a hormone with an astonishing array of activities that appears to have been created, selected, and integrated by nature to protect the host from infection" (Atkins, 1984, p.347). Currently, it is generally accepted among health care providers, in theory if not in practice, that fever is an adaptive bodily response to infection that should not be treated automatically (Cunha et al., 1984; Done, 1981; Fruthaler, 1985; Levi, 1984; Schmitt, 1984; Weiss, 1983; Younger & Brown, 1985).

Parental Knowledge and Behavior Related to Childhood Fever

Because of scientific study and clarification of the mechanisms by which disease causes an elevation in body temperature in the past three decades, health care providers have at their disposal a better understanding of the pathogenesis of fever. Their approach to fever management can be based upon scientific rationale rather than ritual (Younger & Brown, 1985). Unfortunately, there has been some problem in passing this information on to the public. Many parents do not recognize the beneficial effect of fever in childhood illness, and their treatment is frequently inappropriate and overly aggressive.

Research conducted by Schmitt (1980) can be considered the classic study in identifying what parents know about fever and how they manage fever at home. Subsequent articles and studies have been based on and confirm Schmitt's work (Casey et al., 1984; Fruthaler, 1985; Kramer, Laimark, & Leduc, 1985; Schmitt, 1984; Wagner et al., 1982).

Schmitt (1980) collected data from 81 parents bringing their children to a university hospital-based walk-in pediatric clinic.

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Approximately 50% of the families surveyed had one child, 14% of which were younger than six months of age and received Medicaid. Parents completed a one-page, 11 item questionnaire, unassisted, on their understanding of fever. Areas of parental knowledge explored by the questionnaire included the level of body temperature that was considered a fever. Parental concern related to harmful effects of fever, treatment measures used to reduce fever, and the parent's source of information about fever. If time permitted, the clinic nurse reviewed the appropriate answers with the parents. Tests of instrument reliability and validity were not reported.

In general, Schmitt's (1980) findings indicated that many parents are unduly worried about fevers as evidenced by the fact that 63% of all parents reported that they "worry lots", 43% of parents took their child's temperature five or more times a day, and 48% would awaken their sleeping child to give antipyretic medication. Most parents (52%) worried about serious permanent neurological damage resulting from fevers. Based on these concerns, it is understandable that most parents treat fevers very aggressively. Responses to questions related to fever management indicated that parents know the correct interval for administering antipyretic drugs. However, 7% may give an inadequate drug dose and 4% may inadvertently overdose their child by giving the drug too frequently.

An interesting finding of Schmitt's study that has important implications for the present study is that 51% of all parents cite what physicians or nurses say or do as their main source of information

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about fevers. When the group of parents citing physicians and nurses as their source of information was compared with a group of parents citing friends, relatives, or reading as their source of information no significant differences were found by Chi Square concerning how often they gave inappropriate responses.

Based upon his findings, Schmitt (1980) concluded that the concerns of parents about fever were unjustified and parental knowledge about fever was characterized by misconceptions. Schmitt (1980) reviewed the literature on the maximal level of fever reported in children with acute infectious diseases, the level of fever that can cause harm, and what the harmful effects are. From this review, Schmitt (1980, 1984) proposed guidelines for physicians and nurses to use in counteracting "fever phobia" in parents.

Kramer, Naimark, and Leduc (1984) replicated Schmitt's (1980) study in an attempt to document whether similar findings of "fever phobia" prevailed among middle and upper middle class parents in a private practice setting. Another purpose of this study was to investigate certain clinical and sociodemographic factors thought to be associated with "fever phobia."

Parents of 202 febrile children age six months to six years visiting a private pediatric group practice for a chief complaint of fever were surveyed over a 17 month period. Background sociodemographic and clinical information was collected. Eight pretested questions, similar to Schmitt's (1980) questions about knowledge, attitudes and fears concerning fever and its treatment in

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young children were asked. Correlations were calculated using conventional Pearson product moment correlation coefficients and Chi Square analysis. Socioeconomic status was measured using the two factor index of Green based upon maternal education and occupation of the head of the household.

A wide socioeconomic spectrum, shifted slightly toward the upper end of the scale was represented in this study as compared to the parental spectrum in Schmitt's (1980) study which represented the lower end of the socioeconomic scale. Kramer et al. (1985) reported findings similar to Schmitt (1980) regarding the level of temperature considered a fever, the temperature at which harmful effects could occur, and the type of harmful effects that could occur.

The clinical and sociodemographic characteristics of the child or family hypothesized to be associated with parental attitudes toward fever showed few associations. Some associations were opposite to those predicted. It was hypothesized that the younger the index child, absence of other children in the home, and lower socioeconomic status would be associated with greater parental "fever phobia". A small but statistically significant inverse correlation ($r = .16$; $P = .011$) was found between the age of the index child and the minimum temperature considered by the parent to constitute a fever. Parents of younger children reported a higher temperature for what they considered a fever. No associations were found with the age of the responding parent or the presence of other children in the home. The higher the temperature of the index child upon enrollment in the study the higher

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the responding parent placed the minimum febrile temperature, the maximum attainable temperature, and the temperature for dangerous sequelae. Most attitudes indicated no associations with socioeconomic status.

Two findings in the study by Kramer et al. (1985) may have significance for the present study. Presence of other children in the household or past experience with fever was proposed as a possible limitation of the present study. The presence of other children in the family was not found to be associated with parental knowledge about fever and, therefore, may not distort the findings as anticipated. The fact that parents of children experiencing higher temperatures were less worried about the dangers of fever is an important finding to take into consideration when analyzing the data from the present study.

Schmitt's (1980) findings are confirmed by Kramer et al. and can be generalized to a somewhat expanded population. Differences in the source of health care, private and walk-in, do not seem to alter the findings. Kramer's (1985) study adds to the data obtained by Schmitt (1980) by investigating pertinent clinical and sociodemographic variables.

Parental knowledge about childhood fever and fever management was originally studied from a medical perspective. In a quality assurance study, nurses (Wagner et al., 1984) used Schmitt's (1980) data as a basis to study the knowledge of parents and to develop instructional material for parents bringing febrile children to an emergency department. Twenty-one parents with children less than 16 years of age

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with temperatures higher than 37.8°C orally or 38.3°C rectally were interviewed and asked to demonstrate the use of a glass thermometer. Findings by Wagner et al. (1984) in which 71% of the parents gave medication to their children before the fever reached 38.9°C were similar to those reported by Schmitt (1980). Other findings reported by Wagner et al. are that 62% of the parents had thermometers at home, 52% of the parents were able to read a thermometer correctly, and 71% were unable to state the correct normal temperature. On the basis of these findings, Wagner et al. made three recommendations for nursing practice:

1. Implementation of a standard nursing care plan for the child with fever...
2. Revision and updating of an instruction sheet for parents regarding care of a child with fever...
3. Stocking of glass thermometer in the emergency department as an optional charge item for patients...(p. 328)

Recommendations for further studies were also made by Wagner et al. (1985). Suggestions included expanding the questionnaire to include demographic data, using follow-up telephone surveys, studying recidivism, and studying physicians' and nurses' knowledge of caring for febrile children. The study by Wagner et al. (1985) demonstrates the need not only to identify the problem of parental misconception regarding childhood fever but also the need to plan practical nursing interventions to deal with the problem.

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In summary, parental misunderstanding of childhood fever and fever management has been identified in a review of the literature. Parental misunderstanding was found among parents from different socioeconomic backgrounds seeking treatment from a variety of health care sources. Some of the findings from previous studies may have important implications for the data analysis of the present study.

Fever Management

Despite the accumulation of data supporting the fact that fever is the body's adaptive response to infection, fever management strategies do not consistently reflect this philosophy. Many opinion-based articles regarding the principles of childhood fever management have recently been published (Emergency Medicine, 1985; Fruthaler, 1985; Levi, 1984; Younger & Brown, 1985). Questions frequently raised in the literature are "Should fever be treated?" and if so, "Under what circumstances?" If the decision is made to treat childhood fever, certain basic principles provide the basis for treatment.

One of the most important principles is that fever is not a by product of disease that should be treated routinely and automatically (Lone, 1981; Emergency Medicine, 1985; Fruthaler, 1985; Griffin, 1986; Levi, 1984; Younger & Brown, 1985). Criteria such as the body temperature pattern and other signs, symptoms, and behavior associated with fever are more important determinants of the intervention than a single elevated body temperature reading. Fever management should be individualized to the specific child and situation.

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Temperature Measurement

Temperature measurement is a topic researched and reported extensively in nursing literature over the past 20 years. Site selection for temperature measurement has been studied and compared (Blarney, 1974; Eoff & Joyce, 1981; Nichols, 1966). The length of time for temperature measurement has been studied and replicated (Graves & Markarian, 1980; Nichols, 1972; Nichols & Verhonick, 1967, 1968). Thermometer placement has also been researched (Erickson, 1980; Nichols & Glor, 1968). Different types of thermometers have been studied (Barrus, 1983; Erickson, 1980; Graves & Markarian, 1980). Studies related to the new plastic thermometer strips can also be found in medical literature (Lewitt et al., 1982; Scholefield et al., 1982). Subjective assessment of the body temperature by palpation has been researched as a means of determining body temperature (Banco & Veltri, 1984; Bergeson & Steinfield, 1974).

Less importance is attributed to the actual temperature in determining the presence or absence of serious illness (Fruthaler, 1985; Levi, 1984). Observation of signs and symptoms and the child's behavior are thought to be more important indicators of the degree of illness. Playfulness, alertness, consolability, motor ability, eating, color, respiratory status, and hydration are the parameters which have been suggested that should influence clinical judgement in addition to the child's temperature (Long & Henretig, 1987; McCarthy, Jekel, Stashwick, Spiesel, & Dolan, 1980).

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General recommendations have been made for temperature measurement in febrile children. Schmitt (1985) recommends that the temperature should be taken once a day, in the morning, until the fever is gone. He states that "the main purpose of temperature taking is to determine whether a fever is present or absent, not to chart its every move" (Schmitt, 1984, p. 930). This point of view is shared by Mitchell (1973). Waking a sleeping child to check his/her temperature is discouraged (Levi, 1980). Frequent temperature measurement during illness or routine temperature measurement during well child visits, reinforces parental concern (Fruthaler, 1985).

Despite the extensive research on the topic of temperature assessment, many physicians and nurses still base their interventions on the assumption that in children rectal temperatures are the safest, most accurate way to measure body temperature. Factors have been identified that invalidate this assumption.

A great deal of controversy surrounds the method or site of temperature measurement. The main purpose of taking temperature is to determine whether or not a fever is present. Documentation of the exact level is not necessary in the diagnosis or treatment of the underlying problem (Blainey, 1974; Fruthaler, 1985; Schmitt, 1984). Therefore, many sites can be considered for determining the average temperature of the body.

It has been recommended that site selection be based on specific criteria (Blainey, 1974; Eoff & Joyce, 1981). The criteria for choosing an optimum site for temperature taking are safety and accuracy and include:

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Blainey, 1974, p. 1859)

After comparing the advantages and disadvantages of the rectal, ublingual, and axillary sites, Blainey (1974) states that the ublingual site, controlling for external influences, reflects the most ccurate core temperature. The axillae is the site of choice for nfants in controlled environments. The rectal site should only be sed when other sites are inappropriate or impractical.

The rectal site, although still preferred by many physicians and rses, presents potential dangers for infants in the form of rectal eformation and psychosocial implications for toddlers and eschoolers (Barrus, 1983; Eoff & Joyce, 1981). Eoff & Joyce (1981) dertook a study to determine whether or not there was a clinically gnificant difference between rectal and axillary temperatures of ddlers and preschoolers. Consideration was taken regarding variables ch as sex, weight, and length of time that may affect the temperature tained at each site.

Twenty-five toddlers (age 1-3) and 25 preschoolers (age 3-6) were domly selected from hospitalized children. Their weights ranged m 6.3 Kg. to 29.7 Kg. Using a glass thermometer, rectal peratures were taken for three minutes, immediately followed by llary temperatures for five minutes. A mean difference of .49°C in

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rectal and axillary temperature was found for the total group tested. high positive correlation (.9) was obtained using the Pearson Rho orrelation. Using ANOVA, the relationship was found to be highly ignificant at the .001 level.

Further support for the accuracy and use of the axillary site can e found in the literature. David (1983) concluded that the axillary eading (37.2°C- cutoff for fever) detected 93% of rectal fevers etween 38°C and 38.9°C and 100% of fevers higher than 39°C.

Kresch (1978) while agreeing that the axillary site is safer and isier in children, contends that the axillary site is not reliable for reening of fever. When the records of 108 children seen at an tpatient health center whose temperatures were taken both axillary d rectally or sublingually were reviewed, it was found that 14 of 21 ildren with fever documented by rectal or sublingual measurement had t been febrile by axillary measurement. Kresch (1978) reports the nsitivity of axillary temperature as 33.3%, specificity 97.7%, and sitive predictive value 78%.

Fruthaler (1985) suggests that the presence of fever can be ected by touch and that in most cases use of a thermometer is ecessary. Arguments both for and against subjective assessment of presence of fever in children can be made. Assessment of the sence or absence of fever without a thermometer may cause a delay in king care or result in inappropriate use of medical services. On other hand, routine temperature measurement with a thermometer, hough more precise, may contribute to "fever phobia."

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Banco and Veltri (1984) studied 303 patients between the ages of five days and 15 years in order to assess the ability of mothers to subjectively determine the presence or absence of fever in their children when compared with simultaneous temperature measurement by means of a thermometer. When the mother's assessment was compared to the child's oral or rectal temperature, the mothers who said their children were febrile were correct 52.3% of the time. Those who said their children were afebrile were correct 93.9% of the time. Therefore, a mother who says her child does not have a fever is usually correct. However, with only a 50% predictive value, a mother's assessment of the presence of fever is less meaningful.

The investigators concluded that the mother's subjective assessment is useful to decrease the probability of the presence of fever at all ages and identify high fevers in most young children. Banco and Veltri suggested that palpation is a reasonable screening method to determine which child should have his/her temperature measured by thermometer.

In a study challenging the reliability of palpation as a screening method for fever, Bergeson and Steinfeld (1974) compared the estimation of fever by palpation performed by nursing assistants with thermometer readings. Estimates were classified as no fever, low fever, or high fever. Temperatures were then measured with a thermometer, rectally for children less than three and one-half years and orally for all older children. Of the 138 with fever by thermometer reading, 42% were estimated to be afebrile. Among the 1,011 without fever, 1.8% were

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estimated to be febrile. The incidence of overestimation was found to be greater than underestimates ($p < .0001$).

Based on these findings, the investigators concluded that palpation as a screening method for fever was unsatisfactory. Bergeson & Steinfield (1974) suggested that the frequency of the finding of an unexpected fever of the sole factor alerting the physician to the presence of disease required further study.

Temperature measurement is an important component of the management of a child with a fever. Perhaps this aspect of fever management does not have to be adhered to as rigidly as once believed. The actual body temperature must not be considered in isolation but in relation to other signs and symptoms of illness.

When temperature assessment is indicated, site selection should be individualized to the child's age, development, and physical condition. In general, the axillary site is the safest, without significantly compromising reliability in the two month to four year old population. Palpation, especially by mothers, may be a satisfactory screening method for fever determination.

Antipyretic Therapy

Medications that have the ability to reduce fever are classified as salicylates (aspirin), aminphenols (acetaminophen, phenacitin), aryealkanoic acids (ibuprofen, naproxen), phenyl pyrazoles phenylbutazone), and indomethazone (Done, 1983; Gladtke, 1983; ovejoy, 1978; Temple, 1983). Because of the actual and potential

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toxic affects associated with the use of the other drugs, aspirin and acetaminophen have emerged as the antipyretic drugs of choice (Done, 1983; Gladtke, 1983; Temple, 1983). Both drugs have proven to be equally efficacious in achieving antipyresis (Done, 1983; Eden & Kaufman, 1967; Gladtke, 1983; Hunter, 1973; Lovejoy, 1978; Steele, Tanaka, Cara, & Bass, 1970; Tarlin, Lanarigan, Babineau et al., 1972). Certan clinical indications and contraindications may influence the selection of one drug over the other.

Until the last decade, aspirin was the most widely and longest use of the two drugs and, consequently, has accumulated the most adverse effects including gastrointestinal, irritation, clotting impairment, and allergic reactions. Furthermore, aspirin has the disadvantage of being available only in tablet form making it more nconvenient to administer to infants.

One advantage to the use of aspirin is the public's familiarity ith action, dosage, and side effects. In addition to it's antipyretic nd analgesic action, aspirin, compared with acetaminophen, has a nique antiinflammatory effect.

Despite the advantage of using aspirin as an antipyretic, an ssociation between the use of aspirin and the development and rognosis of Reye's Syndrome has been suggested by recent epidemiologic tudies. Case control studies, in which patients and their families th Reye's Syndrome were interviewed and compared to health and/or ill ontrol subjects, have been conducted (American Academy of Pediatrics, 82; Starko, Ray, Domiquez, Stromberg, & Woodall, 1980). Aspirin was

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reportedly given to a significantly larger proportion of Reye's patients than to control group subjects. Control subjects were more likely to receive acetaminophen than the study subjects. Starko, Ray, Domiquez, Stromberg, & Woodall, 1980) concluded that salicylate, in a dose dependent manner, appeared to be a possible cause of Reye's Syndrome, perhaps potentiated by fever. Increasing doses of salicylate seemed to be directly related to the severity of Reye's Syndrome. Based on these findings, the Committee of Infectious Diseases proposed that there is a "high probability that the administration of aspirin contributes to the causation of Reye's Syndrome" and "that aspirin should not be prescribed under usual circumstances for children with varicella or those suspected of having influenza on the basis of clinical or epidemiological evidence" (American Academy of Pediatrics, 1982, p. 812). Publicity of this possible association and the subsequent decrease in aspirin usage has resulted in a dramatic decrease in the number of Reye's Syndrome cases.

Acetaminophen has replaced aspirin as the number one drug of choice as an antipyretic (Brown, Fihrig, & Finberg, 1983; Haas, 1983). Acetaminophen has the advantages of being available in both liquid and tablet forms and has no cross-sensitivity with aspirin (Lovejoy, 1978). Because of the short term duration of its widespread usage, adequate data has not been collected regarding the long term adverse effects of acetaminophen therapy. In therapeutic doses, few side effects have resulted from acetaminophen. In cases of acute poisoning, hepatotoxicity and damage can result. Upon comparing the efficacy of

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reducing fever, side effects, and risks of toxicity, acetaminophen may be preferred over aspirin as an antipyretic agent in children.

When fever appears to be resistant to traditional pharmacologic intervention, alternative dosing of aspirin and acetaminophen has been recommended fever management. In a study combining aspirin and acetaminophen, using the same dose as with each drug alone, a more sustained antipyretic effect with no increase in toxicity was demonstrated (Steele et al., 1970). Done (1981) cites problems using aspirin and acetaminophen concomitantly and alternatingly. The presence of salicylate increases susceptibility to the hepatotoxicity of acetaminophen. Conversely, more aspirin stays in the body as aspirin rather than salicylic acid in the presence of acetaminophen. It is the aspirin moiety rather than salicylic acid that impairs platelet function in the clotting mechanism. The conclusion is that alternating or concomitant dosing of two antipyretics is not necessary (Temple, 1983) and may even result in adverse effects (Done, 1981).

An important issue to explore is dosing if acetaminophen is recommended as the drug of choice for reducing body temperature in children. Labeled doses of antipyretics have been considered to be subtherapeutic and excessively frequent (Done, 1983). Subtherapeutic doses of antipyretic medications may actually encourage parents to increase the dose and/or frequency in order to obtain the desired effect. Excessively frequent dosing can result in inadvertent overdosage.

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Optimal temperature reduction occurs with acetaminophen doses in the range of 10-15 mg/Kg given at four hour intervals (Temple, 1983). When compared with a dosing schedule a 5 mg/Kg, the increased dose of acetaminophen resulted in a maximum temperature decrement and an increase in the duration of antipyretic effects. Although not included on package labels, doses based on body weight are the most accurate and practical means for determining the appropriate dose for the individual child. However, this dosing method can also be applied safely to an age related dosing schedule for convenience and consumer utilization.

The effectiveness and merits of routine antipyretic therapy in children remain controversial (Done, 1983; Hunter, 1973). The decision to recommend antipyretic therapy must take risk/benefit issues of both aspirin and acetaminophen into consideration. In view of recent epidemiologic studies, the risks of aspirin may exceed the benefits in the treatment of childhood fever. Because of the relatively low risk associated with acetaminophen, it is currently the drug of choice for alleviating the signs and symptoms associated with febrile childhood illness.

Sponging

The traditional antipyretic measure of tepid sponging is still used and recommended despite improved understanding of body temperature regulation, the pathogenesis of fever, and the mechanism by which antipyretics reduce fever (Donahue, 1983; Griffin, 1986; Newman, 1985). Physical removal of body heat alone, which is accomplished by sponging,

is ineffective in lowering elevated body temperature resulting from an infectious process because it does not affect the elevated hypothalamic thermoregulatory set point.

Simulating the way sponging is done in an outpatient department, Newman (1985) conducted a study to evaluate the efficacy of sponging in reducing body temperature in febrile children. Children, age three months to two years with temperatures of 39.0°C or higher, in the treatment group, received continuous sponging of the head, face, and body in a basin of tepid water for 20 minutes. Temperatures were rechecked 30 minutes after they received sponging or 50 minutes after their admission temperatures were taken. Control group children were undressed to their diapers but did not receive sponging. Their temperatures were retaken 50 minutes after admission. The rectal site was used in all patients with a mercury thermometer. Children who had not received antipyretic medication or had received an inadequate dose in the four hours before admission received 5-10 mg/Kg after the initial temperature reading. No medication was given if the child had received an adequate dose of antipyretic in the four hours prior to admission.

The mean temperature change for the treatment group was .06 $\pm$ .61 (SD) and -.92 $\pm$ .57 for the control group. Using the t test of independent means with a two-tailed test of significance, no statistically significant difference was found at or below the .05 level between the treatment and control group with respect to initial temperature, temperature change, and interval between the temperature

easurement. The hypothesis that sponging febrile children treated ith antipyretics does not lower the temperature significantly was upported. Furthermore, the investigator concluded that sponging, the ay it was done in the emergency department, did not lower body emperature below that achieved with antipyretics alone. Newman (1985) ecommended that sponging be abandoned as ineffective and impractical n reducing body temperature in febrile children whose fever is ttributed to infection.

In an earlier study, Steele et al. (1970) compared the ffectiveness of three types of solutions used for sponging (tepid ater, ice water, and equal parts 70% isopropyl alcohol and tepid ater) and the combined effects when each was used with acetaminophen. ponging alone with tepid water was found to be effective in lowering he temperature to 39°C but less effective for further decrease. ponging with ice water or alcohol and water combined with etaminophen resulted in the greatest temperature reduction but reater discomfort.

Hunter (1973) tested the efficiency of five antipyretic regimens: placebo; 2) aspirin; 3) acetaminophen; 4) acetaminophen and tepid onging, and 5) tepid sponging alone. Tepid sponging alone caused a 1°C reduction in temperature at one and one-half hours compared with 5°C with acetaminophen, 1.2°C with aspirin, and 1.6°C with etaminophen and sponging.

Aynsley-Green (1975) cautions against the indiscriminant use of nging in febrile states. Childhood fever is often associated with

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unrecognized dehydration resulting in a reduced circulating blood volume which causes peripheral vasoconstriction preventing heat loss. Tepid sponging causes further vasoconstriction and heat retention. Fluid replacement should be implemented to restore circulating blood volume in the prevention and treatment of childhood fever.

Because of the pathophysiology of fever caused by an infection and the mechanism by which sponging reduces body temperature, sponging alone is not effective in treating fever. Furthermore, sponging may actually increase the body temperature by causing vasoconstriction and shivering. For temperatures over 104^{o}F that have not responded to antipyretics after one-half hour, however, sponging with tepid water has been suggested (Schmitt, 1984).

Educational Intervention for Parents

If health care providers are to overcome the misconceptions and fear parents have about childhood fever and fever management, effective strategies must be identified, developed, and implemented, that will affect both a change in parental knowledge and behavior. Starfield, Steinwachs, Morris, Bause, Seibert, and Westin (1979) suggest that greater awareness of parental concerns is associated with greater satisfaction and compliance and better results of care. A lack of congruency related to problem identifications and expectations between the health care provider and parent leads to decreased satisfaction and reduced compliance with the management of health care problems. Attempts to eliminate incongruence using educational intervention have

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proved inconclusive (Casey et al., 1984). This lack of success may be attributed to the client's perception of the problem, communication problems between the provider and client, lack of provider knowledge about the client's environment, knowledge, and behavior, and problems with strategy planning and the particular intervention strategy employed. Educational intervention studies related to parent-child health concerns will be reviewed.

Casey et al. (1984) developed an active approach to educational intervention for fever therapy for parents in a private practice group. They combined an initial assessment, educational intervention, reinforcement, and evaluation of their effectiveness on parental management of fever. Parental participation was encouraged through the use of demonstration techniques. A printed reinforcement sheet summarizing the informational content was used to sustain the effect of the intervention.

One hundred six parents of 108 children age six months to four years scheduled for a routine well child visit over a 12 month period participated. Following their appointment, parents were interviewed to assess their knowledge about the definition of fever, use of antipyretics, and usual management of fever in their children. Parents were then asked to keep an illness record describing their behavior in response to their child's illness over a two month period. The illness record included a symptom check list, a temperature graph, a medication chart, and a question about physician contact.

Fifty-three parents in the treatment group met with a research assistant for the educational intervention which lasted approximately 20 minutes. The components of the intervention were: 1) the minimum temperature considered to be a fever; 2) temperature measurement; 3) appropriate doses of acetaminophen; and 4) situations requiring physician contact. Two months later, a printed informational reinforcement was mailed to parents in the treatment group. After four months, changes in knowledge were measured by interviewing all parents by telephone using a questionnaire similar to the initial questionnaire. Behavior changes were determined in terms of the appropriateness of physician contact and the use of antipyretics reported in illness records and chart audit.

No significant sociodemographic differences were found between the intervention and control groups which reflected a relatively well educated group with small intact families. The majority of parents were misinformed about some aspect of fever management, unable to define fever accurately, and did not know the appropriate indication, dosage, or frequency of antipyretic therapy.

The percent of physician visits rated inappropriate for the intervention group was 9.5 compared with 38.5 in the control group. The p value calculated directly by Fisher's exact test was .05. Inappropriate telephone calls to the physician were 26.1% in the intervention group and 56.3% in the control group ($p \leq 0.2$). In 12.7% of the intervention group, antipyretic use was inappropriate compared with 42.6% of the control group. Chi Square with Yates correction was

used to calculate the p value for antipyretic use which was $< .005$ ($X^2 = 31.70$).

Following interview and assessment, both the control and treatment groups showed evidence of an increase in knowledge. Furthermore, the intervention group also demonstrated changes in their behavior in managing fever which was not seen in the control group. The intervention group managed febrile episodes more appropriately as evidenced by fewer inappropriate physicians contacts (phone calls and visits) and fewer incorrect doses of antipyretics. The active approach to educational intervention used by Casey et al. (1984) was successful in increasing parental knowledge and effecting appropriate behavior changes in the management of childhood fever.

Other experimental research studies have demonstrated that educational intervention strategies with parents have been effective in improving knowledge and changing behavior to varying degrees. Physician efforts at parental education and counseling regarding child development demonstrated some positive effects on maternal function (Chamberlain, Szumowski, & Zastowny, 1979, 1980). Using one way analysis of covariance, the significance of difference between low, medium, and high level of M.D. input was .026 for gain in knowledge, .028 for use of positive contact, and .000 for feeling helped by the M.D. Mothers reported more positive contact with their child and more feeling of being supported in the childrearing role when the pediatricians made at least a moderate effort to provide parental education and counseling. However, no significant differences were

found on the number of maternal concerns about or reported conflicts with the child, the mother's perception of how difficult the child was to rear, or the mother's perception of overall functioning. In fact, mothers receiving a high level of physician input reported more behavioral problems with their children. The amount of physical input was not related to childhood developmental status.

Physicians practicing with nurse practitioners had higher teaching scores than other physicians, but the scores were not significantly different. Mother receiving well child care from practices with nurse practitioners also had a higher mean score for gain in knowledge and reported more use of positive contact with children. However, only the fact that mothers felt more supported in the childrearing role achieved a level of statistical significance.

Educational intervention by pediatricians has been reportedly successful in changing parental behavior related to proper infant car restraint use but the effect diminished over time (Reisinger, Williams, Wells, Johns, Roberts & Podgainy, 1981). At the one month newborn well child visit, correct restraint use was observed to be 23% higher in the experimental group (38% vs 31%); 72% higher at the two month visit (50% vs 29%); 9% higher at the four month visit (47% vs 43%); and at 15 months it was 12% higher (56% vs 50%). The smaller increment of effect of the education at four and 15 months resulted from increases in restraint use by the comparison group. The effect of the education was to influence those parents who would normally restrain their children to do so at an earlier age.

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Advice given to parents by public health nurses about child care was reported by mothers to provide reasonable solutions to practical problems (Lauri, 1981). Prior to the educational intervention, there were no statistically significant differences in the parent's actual child care and education between the experimental and control groups. The intensified guidance provided by the public health nurse may have assisted the experiment group to apply their knowledge to the practice of child care.

Education intervention strategies have proven somewhat successful in altering parental knowledge and affecting parental behavior despite the fact that a change in behavior does not necessarily accompany a change in knowledge. an active approach involving parental participation and reinforcement has been shown to be the most effective strategy. However, the effects of an education intervention tend to become diminished over time.

Discussion

The present study is based on a number of factor identified in a view of the literature pertaining to childhood fever. "Fever phobia" been identified as a common problem among parents. This phenomena exists among parents seeking health care from a variety of sources. Parents in both the lower and middle socioeconomic classes have been found to experience fears and misconceptions related to childhood fever. Young age of the index child, absence of other children in the household, and higher temperatures were not found to be associated with

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greater degrees of parental "fever phobia." "Fever phobia" may, to some extent, be a learned phenomenon. At least one contributing factor to "fever phobia" is the message that health care providers convey to parents through their instructions and actual management of childhood fever.

Because parental "fever phobia" may lead to inappropriate fever anagement, efforts should be expended to reeducate parents about the efinition, significance consequences, and appropriate treatment of hildhood fever. With the exception of one recent randomized trail by asey et al. (1984), which demonstrated the effectiveness of an ducational intervention in changing parental knowledge and behavior elated to childhood fever, little research has been done to address he problem of "fever phobia." Because "fever phobia" is recognized as response to disease, it is an appropriate health care problem for rsing intervention. Education and counseling are two roles or nctions within the domain of the nursing profession. Using the work Casey et al. (1984) as a model, the emphasis of the present study is the impact of a nursing educational intervention on parental owledge and behavior in the management of childhood fever.

Fever, as an adaptive bodily response to infection, is the primary umption upon which the educational intervention and management ommendations are based. Changing parental misconceptions about er as a harmful effect of illness to the appropriate perception of er as a beneficial response to infection may effect a change in ental behavior in the management of childhood fever. Fever

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management techniques should reflect this philosophy rather than undermine it. Treatment of childhood fever should be based on scientific rational rather than ritual.

A great deal of discussion and controversy surrounds the available fever treatment methods including temperature measurement, antipyretic therapy, and sponging. The goal of fever management should be to facilitate the adaptive response and relieve the discomfort associated with fever. Safe and effective treatment methods based upon scientific rationale were extrapolated from the literature and synthesized into recommendations for treating febrile episodes. Research comparing the rectal and axillary sites for temperature measurement resulted in the recommendation of the axillary site as being safe and accurate for identifying the presence of fever. Supportive measures such as increasing fluid intake and facilitating health loss by removing excess clothing are suggested as the first lines of fever management. If these measures are ineffective in keeping the child comfortable, antipyretic/analgesic therapy and further assessment of the child is recommended. Research on the safety, effectiveness, and dosage of antipyretics indicates that acetaminophen is the drug of choice for treating childhood fever. Sponging has been found to be ineffective in managing childhood fever due to infection.

Most articles or research studies deal with aspects of childhood fever and fever management separately. However, in Schmitt's (1984) article, issues related to childhood fever including the incidence of childhood fever, "fever phobia," definition and causes of fever,

temperature measurement, benefits of fever, harmful effects of fever, fever treatment, recommendations for children with febrile seizures, seeking medical attention, as well as techniques and results of parent education are presented along with a discussion of the scientific basis of each issue. Schmitt's (1984) recommendations provide the basis for the informational content of the educational nursing intervention for the present study.

Certain limitations exist in the literature that has been reviewed for this study. Established instruments for the collection of parental knowledge and behavior data have not been developed. Parental knowledge has been measured by different questionnaires in each study. The reliability and validity of these instruments have not been reported.

Although "fever phobia" has been identified and the findings confirmed, there is a deficit of information about sociodemographic and clinical correlates. More descriptive data is needed in order to clearly delineate the origin and scope of this problem.

Because of the limited work done in the area of experimental intervention related to parental education, it is not yet possible to determine which educational methods are effective and which outcomes measures are appropriate. In the one educational intervention study specifically addressing "fever phobia," parental behavior was measured in terms of the appropriateness of physician contact and self-reported use of antipyretics. Data concerning the relationship of parental knowledge and behavior following the intervention was not reported.

Nurses and physicians are reported to be a major source of information about childhood fever for parents. Because physicians and nurses may contribute to parental "fever phobia," it would be helpful to investigate what health care providers themselves know and do about childhood fever. Except for one study pertaining to pediatric house officers, data pertaining to this issue is lacking in the literature.

One distinctive characteristic of the literature reviewed for this study is its timeliness. Literature pertaining to parental knowledge and childhood fever is relatively current. Schmitt's (1980) identification of "fever phobia" has obviously inspired further research and opinion-based literature. The most up-to-date information about all aspects of fever management is currently available in medical and nursing publications.

Parental management of childhood fever is an age old problem. The problem has been recognized in clinical practice and documented through scientific research. Information pertaining to childhood fever and fever management in the current medical and nursing literature serves as a guide for future research.

Summary

Despite an increase in scientific knowledge about the pathophysiology of fever and all areas of fever management, health professionals have been largely unsuccessful in synthesizing this knowledge, applying it in clinical practice, and communicating it to parents. For the most part, parental knowledge of fever and the

components of fever management have been dealt with separately in both medical and nursing literature.

The pathophysiological basis of fever as an adaptive response is being widely disseminated in pediatric, general patient care, and critical care publications. It has been documented that fever management is not always guided by the pathophysiological mechanisms of fever in clinical practice. In fact, the issue of whether or not to treat fever continues to be debated.

Parental misconceptions about childhood fever is well documented in the medical research literature as "fever phobia." Further research and opinion-based medical and nursing literature has been fostered by these studies. Recommendations for clinical practice and parent education have also been proposed based on these findings.

Site selection in temperature assessment is perhaps the most thoroughly studied component of fever management. It is the subject most frequently addressed in nursing research literature. Once again, in clinical practice, the issues remained unresolved.

Antipyretic therapy is acknowledged as the treatment of choice when the fever is due to an infectious process for the purpose of relieving associated discomfort. When the two most popular antipyretics, aspirin and acetaminophen, are compared in terms of efficacy, side effects, and risk of toxicity, it appears that acetaminophen is currently the drug of choice for treating febrile children.

The appropriate place for tepid sponging in controlling febrile

needs to be implemented in clinical practice and transmitted to parents.

Several studies have been conducted to evaluate the effectiveness of educating parents, especially mothers, in relation to a number of child care issues. Only one such study could be found addressing the specific problem of childhood fever and fever management. This particular study was effective in increasing parental knowledge and affecting behavior. In other studies, health care providers have been able to demonstrate that education interventions have resulted in an increase in parental knowledge and change in parental behavior to varying degrees.

In the present study, the prevailing concepts of childhood fever and the most efficacious techniques for fever management were extrapolated from the literature and synthesized into a single educational intervention for teaching parents with children between the ages of two months and four years of age. It was anticipated that active parent and nurse interaction and participation would facilitate the learning process and the knowledge gain would be reflected in actual behavior.

Research methodology used in this study will be presented in Chapter IV. Study design, subject selection, instrument development, data collection, scoring, and statistical analysis will be discussed there.

CHAPTER IV

Methodology

Overview

In this research, an attempt is made to determine the impact of rsing intervention on parental knowledge and behavior in the nagement of childhood fever. Parental knowledge and reported navior are the dependent variables. The treatment or independent riable is the educational nursing intervention. Statistical ferences will be made based on the data analysis.

The purpose of this chapter is to describe the research hodology used in this study. The sample, data collection sites, trument development, intervention, data collection, scoring, tistical analysis, and reliability and validity of the measures are cussed.

Hypotheses

In order to test the hypotheses of this study, they have been tated in the null form.

Hypothesis I: There will be no difference in knowledge about childhood fever and fever management demonstrated between parents receiving the nursing intervention and those parents not receiving the intervention.

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ypothesis II: There will be no difference in the appropriateness of fever management behavior between parents receiving the intervention and those parents not receiving the intervention.

pothesis III: There is no relationship between knowledge of childhood fever and reported parental behavior in the management of childhood fever.

Sample

Participants in the study were a volunteer convenience sample of parents. Subjects were recruited from parents seeking treatment for eir child at an ambulatory care department and immunization clinic at county health department during the last summer of 1986. Criteria selection are listed:

The parent must have at least one child between two months and four years of age.

The child must not be allergic to aspirin or acetaminophen.

The child must not have any chronic disease of a debilitating nature.

There must be no immediate family history of febrile seizures.

The parent must be able to speak, read, and write in English.

The family must be able to be contacted by telephone.

to the voluntary nature of sample selection, the results of the ly can be generalized only to parents processing characteristics lar to those of the study sample.

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Data Collection Sites

Two agencies were utilized in the selection of participants for this study. Both sites are located in a midwestern county with a population of approximately 150,000. One agency was an ambulatory care department of a 300 bed community hospital providing emergency and walk-in services. A county health department serving the same community and providing a weekly immunization clinic was the other agency. Written approval was obtained from the administrations of both agencies for the purpose of recruiting study participants (see Appendix A).

Operational Definitions

Parent: Parent is defined as the biological or legal mother, father, or guardian who assumes responsibility for the care of the child.

Knowledge: Knowledge is defined as the score obtained on the pre and post fever questionnaire.

Fever: To be considered febrile, the body temperature is defined as greater than or equal to 100.4°F rectally, greater than or equal to 100°F orally, or greater than or equal to 99.6°F axillary.

Childhood: For the purpose of this study, childhood is defined as between two months and four years of age. Both male and female children are included.

Behavior: Behavior is defined by an appropriateness score of self-reported activities performed by the parent in the actual management of a child's fever. Behavior will be judged as appropriate

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inappropriate by comparing the reported behavior to specific commendations for fever management specified by Schmitt (1984).

Instrument Development

The instruments used in this study were developed by the vestigator based on a review of the literature. A sociodemographic stionnaire was designed to elicit information abut the parent's sex, , education, occupation, income, number and ages of children, source health care, source of knowledge about fever, and prior experience h febrile childhood illness. A knowledge pre/posttest was designed adapted from previously conducted studies (Casey et al., 1984; mer et al., 1984; Schmitt, 1980; Wagner et al., 1984). Both truments were piloted for clarity using 20 individuals who did not ticipate in the study (see Appendix B).

As a component of the treatment, a fever information and truction guide was prepared. The information and recommendations fever treatment were selected and synthesized from current medical erature (Schmitt, 1984). Suggestions for fever treatment were based he safety and effectiveness of the method (see Appendix C).

A self-reported record of fever management was developed to ect and analyze information about parental behavior during a ile episode (see Appendix D). The diary has been found to be an ctive research instrument in the study of health and illness vior (Roughman & Haggerty, 1972).

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Intervention

Using a table of random numbers, parents were randomly assigned to the control or experimental group as they were identified as eligible participants and agreed to participate in the study. Using the last two digits of the five-digit random numbers, the first 40 numbers less than 81 chosen were assigned to the experimental group. The remaining 40 were assigned to the control group.

The treatment consisted of an educational intervention in which the investigator visited individually with the parent or guardian responsible for providing care to a child during a febrile episode. Parents in the experimental group were contacted within one week of enrollment by phone and arrangements were made for the time and place of the home visit at the parent's convenience. The parent was again contacted by phone within 24 hours prior to the visit to confirm the appointment. In the event that the previously arranged appointment was not convenient at the time of the confirmation call, another appointment was arranged. On three occasions, parents were not found to be home at the scheduled time. The family was then contacted by phone within 24 hours to reschedule the appointment.

An instructional format was followed during each home visit which lasted approximately 30 minutes. Prior to beginning the actual instruction, the investigator prepared the participant for the experience by discussing in general the problem of parental understanding and management of childhood fever. The investigator's purpose for conducting the study was also discussed. Parent's active participation in the discussion was encouraged by inquiring about

oblems and questions they may have experienced under similar
rcumstances.

The informational content of the intervention was introduced to
e parent as recommendations for safe and effective methods they could
e to manage episodes of childhood fever at home. Using the fever
formation and instruction guidelines prepared by the investigator,
e investigator addressed four topics. First, the nurse researcher
esented general information about body temperature regulation and
ver. Fever was described as the body's normal response to infection.
80% to 90% of the cases, fever is usually due to a self-limiting
ral illness. The normal body temperature was defined for parents as
.6°F. Normal variations in body temperature caused by the time of
, exercise, environmental temperature, type of clothing, and
gestion of warm foods and fluid were discussed. The numerical values
fever according to the site of temperature measurement were stated.
er indicators of childhood illness such as activity, alertness, and
etite were presented.

Second, temperature measurement was discussed. The purpose of
perature measurement, which is to determine the presence of an
vated body temperature, was discussed. The frequency of temperature
surement was also discussed. Checking the child's temperature two
three times daily (taking diurnal variations into consideration)
le wake was recommended. Waking a sleeping child to check his/her
perature was not recommended. Disadvantages of both the oral and
al sites for temperature measurement were stated.

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Specific methods used in the management of childhood fever were iiscussed along with the purpose of treatment. Supportive, symptomatic neasures were recommended as the first line of treatment for fever. ncreasing fluid intake was recommended for preventing the potential omplications of dehydration. Avoidance of excessive clothing was ecommended to facilitate the dissipation of body heat. Both measures acilitate comfort.

The administration of antipyretic medication, specifically cetaminophen, was recommended for temperatures in excess of $102^{0}F$ ssociated with discomfort. Recommendations for dosage was based on ody weight. The recommended frequency for antipyretic medication is very four hours while awake. The action of acetaminophen was iscussed. The potential relationship between aspirin and Reye's yndrome was presented. Potential adverse reactions of both aspirin nd acetaminophen were cited.

Sponging as a means of temperature reduction was also discussed. he mechanism by which sponging reduces body temperature was stated. ndications for sponging, one-half hour after the administration of etaminophen, were presented. Recommendations for the type and mperature of solution, frequency, and duration of sponging were ven.

Finally, indications for seeking medical advice and/or treatment re discussed. A fever information and instruction guide was left th the parent for future reference. Parental questions were again couraged and answered at the end of the discussion.

Parents in the control group received no information regarding ldhood fever and management from the nurse researcher. Parental lerstanding and management was based on their previously or ncurrently acquired experience and information from other sources.

Data Collection

Based on the criteria for selection, parents seeking service at e health department immunization clinic were approached regarding the udy participation directly by the investigator or an assistant. The sistant was a Registered Nurse who had been informed in detail about e nature and process of the research study. The investigator or the sistant first introduced herself to the parent and explained that the vestigator was conducting a study about childhood fever in partial fillment of a Master's Degree in Nursing. The parent was then asked they would be willing to consider participating in the study. If ents were interested, they were given a letter of explanation to d and retain. Questions regarding the explanation of the study were ouraged and answered by the investigator. If the parent agreed to ticipate, he/she then read and signed a consent form which was urned to the investigator (see Appendix E). Next, the participant leted a sociodemographic questionnaire which was marked with an tifying code number and collected in an unmarked envelope. lly, the participant was given the fever knowledge pretest, marked the corresponding code number, in a stamped, self-addressed lope to complete at home and return to the investigator within days.

Participant recruitment and initial data collection at the ambulatory care department was similar to that at the health department. Recruitment was conducted by registered nurses triaging parents presenting their child for ambulatory care. Ambulatory care department nurses participating in triage were instructed in group and individual meetings on the purpose of the study and the procedure for recruiting study participants. Following the instructional meetings, a written letter of explanation was left in each nurse's mailbox as a reinforcement (see Appendix F). The procedure for recruiting subjects, which included the criteria for selection was also posted in the triage area. Families bringing children in the appropriate age range for treatment of a febrile illness or an illness with fever as a related symptom were approached for participation in the study. The procedure for enrolling a family in the study was the same in the ambulatory care department as at the immunization clinic.

In appreciation for their participation, participants were given an age appropriate sample of Tempra and a bulb tipped glass mercury thermometer. As subjects were enrolled in the study, their name, address, and phone number were recorded on a log sheet along with their identifying code number. This information was necessary for future contact of study participants. A frequency count was kept of those parents refusing to participate in the study so that the percent of participants could be calculated.

Sociodemographic questionnaires were reviewed by the investigator upon receipt. Families with a history of febrile seizures and children with debilitating chronic diseases were identified and notified of

their exclusion from the study. Receipt of fever questionnaires was recorded on the log. Reminder post cards were mailed to those participants who had not returned their questionnaires within one week following enrollment.

In late September, 1986, all subjects received information and materials, marked with their corresponding code number, necessary for collection of fever management data. A packet containing instructions, ten fever records, five stamped, self-addressed return envelopes, and five slips of paper stating the children experienced no febrile episodes was mailed to subjects (see Appendix G).

Study participants were instructed to complete a fever record for the first 24 hours of each fever episode experienced by each child age two months to four years beginning October 1, 1986 and ending February 28, 1987. Subjects were instructed to call the investigator in the event that they required more fever records. Each fever episode was considered to be separated from the previous episode of fever by at least 72 hours without fever. At the end of each month, the parent was to return all fever records or the slips that the child did not experience a fever to the investigator in one of the envelopes provided. A reminder postcard was mailed to all participants not returning fever records within one week following the end of the month reminding them to return fever records or statement of no fever to the investigator.

One week prior to the end of data collection in February 1987, posttest fever questionnaires were mailed to all participants for completion with instructions to return the posttest with fever records

or statements of no fever at the end of February. A note of thanks was included with the posttest. Participants were also informed at that time that they would receive study results upon completion of the data analysis (see Appendix H).

In October, 1987, all study participants were sent a letter explaining the results of the study. For those parents not receiving the intervention, a copy of the fever information and instruction guidelines was enclosed (see Appendix I).

Measurement

Parental knowledge was measured both pre and posttest in the experimental and control groups. An arbitrary score of zero was assigned to incorrect responses and a score of one to correct responses. Upon receipt of pre and posttest knowledge questionnaires, the questionnaire were scored. Scores were totalled and an overall individual knowledge score was obtained ranging between zero and 21. Mean knowledge scores were then calculated for control and experimental groups pre and posttest.

Parental behavior was measured by parent reported fever records. Individual behavior items were considered appropriate or inappropriate based on the information and instruction guidelines provided during the educational intervention. Appropriate behavior was assigned a score of one and inappropriate behavior a score of zero. An overall appropriateness score was determined by totaling the item scores with a possible range of zero to ten.

In the event that more than one episode was reported by a single family, one episode was selected randomly for scoring. Experimental and control group data was then based on the number of fever episodes reported by each group. A mean appropriateness score was calculated for each group.

Reliability and Validity

The knowledge pre/posttest was developed by the investigator and adapted from questionnaires used in previous studies. The reliability and validity of the instruments used in previous studies were not reported. The behavior instrument was also developed by the investigator.

Reliability of the knowledge instrument, an estimate of the internal consistency or homogeneity of the knowledge items, was determined following data collection. Coefficient alpha, which is the consistency of the scores of a group of individuals across items on a single test, was chosen for estimating the reliability of the knowledge measure because it measures the extent to which a response to any one item on the knowledge test is a good indicator of the response to any other item on the same knowledge test. Reliability of the instrument is also indicative of the extent to which all items are measuring the same concept.

In order to establish the reliability of the present knowledge instrument, regional knowledge variables were grouped according to the concept of knowledge they were thought to measure such as general knowledge, temperature measurement, etc. Alpha coefficient was

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computed on each group of variables to determine the reliability among these items. However, these alpha coefficients were relatively low, indicating a great deal of variation of responses among these groups of items.

In an effort to improve the reliability of the instrument, all new variables were listed along with the percent of correct and incorrect responses and missing values. Variables with no variance and those with greater than or equal to 90% correct or incorrect responses were eliminated. An all item correlation table was computed on the remaining variables. The correlation table was examined and variables with correlations of greater than or equal to 2.0 were included in a new group of variables. These new groups were then reexamined and consistent patterns of relationships were identified.

Alpha coefficient was again run on the new groupings. In the event that elimination of a certain variable would improve the reliability, the variable was deleted. Results of reliability test will be reported in Chapter V.

The establishment of validity or the degree to which the pre/post knowledge test accurately represent parental knowledge and the fever record actually represents parental behavior is difficult to establish. Face validity of the knowledge pre/posttest is supported by the fact that the instrument is representative of similar instruments used in previous studies to determine parental knowledge regarding fever. Face validity also applies to the self-reported record of parental behavior. Coughman and Haggerty (1972) found the diary to be an effective research instrument in the study of health and illness behavior.

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Although self-reported behavior may not reflect actual behavior, because of the anonymity of parental responses, there is no reason for parents to intentionally falsify their behavior.

Furthermore, content validity of both the knowledge and behavior instruments has been supported through the process of thesis committee review and approval. Three of the four committee members have clinical expertise in pediatrics, one of whom has conducted research in the area of body temperature elevation in response to DPT immunization.

If Hypothesis III had been supported by statistical analysis and a positive relationship between parental knowledge and behavior in the management of childhood fever had been established, predicative validity could not have been established. Because this hypotheses was not supported, predictive validity cannot be claimed.

Statistical Analysis

Sociodemographic data was analyzed using descriptive statistics. Tables summarizing frequencies and percentages of sociodemographic characteristics are presented in Chapter V.

Hypothesis I

Parents receiving the nursing intervention will demonstrate greater knowledge about childhood fever and fever management than parents not receiving the intervention. Because this study is a pre/posttest control group design, the change in the posttest knowledge score of the experimental group over and above the change that occurred in the control group score can be attributed to the experimental treatment. The level of statistical significance was set at .05. T-

test was chosen for statistical analysis. A comparison was made between the difference of the posttest mean scores of the experimental and control groups. Due to the attrition of subjects at the time of posttest, a smaller number of valid cases was available for analysis than was originally anticipated.

Hypothesis II

Parents receiving the nursing intervention will report more appropriate fever management behavior than those parents not receiving the intervention. The significance of difference in appropriateness of fever management behavior between the experimental and control groups was determined by a t-test. Parents not reporting any fever episodes were not included in this analysis.

Hypothesis III

There is a positive relationship between parental knowledge of childhood fever and reported parental behavior in the management of childhood fever. The relationship between parental knowledge and behavior was determined using bivariate correlational statistics. Because both parental knowledge and behavior were expressed as interval scores, the Pearson Product Moment Coefficient r was used to determine the degree of relationship between knowledge and behavior. In order to be included in the statistical analysis of data related to this hypothesis, participants completed and returned all data, including the knowledge posttest and a report of at least one fever episode.

In controlling for the degree of risk of making a type I error in testing the null hypothesis, the level of significance for statistical

statistical analysis was established at the .05 level. Results of statistical analysis will be reported in Chapter V.

Protection of Human Rights

Guidelines specified by the MSU Human Subjects Review Committee were followed in order to insure the protection of the rights of study participants. Approval of the Committee was granted on June 30, 1986. Approval for clinical investigation was granted by the ambulatory care department and the county health department for recruitment of study participants beginning August 1, 1986 (see Appendix J).

Participants were informed of the nature and purpose of the study and assured of confidentiality at the time of enrollment using a letter of explanation and consent form. Number coded questionnaires and fever records were separated from subject identifying data by the investigator prior to data compilation and analysis. All data were reported in aggregate form.

Summary

Methodology employed in this study was presented in Chapter IV. The study sample, data collection sites, instrument development, intervention, measurement, statistical analysis, reliability and validity, and protection of human rights were discussed in detail.

In Chapter V, data obtained in the study will be presented and results analyzed and interpreted. Sociodemographic characteristics will be described and descriptive statistics relating to parental knowledge and behavior will be reported. Inferential statistics

related to each hypothesis will be presented. Results of statistical analysis will be interpreted. Implications of the findings will then be discussed. A summary of hypothesis acceptance will conclude Chapter V.

CHAPTER V

Data Presentation

Overview

The purpose of this chapter is to present an analysis of data and discuss the interpretation of the results. In this chapter, data which describe the study population and relate to the research hypotheses are presented. Descriptive statistics are used to describe the study sample in terms of relationship to the child, race, marital status, education, occupation, income, number and ages of children, past experience with fever episodes, source of health care, and previous education in relation to the management of childhood fever. Data relating to the research hypotheses are based on scores generated from pre and post knowledge tests and self-reported fever management records.

The data were analyzed using several statistical analysis techniques. Descriptive statistics employed included frequencies, percentages, means, and ranges. T-test was the inferential technique applied to reach Hypotheses I and II. Hypothesis III was analyzed using Pearson Product Moment Correlation. The data are presented in the following sequence: 1) descriptive analysis of the study population as a whole; 2) descriptive analysis and comparison of the experimental and control groups according to sociodemographic variables; 3) reliability analysis of the knowledge instrument; 4) descriptive analysis of knowledge items; 5) descriptive analysis of behavior items; 6) inferential statistics; and 7) analysis of other predictive dependent variables.

Presentation of the data will be followed by an interpretation of the results of the statistical procedures. An explanation of the findings will be provided. Relationships between the current data and that of previous studies and theory will be discussed. Conclusions based on data analysis will be stated. A summary of the research hypotheses will conclude this chapter.

Descriptive Analysis of Data

Study Sample

One hundred ten parents were approached regarding participation in this study. Twenty-seven percent (n = 30) refused.

The study sample consisted of 80 parents of children between two months and four years of age. These parents were seeking treatment for their children at an ambulatory care department or a health department immunization clinic.

Sociodemographic Descriptors

Relationship to the child, race, marital status, education, occupation, income, number and ages of children, past experiences with fever episodes, source of health care, and previous education in relation to the management of the childhood fever were the sociodemographic descriptors used in this study. Mothers represented the majority of parents participating in this study (see Table 1).

Eighty-seven and one-half percent (N = 70) of the study sample was Caucasian. The Black race comprised 10% (N = 8) of the sample. The remaining 2.5% (N = 2) was distributed evenly between Hispanic and other racial categories (see Table 2).

Table 1: Number and Percentage Distribution of Relationship of Parent to Child

Relationship	N	Percent
Mother	73	91.2
Father	6	7.5
Guardian	1	1.2
TOTAL	80	100.0

Table 2: Number and Percentage Distribution of Race of the Parent

Race	N	Percent
Caucasian	70	87.5
Black	8	10.0
Hispanic	1	1.2
Other	1	1.2
TOTAL	80	100.0

The majority of parents studied, 72.5% (N = 58) were married. Approximately 16% (N = 13) of the parents reported never having been married. Five percent (N = 4) and 6.3% (N = 5) of the parents respectively were either separated or divorced (see Table 3).

Table 3: Number and Percent Distribution of Parental Marital Status

Marital Status	N	Percent
Married	58	72.5
Never married	13	16.2
Divorced	5	6.3
Separated	4	5.0
TOTAL	80	100.0

Fifty-nine percent (N = 45) of the population reported having graduated from high school. Parents having less than a high school education comprised 13% (N = 10) of the subjects studied. Twenty-eight percent (N = 21) reported being educated beyond the high school level (see Table 4).

The largest percent of parents (44%, N = 33) reported their occupation as that of homemaker, housewife, or mother. Nine percent (N = 7) reported being teachers or secretaries. Unemployment was reported by 7% (N = 5) of the respondents. Other types of employment reported included a variety of skilled and unskilled occupations (see Table 5).

Table 4: Number and Percentage Distribution of the Highest Level of Parental Education

Highest Grade Completed in School	N	Percent
8th	1	1
9th	2	3
10th	2	3
11th	5	7
12th	45	59
1 year college	8	11
2 years college	5	7
3 years college	2	3
4 years college	2	3
Masters degree	4	5
TOTAL	76	100

Of 72 respondents, the largest percent of parents (21%, N = 15) reported their income to be less than $5,000 annually. Sixty-eight percent (N = 49) reported an annual income of less than $20,000. Twenty-six percent (N = 18) reported an income of between $20,000 and $40,000 per year. An annual income of more than $40,000 was reported by 7% (N = 5) of the subjects (see Table 6).

Table 5:

Occupatio
Housewife
Teacher
Secretary
Unemployed
Student
Laborer
Customer S
Self-emplo
Other*
TOTAL

*waitress, receptioni processing

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Table 5: Number and Percent Distribution of Parental Occupation by Title

Occupation	N	Percent
Housewife	33	44
Teacher	7	9
Secretary	7	9
Unemployed	5	7
Student	3	4
Laborer	3	4
Customer Service/Fast Food	2	3
Self-employed	2	3
Other*	13	13
TOTAL	72	96

*waitress, cook, cashier, optical lab technician, paramedic, receptionist, baker's helper, day care, nurse's aide, pastor, data processing, inspector, hearing aid specialist

The study sample consisted of 80 families with a total of 178 children. The number of children in each family ranged from one to six with a mean of 2.2 children per family. There were three children or less in 82% of the families (see Table 7).

Table 6: Number and Percent Distribution of Families by Income

Annual Income	N	Percent
$ 0 - $ 4,999	15	21
$ 5,000 - $ 9,999	11	15
$10,000 - $14,999	13	18
$15,000 - $19,999	10	14
$20,000 - $24,999	7	10
$25,000 - $29,999	4	6
$30,000 - $39,999	7	10
$40,000 - over	5	7
TOTAL	72	100

Table 7: Distribution of the Number and Percent of Children Per Family

Number of Children in Family	N	Percent
1	15	19
2	41	51
3	18	22
4	4	5
5	1	1
6	1	1
TOTAL	80	100

Ages of the children ranged from less than one year to 16 years of age. One hundred percent (N = 80) of the families had an only or youngest child who was less than four years of age. Of the 64 families with at least two children, 55% (N = 35) of the children were less than four years of age and of the 23 families with at least three children, 13% (N = 3) were less than four years of age (see Table 8).

Table 8: Distribution of Children by Age

Age of Child	N	Percent
Less than 1 year	26	15
1	24	14
2	15	8
3	17	10
4	36	20
5	16	9
6	6	3
7	10	6
8	7	4
9	3	2
10	2	1
11	4	2
12	5	2
13	1	1
14	1	1
15	2	1
16	1	1
TOTAL	176	100

Ninety-four percent (N = 74) of the respondents reported having previous experience with their child/children having a febrile episode. Of those 74, 86% (N = 49) reported the fever episode to be within the previous six months and 14% (N = 8) in the previous seven to 12 months.

The majority of parents (96%, N = 76) reported that the usual source of health care for their children was either a family physician or pediatrician. None of the parents cited a nurse in advanced practice as their primary care provider (see Table 9).

Table 9: Number and Percent Distribution of Source of Health Care

Source of Care	N	Percent
Pediatric NP	0	0
Family Physician	53	67
Pediatrician	23	29
Health Department	1	1
Emergency Room	2	3
TOTAL	79	100

Seventy-seven percent (N = 61) of the families reported receiving instructions about fever management. When asked to identify the source of that information, the majority of the subjects (N = 39) again cited the family physician, emergency room (N = 27), and pediatrician (N = 21) (see Table 10).

Table 10: Number and Percent Distribution of the Source of Information About Fever Management

Source	N	Percent
Family Physician	39	27
Emergency Room	27	18
Family	24	17
Pediatrician	21	15
Friends	9	6
Office Nurse	8	6
Magazine	8	6
T.V.	6	4
Child Care Book	1	1
TOTAL	143	100

Comparison of Groups According to Sociodemographic Variables

The frequency and percent were also calculated for each sociodemographic variable by control and experimental group. As a result of a random assignment, 43 parents were in the control group and 37 in the experimental group. Very little difference was found between the experimental and control groups in respect to the relationship to the child of the parent responding to the sociodemographic questionnaire (see Table 11).

Table 11: Number and Percent Distribution of Parental Relationship to the Child by Group

Relationship to the Child	Control		Experimental	
	N	%	N	%
Mother	39	90.7	34	91.9
Father	3	7.0	3	8.1
Guardian	1	2.3	0	0
TOTAL	43	100.0	37	100.0

Groups varied somewhat according to racial distribution. A higher number of Blacks was found in the control group (see Table 12).

Table 12: Number and Percent Distribution of Parental Race by Group

Race	Control		Experimental	
	N	%	N	%
Caucasian	34	79.1	36	97.3
Black	7	16.3	1	2.7
Hispanic	1	2.3	0	0
Other	1	2.3	0	0
TOTAL	43	100.0	37	100.0

Marital status of the study subjects was fairly evenly distributed. A larger number of subjects in the control group reported being separated and divorced. Six percent more parents were married in the experimental group than in the control group (see Table 13).

Table 13: Number and Percent Distribution of Parental Marital Status by Group

	Control		Experimental	
Marital Status	N	%	N	%
Married	30	69.8	28	75.7
Never Married	7	16.3	6	16.2
Separated	3	7.0	1	2.7
Divorced	3	7.0	2	5.4
TOTAL	43	100.0	37	100.0

Educationally, the two groups were fairly similar. The majority of subjects in each group reportedly completed a high school education. A larger percent of parents in the control group reported having two or more years of college education (21%, N = 9) than the experimental group (5.4%, N = 2) (see Table 14).

The most frequently reported occupation in both the control and experimental groups was that of homemaker, housewife, and mother. In the control group, 51.2% (N = 22) and 29.7% (N = 11) of the experimental group reported this occupation. The remainder of the

Table 14: Number and Percent Distribution of Parental Education by Group

Highest Grade Completed In School	Control N	Control %	Experimental N	Experimental %
8th grade	0	0	1	2.7
9th grade	2	4.7	0	0
10th grade	2	4.7	0	0
11th grade	2	4.7	3	8.1
12th grade	22	51.2	23	62.2
1 year college	4	9.3	4	10.0
2 years college	4	9.3	1	2.7
3 years college	2	4.7	0	0
4 years college	0	0	2	5.4
Master Degree	3	7.0	1	2.7
TOTAL	41	95.6	35	94.6

subjects was evenly distributed among 11 occupations in the control group and 14 in the experimental group. Unemployment was reported by 7% (N = 3) of the control subjects and 5.4% (N = 2) of the experimental subjects (see Table 15).

Table 15: Number and Percent Distribution of Parental Occupation by Group

	Control		Experimental	
Occupation	N	%	N	%
Homemaker, etc.	22	51.2	11	29.7
Teacher	3	7.0	4	10.8
Student	2	4.7	1	2.7
Customer Service	1	2.3	1	2.7
Laborer	1	2.3	2	5.4
Secretary	2	4.7	5	13.5
Self-employed	1	2.3	1	2.7
Unemployed	3	7.0	2	5.4
Paramedic	1	2.3	0	0
Waitress	0	0	1	2.7
Cook	0	0	1	2.7
Receptionist	1	2.3	0	0
Day care	1	2.3	0	0
Optical Lab Technician	0	0	1	2.7
Cashier	0	0	1	2.7
Baker's Helper	0	0	1	2.7
Nurse Aide	0	0	1	2.7
Pastor	0	0	1	2.7
Data Processing	1	2.3	0	0
Hearing Aide Specialist	1	2.3	0	0
Inspector	0	0	1	2.7
No answer	3	7.0	2	5.4
TOTAL	43	100.0	37	100.0

There appears to be somewhat greater uniformity in the distribution of incomes reported by control group subjects and greater variability among experimental group subjects (see Table 16).

Table 16: Number and Percent Distribution of Parental Income by Group

	Control		Experimental	
Annual Income	N	%	N	%
$ 0 - $ 4,999	8	18.6	7	18.9
$ 5,000 - $ 9,999	7	16.3	4	10.8
$10,000 - $14,999	6	14.0	7	18.9
$15,000 - $19,999	7	16.3	3	8.1
$20,000 - $24,999	6	14.0	1	2.7
$25,000 - $29,999	0	0	4	10.8
$30,000 - $39,999	2	4.7	5	13.5
$40,000 - over	3	7.0	2	5.4
No answer	4	9.3	4	10.8
TOTAL	43	100.0	37	100.0

The two groups were similar according to the number of children per family. The majority of families in both groups reported having two children (control group $\bar{x} = 2.3$, experimental group $\bar{x} = 2.1$) (see Table 17).

Table 17: Number and Percent Distribution of Children Per Family by Group

Number of Children Per Family	Control		Experimental	
	N	%	N	%
1	7	16.3	8	21.6
2	22	51.2	19	51.4
3	9	20.9	9	24.3
4	4	9.3	0	0
5	0	0	1	2.7
6	1	2.3	0	0
TOTAL	43	100.0	37	100.0

The majority of parents in both groups reported that their children had previously experienced a febrile episode. Furthermore, in the control group, 72.1% (N = 31) and 48.6% (N = 18) in the experimental group reported their most recent experience with an episode of childhood fever had been within the past six months (see Table 18).

The distribution of the source of health care was also similar between groups. Most subjects reported the family doctor as their main source of care followed by the pediatrician (see Table 19).

Table 18: Number and Percent Distribution of Family Experience with Fever Episodes by Group

	Control		Experimental	
Fever Episode	N	%	N	%
Previous	42	97.7	32	86.5
No previous	1	2.3	4	10.8
No answer	0	0	1	2.7
TOTAL	43	100.0	37	100.0

Table 19: Number and Percent Distribution of Source of Health Care by Group

	Control		Experimental	
Source of Care	N	%	N	%
Family Physician	30	69.8	23	62.2
Pediatrician	12	27.9	11	29.7
Health Department	0	0	1	2.7
Emergency Room	0	0	2	5.4
No answer	1	2.3	0	0
TOTAL	43	100.0	37	100.0

Nearly 75% of parents in each group reported receiving previous instructions related to the measurement of childhood fever (see Table 20).

Table 20: Number and Percent Distribution of Families Previously Receiving Information About Childhood Fever by Group

	Control		Experimental	
Information Received	N	%	N	%
Previous	32	74.4	29	78.4
No previous	10	23.3	8	21.6
No answer	1	2.3	0	0
TOTAL	43	100.0	37	100.0

Of those parents reporting that they had previously received fever instructions, the majority in each group reported that the family physician was the source of that information. From that point, the frequency of sources of fever information varied between the two groups (see Table 21).

Table 21: Number and Percent Distribution of the Source of Information About Childhood Fever by Group

	Control		Experimental	
Source of Information	N	%	N	%
Family Doctor	22	51.2	17	45.9
Emergency Room	19	44.2	8	21.6
Pediatrician	12	27.9	9	24.3
Family	10	23.3	14	37.8
Friends	5	11.6	4	10.8
Magazine	5	11.6	3	8.1
Office Nurse	3	7.0	5	13.5
T.V.	2	4.7	3	8.1
TOTAL	78	181.5	63	170.1

Reliability of Knowledge Instrument

The reliability of the knowledge instrument in this study was difficult to establish. The instrument used to measure parental knowledge of childhood fever and fever management was developed by the investigator based on instruments used in pervious studies and a review of the literature. The reliability of instruments used in previous studies was not reported.

In order to determine the reliability of the present instrument, knowledge items were first of all grouped according to the dimension or

subgroup of knowledge they were intended to measure such as antipyretic medications, temperature measurement, and general knowledge about fever. An analysis of internal consistency was then performed on the appropriateness score of the regional variables. Small groups of pre/posttest items approached similar and modest reliability coefficients.

Three of the 23 total items pertaining to general knowledge about fever, how high an untreated fever can go, description of fever, and the purpose of fever treatment, achieved an alpha coefficient of .32041 on pretest and .44240 on posttest. Two items pertaining to supportive measures of fever treatment, hydration and sponging, and one item, the purpose of fever treatment, achieved an alpha coefficient of .52291 pretest and .51682 posttest. This may be a significant finding in that parents may associate these two measures with the purpose of fever management which is comfort more than the administration of antipyretics (see Table 22).

An interesting finding is that when considering two groups of items there was very low reliability on pretest items and more respectable reliability on posttest. These two groups of items consist of items about fever treatment. In one group, the pretest coefficient alpha was .04314 and .50092 on posttest. Similarly in another group of items, the pretest coefficient was .17253 and .51530 on posttest (see Table 23). It is possible that the consistency or reliability of items increases over time. More probably this is due to the difference in the number of valid cases available for analysis in each situation.

Table 22: Analysis of Internal Consistency for Groups of Knowledge Items

	Coefficient Alpha	
Knowledge Item	Pretest	Posttest
For what reason do you treat fever? What kind of solution should you use for sponging? Should you wake sleeping child to check his/her temperature or give antipyretic medication?	.52291 N = 43	.51682 N = 44
How high can an untreated fever go? How would you describe a fever? For what reason do you treat fever?	.32041 N = 40	.44240 N = 31

The number of cases decreased on posttest. Another possible explanation for this phenomena is the effect of the treatment on subjects.

Overall, the response to knowledge items in this particularly instrument was inconsistent. This lack of reliability precludes predicting similar outcomes over time.

Table 23: Change in the Internal Consistency in Groups of Knowledge Items Over Time

Knowledge Item	Coefficient Alpha Pretest	Posttest
What site do you use to check your child's temperature? What is the lowest temperature you consider a fever? How would you describe a fever? What is the safest place to check your child's temperature? It is unsafe to give the correct dose of Tylenol every four hours for two days?	.04314 N = 48	.50092 N = 38
What kind of solution should you use to sponge? When would you seek medical advice? It is unsafe to give the correct dose of Tylenol every four hours for two days? Should you wake a sleeping child to check his/her temperature or give antipyretic medication?	.17253 N = 68	.51530 N = 45

Descriptive Analysis of Knowledge Items

In order to understand what parents do and do not know about fever, to evaluate the effectiveness of the present intervention, and plan for future interventions, it is helpful to look at the frequency of responses to certain individual knowledge items. Pretest knowledge responses of all subjects are used as a basis for this analysis. Knowledge items are grouped according to the general topic they were intended to measure.

Temperature Measurement

Although 43% (N = 24) of all parents reported using the axillary site to check their child's temperature and 54% (N = 35) cited the axillae as the safest place to check the child's temperature, approximately 50% of the subjects reported the alternative oral or rectal sites as the safest or site they would use to measure their child's temperature. Since the axillae is the appropriate site for measuring the temperature of a child age two months to four years, parents may require specific information related to this issue.

Parents overwhelmingly reported the most accurate means or device to measure body temperature. Ninety-nine percent (N = 70) appropriately reported that the glass/mercury thermometer was the most accurate way to determine body temperature. Other possible options were plastic fever strips and touch. This is an area of education which may require less emphasis.

Nature of Fever

Parental understanding of the nature or significance of childhood fever was assessed by asking them to describe fever. Sixty-nine

percent (N = 49) correctly responded that fever was the body's normal response which helps the body fight infection. Inaccurate descriptions of fever as a dangerous symptom that causes serious, harmful effects, or a symptom of infection that always requires treatment were reported by 31% (N = 22). Understanding the basic significance of fever is important in understanding the treatment of childhood fever.

The majority of subjects correctly state the normal body temperature (93%, N = 62). When asked how high an untreated fever could go, 38% (N = 15) responded correctly, 63% (N = 25) responded incorrectly, and 31 subjects reported not knowing the correct answer. Similarly, when asked the lowest temperature that could be considered a fever, 26% (N = 14) responded accurately and 74% (N = 39) inaccurately. Although parents generally know the normal body temperature, they do not seem to know what to consider abnormal or the limits of temperature regulation. The majority of subjects (93%, N = 65) incorrectly reported beginning to treat fever at a much lower level than recommended. Lack of knowledge regarding these particular points may be an influencing factor of fever phobia.

When asked to describe the appropriate reason for treating fever, 37% (N = 26) responded correctly citing comfort as the primary reason to treat fever. Prevention of harmful effects and treatment of infection were the incorrect responses of 63% (N = 45) of the subjects. The majority of subjects, therefore, misunderstood the purpose of fever management. Following the intervention, 59% (N = 27) responded correctly and 41% incorrectly. With fewer people responding posttest, there was an increase in knowledge related to this issue.

Fever Treatment

Knowledge about specific fever management strategies was also assessed. Parents tended to respond inappropriately to questions regarding the temperature at which one would begin sponging and the duration of the sponging process, 91% (N = 60) and 88% (N = 61) respectively. On the other hand, 63% (N = 45) of the parents knew the correct kind of solution to use for sponging.

Knowledge of antipyretic medications was another area of knowledge which was measured. In general, the majority of parents had inaccurate knowledge pertaining to the possible adverse effects of aspirin and acetaminophen (see Table 24). This finding may indicate that parents believe that these drugs could be used without any potential harmful effects which may represent a problem when dosage or frequency of administration was inappropriately high. However, subjects tended to respond appropriately to questions about the action, dose, frequency and duration of the administration of acetaminophen (see Table 25).

Table 24: Number and Percent Distribution of Responses to Questions About Potential Adverse Effects of Antipyretic Medications by All Subjects

	Correct		Incorrect		Total	
Adverse Effects	N	%	N	%	N	%
Aspirin	27	39	42	61	69	100
Acetaminophen	6	9	64	91	70	100

Table 25: Number and Percent Distribution of Responses to Questions About the Action, Dose, and Frequency of Acetaminophen by All Subjects

	Correct		Incorrect		Total	
Use of Acetaminophen	N	%	N	%	N	%
Action	68	96	3	4	71	100
Dose	57	81	13	19	70	100
Frequency/Duration	60	85	11	15	71	100

One hundred percent (N = 67) pretest and (N = 47) posttest of the responding subjects knew that there was a possible relationship between the administration of aspirin to a child with a fever caused by a viral illness and the development of Reye's Syndrome. This finding indicates that the effort to educate the public about this potential relationship has been largely successful.

Supportive Measures

Parents generally responded appropriately to questions related to supportive measures such as hydration and dressing as means to manage fever. Ninety-three percent (N = 65) agreed that giving a child extra fluids to drink was helpful in the management of fever. Elimination of excessive clothing was cited by 89% (N = 63) as another alternative for fever management.

General

Parental anxiety related to childhood fever was approached by determining whether or not parents considered waking a sleeping child who has a fever to check the temperature and give antipyretic medicines. Appropriate responses were almost evenly distributed among all parents. Fifty-one percent (N = 35) answered correctly, 49% (N = 34) incorrectly.

When to seek medical advice for the management of childhood fever is a concern for parents and health care providers. Only 23% (N = 16) responded accurately to the question of when to seek medical advice. Other responses may indicate parental lack of knowledge regarding the significance of fever during acute illness and/or the action of antipyretic medications (see Table 26).

Table 26: Number and Percent Distribution of Responses to a Question When to Seek Medical Advice Regarding the Management of Childhood Fever

When to Seek Medical Advice	N	%
When the temperature reaches 102^{o}F	11	16
Before giving any medication	6	9
After 2 - 3 days and aren't sure what is causing fever	16	23
If 1 or 2 doses of antipyretic medication don't make the fever go away and stay away	29	41
As soon as you realize the child has a fever	2	3
More than one of the above	6	9
TOTAL	70	100

Other explanations for incorrect responses are possible. Alternative responses may indicate that parents think fever is a symptom of an underlying problem requiring medical treatment such as antibiotic therapy. These responses may also be some reflection of the parent's sense of self-efficacy in the management of childhood fever.

Knowledge Scores

The experimental group demonstrated a slightly higher pretest mean knowledge score than the control group. Both groups demonstrated increased mean knowledge scores on posttest (see Table 27).

Table 27: Mean Pre and Posttest Knowledge Scores by Group

Group	N	Pretest	Posttest	P
Control	21	5.071	5.471	NS
Experimental	25	5.333	7.455	.000

In the control group, the difference between pre and posttest mean knowledge scores was not significant ($p = .749$). The difference between pre and posttest was conceivably due to chance. The difference between the pre and posttest mean knowledge score was statistically significant ($p = .000$) for the experimental group. This increase in knowledge can be interpreted to be an effect of the intervention.

Descriptive Analysis of Behavior Items

Self-reported fever management data was gathered over a five month period from October 1986 through February 1987. A total of 30 fever episodes was reported by all subjects. The majority of fever episodes occurred during December 1986 (see Table 28).

Table 28: Number and Percent Distribution of Self-Reported Fever Episodes by Month by All Subjects

Month	N	%
October	7	23
November	5	17
December	8	27
January	6	20
February	4	13
TOTAL	30	100

Sixty percent (N = 18) of the fever episodes reported occurred in children one year old or younger. Twenty-three percent occurred in four year olds. The remaining fever episodes were evenly distributed among two and three year olds (see Table 29).

The fact that most fever episodes were experienced among children one year old or less may indicate that this is the time that education would be most beneficial.

Table 29: Number and Percent Distribution of Fever Episodes by Age of Child Among All Subjects

Age	N	%
< 1	9	30
1	9	30
2	2	7
3	2	7
4	7	23
5	1	3
TOTAL	30	100

Parents varied somewhat in the way in which they perceived their child had a fever. Touch appears to be a significant way to detect fever among this population (see Table 30).

Table 30: Number and Percent Distribution of Responses to a Question About How Parents Knew Their Child Had a Fever

	Yes		No		Total	
How Parents Knew Child Had a Fever	N	%	N	%	N	%
Checked temperature with a thermometer	15	50	15	50	30	100
Child felt hot	25	83	5	17	30	100
Child looked sick	11	37	19	63	30	100

These findings indicate that parents utilize multiple ways of determining if their child is sick and has a fever. This may be an important point in that temperature level alone does not necessarily indicate the severity of the child's illness. Parents may be able to rely on other signs of illness rather than solely on temperature and, thereby, enhance self-efficacy.

Parents were asked what they did when they first realized their child had a fever. The initial management strategies reported were to give an antipyretic medicine and check the child's temperature (see Table 31).

Table 31: Number and Percent Distribution of Responses about Initial Fever Management Among All Subjects

	Yes		No		Total	
Initial Fever Management Strategies	N	%	N	%	N	%
Give antipyretic	28	93	2	7	30	100
Check temperature	26	87	4	13	30	100
Take child to doctor	7	23	23	77	30	100
Observed and did nothing else	6	20	24	80	30	100
Sponged	4	13	26	87	30	100
Called doctor	1	3	29	97	30	100

Seeking medical assistance as an initial fever management is possibly another indication of parental self-efficacy. A rather small percent of parents used this as an initial strategy.

The majority of parents (69%, N = 18) reported using the appropriate site for temperature measurement during a fever episode. The number of times parents reported checking their child's temperature during the first 24 hours of a fever episode ranged from zero to six. The mean of 2.2 is consistent with the recommendation for the frequency of checking body temperature during a febrile episode according to Schmitt (1984).

Medications

Fever management in terms of antipyretic therapy was assessed according to the medication used, dose and frequency. Acetaminophen was the medication reportedly used by 100% (N = 30) of the parents treating a febrile episode. This behavior corresponds to parental knowledge about the safe use of acetaminophen for childhood fever.

Medication dosage appears to be a problem area. Only 40% (N = 10) of the parents administering an antipyretic reported giving appropriate doses of the medication based on the child's body weight. The 60% (N = 15) reporting inappropriate doses of antipyretic medication was not analyzed according to whether the inappropriate dose was less or more than required depending on the body weight.

The majority of parents reporting giving an antipyretic did so with appropriate frequency. Sixty-eight percent reportedly administered the antipyretic at four hour intervals. The remaining 32% (N = 9) reported giving the antipyretic only once or three times during

the first 24 hours of the fever which may have been appropriate depending on the temperature and child's level of comfort.

Sponging

Five parents reportedly used sponging as a fever management strategy. Of those five parents, 60% (N = 3) appropriately reported using luke warm water as the solution for sponging. However, only 20% (N = 1) reported sponging for the appropriate length of time. The remaining parents reported sponging for less than the recommended length of time. Three parents (60%) reported that the child's temperature decreased as a result of the sponging. Perception of this response to sponging may reinforce this behavior during future fever episodes.

Seeking Medical Advice

Eight parents reported contacting their physician or the emergency room for medical advice in the management of the child's fever. Eighty-eight percent (N = 7) appropriately sought medical advice either because the child complained of an associated earache or sore throat, there was a change in the child's behavior, or the temperature was higher than 104^{o}F and/or lasted for more than two or three days. When asked what other things they did to treat their child's fever, 60% (N = 5) reported giving their child extra liquids and 20% (N = 3) reported doing nothing else.

Parental perception of their success in the management of an actual fever episode was elicited. Eighty-three percent (N = 25) rated their efforts at treating their child's fever as successful. Seventeen percent (N = 5) felt their efforts were partly successful.

Behavior Scores

Behavior was measured post treatment by random selection of one self-reported fever episode from each family reporting a fever episode. Nine fever episodes in each group were scored for appropriateness of behavior. The control group achieved a higher mean behavior score (3.33) than the experimental group ($\bar{X}$ = 2.889). The control group, therefore, reported using more appropriate behavior in the management of fever episodes than the experimental group.

Inferential Statistics

The hypotheses of this study have been stated elsewhere in this work but will be restated here more precisely. The inferential statistics for each hypothesis will be presented.

Hypothesis I

Parents in the experimental group will demonstrate greater knowledge about childhood fever and fever management than parents in the control group. This hypothesis has been supported for this particular study population based on the raw data reported earlier in this chapter.

In order to determine if the difference found was statistically significant and, therefore, generalizable beyond this population, a t-test was computed on the mean posttest knowledge scores of the two groups. Using the pooled variance estimate, the two-tail probability that the difference between the control and experimental posttest mean knowledge scores was .000. Using a t-test for the comparison of the means between the experimental and control groups for pretest/posttest

knowledge differences scores, a statistically significant two-tail probability of .014 was obtained. Therefore, this hypothesis is accepted.

The assumption can be made that the educational nursing intervention resulted in improved parental knowledge related to childhood fever and fever management. Furthermore, this finding can be generalized to a larger population with similar characteristics.

Hypothesis II

Parents in the experimental group will report more appropriate fever management than parents in the control group. The mean behavior scores of parents in the control group were greater than that of parents in the experimental group. However, two-tailed probability of the t-test result was .309 which is not significant. Based on these findings, Hypothesis II was not accepted.

The difference in the appropriateness of behavior between the two groups could have occurred as a result of chance. The assumption cannot be made that the experimental group reported less appropriate behavior because of the intervention.

Hypothesis III

As parental knowledge of childhood fever increases, reported behavior in fever management will become more appropriate.

An increase in posttest knowledge was demonstrated in both the control and experimental groups. The relationship between posttest knowledge and reported fever management behavior was evaluated using Pearson Product Moment Correlation. In both groups, a negative relationship was found between posttest knowledge and behavior. The

Pearson Product Moment Correlation Coefficient was -.3536 for both groups. This finding indicates that as knowledge about fever and fever management increases, the appropriateness of actual fever management behavior decreases. Increasing knowledge does not necessarily result in more appropriate behavior. Behavior is complex and may be mediated by other factors.

Other Predictive Independent Variables

Although the educational nursing intervention was the primary independent variable under study in this project, other variables should also be considered as potentially influencing parental knowledge and behavior. The relationship between parental education, income, and previous experience with childhood fever as measured by the number of children was analyzed.

Among all subjects, the number of children in the family and family income had moderately strong positive relationships which were statistically significant with overall fever management and pre/post knowledge score differences, respectively (see Table 32).

It would be expected that as the level of education increased, the pre/posttest knowledge difference score would also increase. A very weak positive relationship exists between parental education and knowledge scores. This finding was not statistically significant. A negative relationship exists between education and behavior. As education increased, the appropriateness of behavior decrease.

Table 32: Relationship of Parental Education, Income and Previous Experience with Fever and Knowledge and Behavior of All Subjects

	Education	Income	Previous Experience
Pretest/Posttest Knowledge difference score	.1119 p = .274	.3425 p = .032	-.1558 p = -.197
Behavior Score	-.1916 p = .225	-.2639 p = .162	.4327 p = .040

In the control group, the number of children in the family had a strong positive relationship with the behavior score, Pearson Correlation Coefficient -.7556 (p = .009). In the experimental group, the relationship between family income and pre/posttest knowledge difference scores was .3316 (p = .077) and the number of children and behavior was .2259 (p = .279).

Previous fever management instruction was also considered as an independent variable which may have had some influence on parental knowledge and behavior. There was no significant difference between the means of past fever instruction and pre/post knowledge test difference scores and fever management behavior of all subjects.

In the control group there was a statistically significant difference between behavior scores based on previous fever instructions. The probability that the group receiving previous

instruction and achieving a higher behavior score was .000. In other words, people in the control group who had received previous instruction reported more appropriate behavior than those who didn't. This finding was statistically significant.

There was no statistically significant difference between mean behavior or knowledge difference scores based on previous instruction in the experimental group. Previous instruction did not influence the appropriateness of knowledge or behavior in the experimental group.

Discussion

The problem under investigation in this research study is to determine the impact of a nursing intervention on (1) parental knowledge regarding the significance and treatment of childhood fever and (2) self-reported behavior in the management of childhood fever. Data pertaining to knowledge and behavior were analyzed in the previous section of this chapter. Based on this analysis, it can be concluded that an educational nursing intervention can have a positive effect on parental knowledge regarding the significance and treatment of childhood fever. The proposed impact of the nursing intervention on self-reported behavior and the relationship between knowledge and behavior was not supported by data analysis.

Hypothesis I

Parents in the experimental group will demonstrate greater knowledge about childhood fever and fever management than parents in the control group. This hypothesis was accepted. In other words, the educational nursing intervention resulted in an increase in knowledge

in the experimental group. Furthermore, the difference between the increase in knowledge in the experimental group and control group was statistically significant. Based on the random assignment of subjects and the tests of statistical significance, it is reasonable to generalize this finding beyond the study subjects to larger populations with similar sociodemographic characteristics. A similar educational nursing intervention would likely produce similar increases in knowledge about childhood fever in different populations of parents with similar characteristics. Replication of this study with different populations producing similar results would lend support to this hypothesis.

Hypothesis II

Parents in the experimental group will report more appropriate fever management than parents in the control group. This hypothesis was not accepted.

The educational nursing intervention did not result in more appropriate fever management behavior in the experimental group. There was no significant difference between experimental and control groups in the appropriateness of behavior. The appropriateness of control group behavior could have occurred by chance alone. One possible explanation for this finding is that pretest behavior in the control group may have been appropriate to start with. It can be said that the nursing intervention did not result in more appropriate behavior in the experimental group, but we cannot conclude that the intervention resulted in less appropriate behavior in that group. Another possible

explanation for these findings is the lack of reliability of the instrument.

Although this finding was opposite to that hypothesized, it is not totally unexpected. This finding may be more clearly understood upon discussion of the last hypothesis.

Hypothesis III

As parental knowledge of childhood fever increases, reported behavior in fever management will become more appropriate. This hypothesis was also rejected as a result of data analysis.

Although parental knowledge of childhood fever increased in both groups, there was not a corresponding increase in the appropriateness of parental behavior. In fact, there was a negative relationship between knowledge and behavior. This lack of correlation between knowledge and behavior is not an uncommon finding in research. Changes in knowledge have often been found to have no influence on behavior. Lack of instrument reliability may also be related to the lack of correlation found between knowledge and behavior.

Knowledge

Analysis of individual knowledge and behavior items may be helpful in identifying patterns of response, planning future interventions, and determining which areas may be problematic. Based on the descriptive data, parents need very little information regarding the type of fever measurement device to use, the normal body temperature, the most appropriate antipyretic medication to use, and the relationship of Reye's Syndrome and the use of aspirin in children.

Although the majority of parents recognize that fever is the body's normal response to infection, they consistently underestimated the lowest and highest temperatures they considered problematic. The response that fever is an adaptive bodily mechanism was also inconsistent with the reason the majority of parents gave for treating a fever. If people truly believed fever was an adaptive response, the logical reason for treating fever would be to provide comfort rather than to prevent harmful effects and treat infection. Emphasis in future interventions should be placed on teaching the purpose of treating fever.

Descriptive data analysis may be indicative of the fact that parents may also require specific information about the use of sponging. Emphasis needs to be placed on the temperature at which sponging should be started and the duration of the process. This information would not necessarily affect the associated behavior.

Despite the fact that parental knowledge related to the action, dose, and frequency of antipyretic medication was generally appropriate, parents demonstrated a much lower level of knowledge about the possible adverse effects of antipyretic medication. Although this may not result in inappropriate behavior, this is an area which may require more intense educational efforts.

Parents may also require information about when to seek medical advice. The majority of parents stated they would seek medical advice if one or two doses of medication didn't make their child's fever go away and stay away. This response seems to reflect a lack of understanding about the nature of fever, the purpose of fever

treatment, the action of antipyretics. Other responses may indicate that parents do not feel capable of managing a febrile episode without medical advice. The goal of this information would be to make appropriate contacts with health care providers and enhance self-care.

Parents demonstrate definite knowledge assets and deficits about childhood fever. It appears that there may be inconsistencies about what parents report they know about childhood fever. Analysis of data related to knowledge indicates areas in which parents may benefit from specific information.

Behavior

Self-reported fever management behavior provides clues for specific areas of intervention. Appropriate dosage of antipyretic medication was found to be problematic based on descriptive data analysis. If parents expect their treatment of fever to be safe and effective, they must provide appropriate doses of antipyretic medication for their children.

Regardless of the appropriateness of their fever management strategies, parents felt at least partly successful in managing a febrile illness. The fact that febrile illnesses are usually the result of self-limiting viruses may contribute to the success that parents feel. Since these episodes usually resolve satisfactorily within a few days regardless of specific fever management, parents would be successful no matter what they did to treat the fever. This perception of success may potentially represent a barrier to attempts to change behavior. Perceived successful behavior, regardless of

appropriateness, may be more resistant to change than that which is perceived as unsuccessful.

Problems

There are some major methodologic issues which may have some bearing on the findings of this study. The first issue is that of reliability and validity of the knowledge instrument. This instrument was developed by the investigator and had not previously been tested for reliability. Reliability analysis for items grouped according to the subject matter they were thought to measure revealed low consistency among knowledge items. Problems which may have contributed to this include the small number of valid cases available for analysis for some items and the lack of variance to responses on certain items.

Because of the attrition of subjects from pre to posttest, a great deal of information was lost. Subjects not lost through attrition could be somehow characteristically different than those subjects who did not complete the study. A very small number of fever episodes were available for scoring and comparison. This factor influences the variance of scores.

Open-ended questions were primarily used to gather behavior information. This type of data was difficult to synthesize for coding and data analysis. Because some information was lost as a result of the open-ended approach, a close-ended questionnaire may have proven more efficient for the collection and analysis of behavior data.

Relationship to Previous Studies

The findings of this study are similar to those reported in the literature (Casey et al., 1984; Kramer, 1985; Schmitt, 1980; Wagner et

al., 1984) especially in terms of the descriptive and inferential analysis of parental knowledge. Certain responses in the present study may reflect the "fever phobia" described by Schmitt (1980). Inappropriate responses to questions related to the high and low levels of fever, nature of fever, purpose of fever management, temperature at which sponging begins, when to seek medical advice, and waking a sleeping child to check the temperature and give antipyretic medication may represent an unjustified parental concern about fever among subjects in this study.

The effects of the present educational intervention were similar to those of Casey et al. (1984) in terms of the impact on parental knowledge. Casey et al. (1984) also found an increase in knowledge in both experimental and control groups. This study differed from that of Casey in terms of the findings related to behavior. Casey et al. (1984) found that the intervention group also demonstrated changes in their management of fever which was not evidenced in the present study. The difference in findings may be attributed to the way in which behavior was measured in each study. In the study by Casey et al. (1984), behavior was operationalized in terms of the number of inappropriate physician phone calls and incorrect doses of antipyretic medication as determined by record review. In the present study, behavior was measured in terms of an overall appropriateness score which combined multiple aspects of fever management including temperature measurement, antipyretic medication, dose, frequency, sponging, supportive measure, and seeking medical advice.

Conclusions

The main conclusion that can be drawn from the analysis of this study is that an educational nursing intervention can result in an increase in parental knowledge in relation to the nature and treatment of childhood fever. This suggests the possibility that nurses can be effective in helping parents know more about childhood fever and fever management. The first hypothesis was accepted.

The same conclusion cannot be applied to changing self-reported parental behavior in the management of childhood fever. Parents in the experimental group did not report more appropriate fever management behavior as a result of the nursing intervention. The second hypothesis was not accepted. More research must be done to determine how nurses can effectively influence parental behavior.

The third hypothesis was not accepted. A positive relationship was not demonstrated between parental knowledge d behavior in relations to childhood fever. In fact, a negative relationship was found to exist between these two variables.

The unreliability of the instruments, small number of valid cases on posttest for data analysis and the infrequency of reported fever episodes represent methodological problems that may have influenced study findings. These issues may be addressed through future research.

Summary

The hypotheses proposed in this research project were related to knowledge, behavior, and the relationship between knowledge and behavior. The first hypothesis was accepted. Parents receiving the

nursing intervention demonstrated greater knowledge about childhood fever and fever management than parents not receiving the intervention. This finding was statistically significant at the .05 level.

The second hypothesis, parents receiving the nursing intervention will report more appropriate fever management behavior than those not receiving the intervention, was rejected. There was no significant difference between the two groups in respect to behavior.

Hypothesis III states there will be a positive relationship between parental knowledge of childhood fever and reported behavior in fever management. This hypothesis was not accepted. Data analysis was indicative of a negative relationship between these two characteristics.

The development of valid and reliable instruments is essential for further research in this area. Replication of this study with other populations may lend support to the findings related to parental knowledge.

In the following chapter, a summary of all preceding chapters will be presented. Recommendations for future nursing research, education, and practice will be made.

CHAPTER VI

Summary and Conclusions

Overview

In this final chapter, a summary of all preceding chapters will be presented. Recommendations, based on this study, for future nursing research, education, and practice will be discussed. The results of this study will be interpreted and the theoretical and nursing implications of these findings will be proposed.

Summary

Fever, along with associated illnesses, in the pediatric group represents a significant proportion of visits to primary care providers. Despite the fact that fever has been recognized as one of the body's adaptive responses to childhood illness, parents frequently become alarmed when a child develops a fever. Schmitt (1980) calls this unjustified concern "fever phobia". A good deal of research has been conducted in the past decade confirming this problem among various populations (Casey, et al., 1984; Kramer, et al., 1985; Wagner, et al., 1984). Only one study was found that attempted to intervene in this particular situation (Case, et al., 1984).

An experimental study was designed by the investigator to determine the impact of a nursing intervention on (1) parental knowledge regarding the significance and treatment of childhood fever and (2) self-reported behavior in the management of childhood fever.

The following hypotheses were proposed.

Hypothesis I: Parents receiving the nursing intervention will demonstrate greater knowledge about childhood fever and fever management than parents not receiving the intervention.

Hypothesis II: Parents receiving the nursing intervention will report more appropriate fever management behavior than the parents not receiving the intervention.

Hypothesis III: There will be a positive relationship between parental knowledge of childhood fever and reported behavior in fever management.

Two theoretical frameworks were used to provide the organizational structure from which the hypotheses were studied. The relationship between the research variables was explained using Bandura's social learning theory, analyzing behavior in terms of reciprocal determinism. According to Bandura's model, physiological functioning involves a continuous reciprocal interaction between behavioral, cognitive, and environmental influences. In the present study, the behavioral dimension is self-reported fever management, the cognitive element is parental knowledge, and the environmental factor is the nursing intervention.

King's (1981) theory of goal attainment was used to describe the proposed impact of the nursing intervention on parental knowledge and behavior in fever management. The nurse and client, each influenced by their own behavior and cognitive factors, interact in the environment in the process of action, reaction, and disturbance.

Using an educational intervention, the goal or transaction is appropriate parental knowledge and fever management.

Support for the fact that there is a need for educating parents about the definition, consequences, and appropriate treatment of childhood fever can be found in a review of the literature. "Fever phobia" is a problem which has been documented among parents from all socioeconomic groups who seek health care from a variety of sources. This fear is thought to influence how parents manage febrile illnesses. Through scientific investigation, fever has been found to be an adaptive host defense response to infection in animals and man. Fever management, therefore, should be based on scientific rationale rather than ritual.

Treatment begins with temperature measurement. The axillary site is the site of choice in terms of safety, accuracy, and convenience in the population of children under study. Acetaminophen, 10-15 mg/Kg given at four hour intervals, is the drug of choice for antipyretic therapy. Sponging alone, which accomplishes the physical removal of body heat, is ineffective in lowering elevated body temperature caused by an infectious process because it does not effect the elevated hypothalamic thermoregulatory set point. Supportive measures such as maintaining adequate hydration and eliminating excessive clothing promote comfort and prevent complications associated with fever.

There is some evidence in the literature that educational interventions may be effective in increasing parental knowledge and changing behavior in relation to a variety of childhood concerns. In one study specifically addressing fever therapy, pediatricians

demonstrated that an educational intervention resulted in an increase in parental knowledge and more appropriate fever management behavior.

In order to test the stated hypotheses, an experimental study was conducted. Participants in the study were a volunteer convenience sample of 80 parents recruited from an ambulatory care department and county health department immunization clinic. Subjects were randomly assigned to control and experimental groups. Sociodemographic information and pretest knowledge questionnaires were completed.

Parents in the experimental group received the educational intervention which consisted of a presentation about the significance of childhood fever, temperature measurement, antipyretic therapy, sponging, supportive measures, and seeking medical advice. Fever information and instruction guidelines were given to each family for future reference. The control group received no information about childhood fever or fever information from the investigator.

During the five months following the intervention, all parents were asked to complete a fever record each time they experienced a febrile episode with their child. At the end of the five months, all parents were asked to complete a posttest knowledge questionnaire.

Knowledge and behavior items were scored correct or incorrect and a mean knowledge score both pre and posttest was calculated for each group. A mean behavior score was also calculated for each group. Data analysis consisted of descriptive statistics for sociodemographic data, knowledge, and behavior items. Inferential statistics in the form of t-tests were used to determine the statistical significance of the findings.

Reliability analysis indicated a lack of consistency among knowledge items in the pre/posttest questionnaire. Subscales consisting of only a few items representing general knowledge about fever and supportive measures of fever treatment approached modest reliability coefficients.

Data analysis results were presented and discussed in Chapter V. Experimental and control group subjects were similar in terms of sociodemographic characteristics.

Both the experimental and control groups demonstrated an increase in knowledge scores on posttest. The difference between the pre and posttest mean knowledge scores was statistically significant for only the experimental group. This change in knowledge can be attributed to the educational intervention.

The control group achieved a higher mean behavior score than the experimental group, which was not found to be statistically significant. Although this finding could have occurred by chance alone, perhaps some factor other than knowledge is more influential in modifying behavior.

The difference between the mean posttest scores of the control and experimental groups was statistically significant thus supporting the first hypothesis. Hypothesis II could not be accepted based on the fact that the experimental group reported less appropriate fever management behavior than the control group. This difference was not statistically significant. The third hypothesis was not accepted. The relationship between parental knowledge and behavior was negative in both groups rather than positive as hypothesized. This unexpected

finding may be due to the small number of valid knowledge and behavior cases available for analysis. In the first five chapters of this thesis, the research problem was stated, the conceptual framework presented, relevant literature reviewed, research methodology discussed, and data analysis summarized.

Recommendations

The present study not only lends support to previous research related to knowledge but also raises questions and issues that require further consideration and investigation. The phenomena known as "fever phobia" is well documented among a variety of populations seeking health care in a variety of settings. This is the second study in which a change in parental knowledge has resulted from an educational intervention. However, it is the first study from a nursing perspective. Unlike the first educational intervention study performed by pediatricians, the present study failed to demonstrate a change in parental behavior in relation to fever management.

The goal of the present study was to intervene in the problem of childhood fever and fever management from an advanced nursing practice perspective to facilitate self-care and enhance parental self-efficacy. The specific purpose of this experimental study was to educate a small group of parents about the adaptive nature of fever in childhood illness and to inform them about safe and effective methods to use in the management of episodes of childhood fever. Based on the finding of the present research study, recommendations can be made for nursing research practice and education.

The overall goal and specific purpose of this research study were accomplished. By identifying a clinical primary care problem and reviewing the related literature, a need was identified to respond to a problem which could appropriately be addressed within the scope of nursing. Diagnosis and treatment of childhood fever, which is a human response to an infectious process and inappropriate parental knowledge and behavior in the management of childhood fever are within the domain of nursing practice and are at least partially amenable to nursing intervention.

Recommendations for Nursing Research

Through review and defense of this research project in terms of methodology and data analysis, many questions have been raised. Perhaps further research may provide information, suggestions, and even resolution to the problem under investigation.

Methodological problems, discussed in Chapter V, have been thought to influence the findings of this study. Research focusing on these problems may help to clarify issues.

Development of reliable and valid instruments by which to measure parental knowledge and behavior in relation to childhood fever and fever management is essential if future research in this area is to be meaningful. Although certain trends can be identified using the current instruments, the predictive and manipulative purposes of research can only truly be pursued if the instruments are consistent and valid. Identification of questions which consistently reflect parental knowledge and behavior in relation to childhood fever and

fever management would significantly improve the quality and credibility of future research.

Perhaps earlier work, which has provided the basis for more current research has been relied upon too heavily. The descriptive data reported by Schmitt (1980) and others (Kramar et al., 1985; Wagner et al., 1984) may have biased the methodology of the present intervention study. It may be helpful to go back to the basis for this research. Gathering more comprehensive data about parents, their knowledge and behavior in relation to childhood fever and correlating these findings with one another may prove valuable in planning for more appropriate and effective intervention strategies. For example, it may be important to determine who else is in the household who may influence parental knowledge and behavior.

In the present study, no distinction was made between families with one child with possibly less experience with childhood fever and families with more than one child with more experience. This may have had some confusing effect on the findings of this study. Future research may focus on descriptive analysis of parents on 1) their first experience with childhood fever, 2) what they know about childhood fever, and 3) what they do about it. A comparison could then be made of similar information about parents who have had more experience with childhood fever. In other words, it is anticipated that parental knowledge and behavior in relation to childhood fever would be different initially (e.g. less appropriate) than in subsequent experiences.

Changes in research design may result in more definitive findings. It may be more instructive to investigate the impact of an intervention on knowledge and behavior of only one dimension of childhood fever management at a time such as antipyretic medication. The amount of information related to the entire realm of childhood fever and fever management may be too vast for the parent to assimilate and utilize at a future time. A potential question for investigation may be: What impact does an educational nursing intervention have on parental knowledge and behavior in relation to temperature measurement?

Evaluation of the effectiveness of the intervention strategy may be problematic due to the ways in which outcome variables were defined. In the present study, knowledge and behavior were defined and subsequently measured very narrowly. Both were either appropriate (correct) or inappropriate (incorrect). Knowledge and behavior are probably never completely right or wrong but depend largely on the individual situation. Redefinition of the knowledge and behavior outcomes may result in different findings. Rather than limiting the definition of behavior to only two levels, appropriate or inappropriate, more significant information could have been obtained if behavior had been defined using a wider range of descriptors such as appropriate, successful or harmful.

The findings of this study which include a significant increase in knowledge among experimental subjects and more appropriate, although insignificant, behavior among control group subjects were based on subjects who completed all aspects of the study. Their ability and

willingness to complete the study could indicate that they have more interest, possibly more than average knowledge, and perhaps preestablished appropriate behavior in relation to childhood fever. A description of those subjects who did not complete the study may provide information which would have otherwise influenced the outcome of the study. For example, how did parents, who did not complete the posttest, compare with parents who did complete the posttest on pretest scores? How did parents who dropped out of the study compare with parents who completed the study in terms of previous experience and childhood fever?

Random selection of fever episodes for those families experiencing and reporting more than one episode may have effected the findings related to behavior. The episode selected for analysis may have been unrepresentative of usual behavior. For example, behavior may become more appropriate soon after the intervention and may decrease over time. A more appropriate approach may have been to ask parents to report behavior in relation to their first experience with childhood fever after the intervention. In that case all first experiences would be used for analysis.

Because of the fact that a substantial number of parents report health care providers as their primary source of information regarding childhood fever and fever management, it is conceivable that these same health care providers contribute to parental misinformation. In fact, this has been observed in clinical practice by the investigator. One strategy for understanding parental misunderstanding about childhood fever is to determine what health care providers, physicians

and nurses, in various health care setting know and teach parents about childhood fever and fever management. Specific questions that may be investigated include: What do health care providers know about body temperature regulation and the pathogenesis of fever? What do health care providers teach parents about childhood fever? What do health care providers teach parents about fever management in terms of temperature measurement, antipyretic medications, sponging, supportive measures, and seeking medical advice? What teaching/learning methods do health care providers use in educating parents about fever and fever management? How do health care providers measure the effectiveness of their educational interventions with parents in relation to childhood fever? Descriptive analysis of the data provided as a result of the investigation of these questions may provide information about parental misunderstanding and mismanagement of childhood fever.

Since it has been established by this and preceding research (Casey et al., 1984) that educational intervention results in a change in parental knowledge, perhaps future research should focus on ways of effecting behavior changes. It is apparent from other sources (Green, 1979) as well as clinical practice and personal experience that knowledge is not necessarily associated with behavior. Perhaps investigators must abandon educational intervention as the sole strategy for changing behavior and look to other disciplines and use other theories as a basis for changing client behavior. In contrast to other schools of thought that explain human behavior in terms of limited determinants, human behavior is analyzed according to Bandura and social learning theory in terms of reciprocal determinism.

> In their transactions with the environment, people are not simply reactors to external stimulation. Most external influences affect behavior through intermediary cognitive processes. Cognitive factors partly determine which external events will be perceived, whether they have any lasting effects, what valence and efficacy they have, and how the information they convey will be organized for future use. The extraordinary capacity of humans to use symbols enables them to engage in reflective thought, to create, and to plan foresightful courses of action in thought rather than having to perform possible options and suffer the consequences of thoughtless action. By altering their immediate environment, by creating cognitive self-inducements, and by arranging conditional incentives for themselves people can exercise some influence over their own behavior (Bandura, 1978, p. 345).

Future investigators may achieve more success if intervention is expanded beyond simply providing information. While continuing to focus on the clients cognitive process, alternative strategies could be tested in relation to changing parental behavior in the management of childhood fever. One possibility for future study may be to determine the effect of positive reinforcement and incentives on changing parental behavior related to childhood fever management. Mutual development of an individualized, predetermined management plan with the parent may prove effective in preventing impulsive or thoughtless actions in times of crisis. Use of other types of interventions such as role modeling, demonstration, or group sessions could be evaluated in terms of effectiveness in changing behavior.

Recommendations for Nursing Practice

Childhood fever is a problem common to health care providers in the primary health care system. Nurses in advanced practice managing primarily healthy individuals and families who will undoubtedly experience childhood fever may benefit from the findings of the present study. Since none of the families in the present study reported receiving care or fever information from a nurse practitioner, knowledge data cannot be related to interaction with a nurse in advanced practice.

In the intervention in the present study, the investigator utilized two primary role characteristics, that of educator and change agent. Based on the findings of the present study, it can be said that the use of the role of educator in relation to knowledge was significantly effective. However, in this particular situation, use of the change agent role in relation to behavior was not significantly effective and a positive relationship was not found to exist between the role of educator and knowledge, and change agent and behavior.

Recognizing the parental need for anticipatory guidance in the management of childhood problems, the nurse in advanced practice who includes childhood fever information in health promotion visits may be successful in increasing parental knowledge about childhood fever. The fever information and management guidelines developed for this study could be used to provide parent education. It cannot be concluded that by increasing knowledge parental behavior will become more appropriate.

A nurse in advanced practice is certainly in the position to manage uncomplicated febrile episodes in children two months to four years of age independently. Collaboration with or referral to a physician would be necessary in situations which are complicated by fluid depletion, seizures, and fevers related to serious infections.

Nurses in advanced practice in primary care are in a position to contribute significantly to further knowledge about parental behavior in childhood fever management by pursuing some of the research questions proposed earlier. Evaluating the effect of parental knowledge and behavior related to childhood fever on the utilization of primary care services may be a useful area of investigation. Another potential research question to pursue is the relationship between parental fever management and the duration of the febrile illness. The following recommendations are based on the findings of the present study. It has been demonstrated in this study that a nursing intervention can make a difference in what clients know. Using the information obtained through literature review, a sound basis for educating parents about the adaptive nature of childhood fever and safe and effective measures for treating a febrile episode can be developed. Ideally parents should be educated in an anticipatory manner, for example, during the initial well child visit. Consistent reinforcement of the principles of fever and fever management during times of acute illness as well as during subsequent well child visits may be necessary. Written instructions for future references may be useful for parents.

Particular information of benefit to subjects in the present study includes the highest temperature that may be considered problematic, the reason for treating fever, the appropriate use of sponging, the possible adverse effects of aspirin and acetaminophen, and when to seek medical advice. Based on self-reported behavior in the management of childhood fever, parents may benefit from information about the weight appropriate dosing of antipyretic medication.

The primary recommendation for nursing practice is based on the information for the educational intervention on scientific research findings. Fever information gathered from a review of scientific literature pertaining to temperature regulation, fever pathogenesis, temperature measurement, antipyretic medication, sponging, and other supportive treatment measures was used as an informational outline for the educational intervention in this study. Despite the fact that this information must have been different than previous parental understanding in at least some instances, the information was processed and recalled at a later time as evidenced by improved posttest knowledge scores in both the treatment and control group.

As reported in Chapter V, 77% of the families reported receiving previous instruction about childhood fever and fever management. The majority cited the family physician, emergency room, and pediatrician as the source of this information. Thirteen percent reported the nurse as a source of fever information. If the concept of misunderstanding and mismanagement of childhood fever is accepted and an educational nursing intervention can make a difference in parental knowledge, nurses in both basic professional and advanced practice are encouraged

to include that education as part of their health maintenance and promotion and acute care management practice. Furthermore, they are challenged to evaluate the effectiveness of their efforts in comparison with other health care providers.

Parental perception of their capability in managing childhood fever was positive. One hundred percent of the parents reporting fever episodes reported feeling at least partially successful in managing an episode of childhood fever. The results of the present study did not support the hypothesis that this nursing intervention could result in more appropriate fever management behavior. Despite these findings, the challenge to achieve that outcome need not be forgotten. Self-care and self-efficacy in the management of childhood fever remain the goal of nursing intervention. Nurses need to be cognizant of the fact that parents will not necessarily do what they are taught or advised to do. A single intervention may not be adequate to initiate a behavior change. Previous parental perception of successful management may be a formidable barrier to changing behavior. Positive reinforcement of appropriate knowledge and behavior is essential for developing the foundation of self-care while continuing to change previous misconceptions and inappropriate behavior.

The following recommendations for nursing practice are related to childhood fever and fever management based on general and theoretical considerations. Client safety should be of utmost concern in providing health care. Management of childhood fever should also take into consideration client comfort and convenience. Principles of childhood fever management should be flexible enough to meet the individual

client situation and needs. Nurses should accept the responsibility for and be motivated to educate and update other health care providers about the problems experienced by parents dealing with childhood fever and the most recent research finding pertaining to fever management. Individual practitioners should also assume the responsibility for evaluating the effectiveness of client education in terms of fever knowledge and fever management behavior in order to monitor and revise their interventions accordingly.

Use of the nursing process may facilitate the nurse's intervention with parents in the problem of childhood fever. Assessment is the initial step in the nursing process. Inquiring about what parents actually know and do about childhood fever should reveal both appropriate and problematic areas. Positive reinforcement of appropriate knowledge and behavior may perpetuate it. When a problem is recognized either in relation to knowledge and/or behavior, steps can be taken to correct it.

Strategies are suggested by King (1981) for goal attainment and Bandura (1978) for facilitating self-efficacy. Planning is an essential part of King's theory of goal attainment. The transaction depends on mutual goal setting. In other words, for the transaction to occur, the parent and nurse should share a common goal. This may prove difficult especially if the parent has already established misconceptions about childhood fever or who's primary concern is symptom alleviation. Once the mutual goal of appropriate knowledge and behavior in the self-care of childhood fever is agreed upon, the means

to achieve the goal are explored and agreed upon by the nurses and parent.

The primary purpose of the nurse-parent interaction is to assist the parent in coping with a health problem, in this case, childhood fever. Once a mutual goal is identified, a positive interpersonal relationship is established. Like Bandura, King sees this relationship as a reciprocally contingent interaction in which the behavior of one person influences the behavior of the other. Participation is required on the part of both individuals (King, 1981). In this process, the client (parent) learns about himself and decision making that affects him in coping with the health care concern.

In the present study, the nurse-client relationship was unilaterally determined by the investigator in an attempt to help parents cope with an anticipated health care problem. Perhaps if the parents in the present study had perceived their behavior in the management of childhood fever as problematic or inappropriate and had established appropriate fever management as their personal goal and been involved in exploring and agreeing on the means to achieve the goal, the second hypothesis may have been supported.

Establishment of purposeful, goal oriented interactions with clients may enhance the effectiveness of care and result in satisfying outcomes. In this relationship, the nurse has the opportunity to find meaning in the client's behavior. Using this information, the nurse can assist the client in learning how to cope with health care problems.

Once the assessment and planning phases are complete, specific interventions are used to achieve the goal. Enhancement of self-efficacy is suggested by Bandura (1982) as a means to influence the interrelationship between knowledge and action. Perceived self-efficacy is concerned with how people judge their capabilities which affect their motivation and behavior. In the present study, the majority of parents reported feeling successful in their management of an episode of childhood fever. According to Bandura (1982) four sources of information influence how well one can execute courses of action required to deal with prospective situations. Nurses may want to consider using these suggestions in facilitating parental management of childhood fever.

Four sources of information based on inactive attainment, vicarious experiences, verbal persuasion, and physiological state may be used to influence parental perception of self-efficacy. The most powerful source of information is inactive attainment which is based on successful active mastery of experiences. Success enhances self-efficacy and failure lowers it. As mentioned earlier, parents in the present study consistently reported feeling successful in managing the reported fever episodes which may influence their perception of their capabilities in managing future fever episodes.

Another source of information about capability is vicarious experience. Observation of other's successful performance can increase self-efficacy expectations in the observer if he perceives himself as possessing similar capabilities. This also works in the reverse. If the observer notes unsuccessful performance in another

person, self-efficacy may decrease. The design of the present study was based on informational content rather than actual performance of fever management techniques.

Verbal persuasion can also be used to convince people they possess capabilities that will allow them to achieve the desired outcome. Persuasion encourages people to try hard to succeed and consequently promotes development of skills and a sense of efficacy. As part of the intervention, parents were told that the information they were given could be used to help them manage febrile episodes safely and effectively. They were also told that fever was an adaptive response to illness and that most childhood fevers were the result of self-limiting viruses. These statements were intended to convey to the parent the idea that they possessed the knowledge and ability to manage most febrile childhood illnesses safely and effectively.

Information about physical state influences perception of capability. Physical signs of tension, visceral arousal, fatigue, and pain tend to decrease performance. Although information about the parent's physical state was not elicited in the present study the level of stress or anxiety precipitated by the febrile illness and experienced by the parent may have influenced the behavior reported in the management of the episode. Abnormally high or low levels of concern or stress associated with childhood fever may result in inappropriate fever management or behavior; where as an optimal level of stress which mobilizes a variety of cognitive processes may result in more appropriate behavior. Other factors such as time of day, perception of the severity of the situation, and availability of

support systems may also have some influence on perception of capability.

> Social learning theory postulates a common mechanism of behavior change - different modes of influence alter coping behavior partly by creating and strengthening self-percepts of efficacy. In any given activity, skills and self-beliefs that ensure optimal use of capabilities are required for successful functioning (Bandura, 1982, p. 127).

Reinforcement, both external and internal, is another source of influence on behavior. Ongoing reinforcement results in the development of expectations from observed regularities about the outcomes likely to result from actions under given circumstances (Bandura, 1982). A reinforcement of behavior as a part of the intervention may have had some effect on promoting appropriate behavior.

To be successful, a nursing intervention aimed at changing behavior or strengthening the relationship between knowledge and behavior may incorporate any combination of these sources of information to increase self-efficacy. Specifically, the information should be used so that cognitively the parent's perception is that fever is an adaptive response to illness and the corresponding behavior should be directed at promoting comfort while facilitating the adaptive response rather than eliminating it.

Recommendations for Nursing Education

Adaptation is a concept which is the basis of nursing theory and the philosophy and curriculum of many nursing education institutions. Nursing students are taught that an increase in body temperature is a cardinal sign of an infectious or inflammatory process. The adaptive

nature of this bodily response to infection should also be stressed. With that emphasis, nursing diagnosis and treatment will focus on facilitating that response rather than suppressing it while promoting comfort and preventing complications. Concepts of fever management should be taught to students based on available research data.

Students must be alert to deal with the problems related to childhood fever regardless of clinical practice or setting. Childhood fever can be appropriately considered within the content of maternal-child health, community health, health maintenance/promotion, acute illness, acute care, or ambulatory setting.

The critique and application of research data should be included in nursing education curriculum. Nursing research should guide clinical nursing practice. In turn, through clinical practice questions should be raised that direct further nursing research. Students should be encouraged to identify clinical management problems related to childhood fever that could be addressed by nursing research activities.

Nurses have been successfully prepared to provide patient education as part of their clinical practice. However, the success of changing patient behavior does not keep up with that of increasing client knowledge through education. In addition to teaching/learning theories, nurses should be academically prepared in the understanding and application of nursing theories such as King's and those borrowed from other disciplines (Bandura) that have been shown effective in facilitating behavior changes.

Nurses should be educated to evaluate the effectiveness of their interventions not only in the statistical sense but in practice as well. Client outcomes determined mutually should be measured objectively and related directly to the goal of the nursing intervention.

In large part, the emphasis of nursing education is on learning to do things to and for clients. This is necessary so that students can learn the technical skills of nursing. An equally important part of nursing education is to teach nurses to apply client advocacy skills in order to facilitate self-care. Self-care can be carried out in the context of simple acute problems such as fever management, health promotion and maintenance, and chronic disease management.

Conclusions

The population to which findings of this study can be applied is made up of Caucasian, married, mothers who largely report being homemakers with at least a high school education. The majority of families reported an annual income of less than or equal to $20,000. There were three or less children in most families with an average of 2.2 children per family. All families reported having had previous experience with childhood fever within the past year. The majority reported having had received previous fever management instructions with the family physician, emergency room, family members, and/or a pediatrician providing that information.

Based on statistical analysis of the data collected for this study, the following conclusions have been drawn. Parental knowledge

about childhood fever and fever management increased directly as a result of the educational nursing intervention. Parental behavior was not more appropriate as a result of the nursing intervention. There was an inverse relationship between parental knowledge about childhood fever and fever management and self-reported fever management behavior.

This research project has been successful in supporting the position that use of a nursing intervention can be effective in helping parents understand certain concepts related to a common primary care health problem. Whether or not improved knowledge actually represents a decrease in "fever phobia" cannot be determined. The question about "fever phobia" remains because of the failure to effect a corresponding increase in the appropriateness of fever management behavior. As in other research intended to alter knowledge and behavior, a corresponding positive relationship was not found between the two variables in the present study.

Findings of the present study support, in part, earlier research findings. An educational intervention study conducted by Casey et al. (1984) designed to address parental "fever phobia", demonstrated an increase in knowledge among parents receiving the intervention. Measuring behavior in terms of appropriate physician contacts and medication dosages, parents in the intervention group also demonstrated more appropriate behavior than did the control group. An educational format was used in both the previous and present study. The intervention was carried out by research assistants in the previous study and by the investigator in the present study. Knowledge was measured in the control and experimental groups pre and posttest in

both studies. The main difference between the two studies was in how behavior was determined. In the present study, behavior was measured by the overall appropriateness of self-reported parental management of actual fever episodes. In the study conducted by Casey et al. (1984), behavior was measured by reviewing office records and determining the appropriateness of physician contacts and antipyretic medication doses.

Another difference between the two studies was the way in which fever episodes were analyzed. Casey et al. (1984) used the total number of fever episodes experienced by all subjects. If a family reported more than one fever episode in the present study, only one episode, which was selected randomly, was included in the data analysis. In the present study, a relatively small number of subjects was analyzed in terms of the behavior hypothesis. Once the number of actual fever episodes analyzed was limited to one per family, each group consisted of nine valid cases.

A reinforcement of fever instructions was mailed to subjects half way through the study by Casey et al. (1984). Families in the present study received written guidelines at the time of the intervention to refer to as necessary. Reinforcement of behavior during data collection may have been a significant influencing factor on the outcome.

Based on the similarities and differences of these two studies, certain inferences can be made. First, educational interventions have been successful in increasing parental knowledge about childhood fever

and fever management regardless of the population studied and the setting in which the intervention took place.

Because of the difference in findings related to the effect of the intervention on parental behavior, it cannot be concluded with certainty that parental behavior can or cannot be changed as a result of an educational intervention. The change in parental behavior reported by Casey et al. (1984) may be a function of the definition given to parental behavior. The educational intervention may prove to be effective if parental behavior is operationalized specifically rather than generally.

Based on this comparison, it cannot be concluded that a simple increase in knowledge necessarily reduces "fever phobia". In fact, the failure to produce a change in parental behavior in the present study may actually be a closer approximation of "fever phobia" than a lack of knowledge as previously thought.

This research study has contributed to issues in nursing related to client education and self-care. Knowledge and competence are outcome measures of self-care. By increasing parental knowledge of childhood fever and fever management, the nursing intervention facilitates client movement toward safe and effective self-care in the management of childhood fever.

A variety of factors could explain the findings obtained in the present study. One of the assumptions of this study was that a relationship does exist between parental knowledge and behavior in relation to fever. The negative relationship found between these variables in the present study requires further consideration. Perhaps

other factors such as beliefs, values, previous experience, stress, and/or influence of significant others are more powerful mediators of behavior than knowledge.

Information about behavior related to fever management prior to the study was not obtained. It is possible by chance alone that parents in the control group had largely appropriate behavior and experimental parents had less appropriate behavior. Since there was no pretest behavior data for comparison, it is not possible to determine if the intervention had any effect on parental behavior. It is possible that prior to interventions, experimental behavior was much less appropriate.

In previous studies (Schmitt, 1980) "fever phobia" was thought to have a negative effect on fever management. The opposite may actually be true. Although parents in the present study were not classified as such, it is possible that there are differences in pre/posttest knowledge and behavior reported by phobic and non-phobic parents. Phobic parents, because of their concerns whether justified or not, may be more likely to change behavior than those whose concern is not as great.

Perhaps the true value of this study lies in the questions that have been raised rather than in the questions that have been answered. Is "fever phobia" actually a function of a lack of parental knowledge as previously thought or is it a more complex phenomena which may be more closely approximated by parental behavior in relation to fever management? What dimensions reliably measure parental knowledge and behavior about childhood fever and fever management? How do health

care providers influence parental knowledge and behavior in relation to childhood fever and fever management? What strategies are effective in changing parental behavior in the management of childhood fever? What effect does improved parental knowledge and behavior in relation to childhood fever have on the primary health care system?

The investigator takes the position that the present study could be improved by defining the variables under study more specifically. In retrospect, it appears that measuring parental knowledge and behavior in overall terms provided only very general data. By defining knowledge and behavior specifically such as in terms of any one dimension of fever management, the confounding effects of other dimensions of childhood fever and fever management on overall knowledge and behavior would be minimized. Areas of appropriate knowledge and behavior could be easily identified. Problematic areas could be singled out and addressed.

The findings of the present study tend to support the position that although an educational intervention can effect a change in knowledge, the change does not necessarily correspond to a change in behavior. Improving knowledge is the first step in facilitating self-care. By itself, knowledge is not adequate. Until reliable methods for changing behavior are identified and applied, it cannot be said that a reliable intervention in the problem of "fever phobia" exists.

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APPENDICES

APPENDIX A

Administrative Approval

FOOTE
HOSPITAL

Your center for progressive healthcare.
Jackson, Michigan

June 18, 1987

To Whom it May Concern:

Mrs. Patricia Baumgartner, RN, is employed by W. A. Foote Memorial Hospital, Inc., Ambulatory Care Department in the Emergency Service.

As part of a project assignment, she has requested and been given permission to survey a particular population group during August 1986, that presents to the Emergency Service with the understanding that hospital policies and procedures, and standards of care will be maintained, including confidentiality.

Also, we are looking forward to a summary of her findings. The summary may be useful to the nursing staff in the Emergency Service for increasing their knowledge and awareness.

Sincerely,

Nancee Radtke
Administrative Director
Ambulatory Care Department

NR/mh

JACKSON COUNTY HEALTH DEPARTMENT
410 ERIE STREET
JACKSON, MICHIGAN 49202
PHONE 788-4420

TO: Pat Baumgartner DATE 9-24-87

FROM: Christine Broesamle, BSN, RN

It is acceptable to recruit subjects for your project from the JCHD Immunization Clinic.

APPENDIX B

Study Questionnaire

Code: _____

Sociodemographic Questionnaire

The following questions describe general things about you and your family. Although I would appreciate your answering every question, if you should prefer not to answer a particular question, please feel free to leave it blank and go onto the next question. Remember, this information will be kept confidential. It should take you approximately 5 minutes to complete this questionnaire. Thank you for your time.

1. Name: (parent that is completing this questionnaire and provides care for child during a fever)

   _____

2. Address: _____ 3. Phone: _____

   _____

3. Relationship: (check one)

   mother ___
   father ___
   guardian ___

4. Ethnic background: (check one)

   White ___ Oriental ___
   Black ___ American Indian ___
   Hispanic ___ Other (please specify) _____

5. Marital Status: (check one)

   never married ___
   married ___
   widowed ___
   separated ___
   divorced ___

6. Education: (highest grade completed in school, including college)

   _____

7. Occupation: _____

8. Income: Total family income for the past 12 months (check one)

0-4,999	___	20,000 - 24,999	___
5,000 - 9,999	___	25,000 - 29,999	___
10,000 - 14,999	___	30,000-39,999	___
15,000 - 19,999	___	40,000 - over	___

9. Children: Please list first name, date of birth, and sex of each of your children.

	name	date of birth	sex
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

10. Have any of your children ever had a fever? (check one)

yes ___
no ___

If yes, when was the last time? _____

11. Are any of your children allergic to aspirin or Tylenol? (check one)

yes ___
no ___

If yes, which child? _____

If yes, to which drug? _____

12. Have you, your child's other parent, or any of your children ever had a seizure (convulsion) caused by a fever? (check one)

yes ___
no ___

13. Do any of your children have a chronic health problem?

yes ___
no ___

If yes, which child? _____

If yes, what is the health problem? _____
_____

14. What is your usual source of health care for your children? (check one)

___ Pediatric Nurse Practitioner
___ Family Doctor
___ Pediatrician
___ Health Department
___ Emergency Room
___ None
___ Other (please specify) _____

15. Have you ever received instructions about childhood fever and how to treat it? (check one)

___ yes
___ no

If yes, from what source? (check as many as appropriate)

___ family doctor
___ pediatrician
___ office nurse
___ emergency room instructions
___ magazines
___ television
___ family - which member _____
___ friends
___ other (please specify) _____

Please feel free to make comments below about any of the following questions that you found difficult to understand. Once again thank you for your cooperation.

Code: ____

Fever Questionnaire

This questionnaire is designed to determine what information you, as a parent, have about childhood fever and how you would go about treating fever. Please answer all questions to the best of your knowledge. Circle the letter of the correct answer. It should take you approximately 5 minutes to complete this questionnaire.

---

1. What site do you use to take your child's temperature?

   a. rectal
   b. oral
   c. axillary

2. What is the normal body temperature?

   a. 98°F
   b. 98.2°F
   c. 98.6°F
   d. 99°F

3. If a child has a fever, how high can it go?

   a. 102°F
   b. 104°F
   c. 106°F
   d. 108°F
   e. 110°F
   f. higher than 110°F
   g. I don't know

4. What is the lowest temperature you consider a fever in a child?

   a. 99°F
   b. 100°F
   c. 101°F
   d. 102°F
   e. 103°F

5. How would you describe a fever your child may develop?

   a. A dangerous symptom that causes serious harmful effects.
   b. The body's normal response to infection which helps the body fight infection.
   c. A symptom of infection which always requires treatment.

6. At what temperature do you begin to treat your child's fever?

   a. 99°F
   b. 100°F
   c. 101°F
   d. 102°F
   e. 103°F
   f. 104°F

7. For what reason do you treat your child's fever?

   a. To prevent harmful effects.
   b. To make him/her comfortable.
   c. To treat the infection.

8. Where is the safest place to check your child's temperature?

   a. mouth
   b. armpit
   c. rectum

9. What is the most accurate way to check your child's temperature?

   a. Glass/mercury thermometer
   b. Forehead fever strip
   c. Touch his/her skin

10. At what temperature would you begin to sponge your child?

    a. 99°F
    b. 100°F
    c. 101°F
    d. 102°F
    e. 103°F
    f. 104°F
    g. higher than 104°F

11. What kind of solution would you use to sponge your child?

    a. ice water
    b. cold water
    c. luke warm water
    d. water mixed with alcohol

12. How long would you sponge your child?

    a. 15 minutes
    b. 30 minutes
    c. 1 hour
    d. until the temperature returned to normal

13. What is one possible bad effect of aspirin?

    a. none
    b. bleeding problems
    c. blurred vision
    d. dizziness
    e. don't know

14. What is one possible bad effect of Tylenol?

    a. none
    b. liver damage
    c. stomach ulcers
    d. headache
    e. don't know

15. When would you contact your doctor, nurse, or the emergency room for help or advice in treating your child's fever?

    a. When the temperature reaches 102°F.
    b. Before giving the child any medicine.
    c. After two or three days when you aren't sure what is causing the fever.
    d. If one or two doses of medication don't make the fever go away and stay away.
    e. As soon as you realize your child has a fever.

Answer the following questions true or false. Circle T for true or F for false.

16. One dose of Tylenol will make your child's fever return to normal and stay normal. T F

17. The best way to decide how much Tylenol to give your child is by his body weight. T F

18. It is unsafe to give the correct dose of tylenol every four hours for two days. T F

19. You should wake your sleeping child if he has a fever to check his temperature and give him Tylenol or aspirin. T F

20. Giving your child extra liquids to drink when he/she has a fever is helpful in treating the fever. T F

21. Dressing your child very warm will help break his/her fever. T F

22. Reyes Syndrome is thought to be caused by treating febrile children due to a viral illness with aspirin. T F

Please feel free to use the space below to make comments about any of the following questions that you may have found difficult to understand. Thank you for your help in completing this study.

APPENDIX C

Fever Treatment

Temperature Measurement

1. Check your child's temperature twice a day, for example, 10 a.m. and 2 p.m. If your child feels very hot and dry and looks flushed, you may want to check the temperature more often.

2. Us a glass mercury thermometer.

3. Place the tip of the thermometer in a dry armpit.

4. Hold the arm close to the body for 4 minutes, then read the thermometer.

5. It is not necessary to wake a sleeping child to check the temperature.

Supportive Measures

1. Have your child drink plenty of liquids such as water, pop, fruit juice, and popsicles while he/she has a fever. This helps prevent dehydration.

2. Do not dress your child too warmly. Heavy clothing and blankets keep the body heat in and increase the body temperature. Do avoid drafts.

3. Encourage rest and discourage vigorous activity which may increase body heat. Normal play is fine.

Medications

1. An antipyretic is a drug that acts to lower elevated body temperature. Examples include acetaminophen (Tempra, Tylenol) and aspirin. The use of aspirin has been related to the development of Reyes Syndrome.

2. If the temperature is greater than 102°F and if the child is uncomfortable (headache, fussy) give liquid or chewable acetaminophen.

3. Dose: The most accurate way to determine the correct amount of acetaminophen to give is according to body weight.

Weight (lbs)	Dose (mg)
6-11	40
12-17	80
18-23	120
24-35	160
36-47	240

4. Frequency: Acetaminophen may be given safely every 4 hours while awake. Do not use longer than 2 or 3 days without consulting a doctor.

5. Note: Your child's temperature will probably not return to normal even with acetaminophen until whatever is causing the infection is gone.

Sponging

1. If your child's temperature is higher than 104° ½ hour after giving acetaminophen, sponge for 30 minutes with lukewarm water.

2. Do not use cold water. It causes shivering and great discomfort. Do not add alcohol to water.

3. Note: The temperature probably will not go below 101°F even with sponging.

APPENDIX D

Fever Record

Code: _____

FEVER RECORD

Instructions: Please complete one of these records each time your child age 2 months to 4 years has a fever starting October 1, 1986 and ending February 28, 1987. It is necessary to keep the record for only the first 24 hours of each fever episode during that time. Each episode of fever is to be considered to be separated from the last episode of fever by at least 72 hours (3 days) without fever. Please answer each question. Once again, thank you for your help.

---

1. _____ 2. Date: _____

3. Child's _____ 4. Age: _____

5. Weight: _____

6. How did you know your child had a fever? (check as many as appropriate)

___ I checked his/her temperature with a thermometer.
___ He/she felt hot
___ He/she looked flushed and sick

7. What did you do when you first realized your child had a fever? (check as many as appropriate)

___ I observed my child but did nothing else.
___ I checked my child's temperature.
___ I gave my child medication.
___ I sponged my child.
___ I called the doctor or emergency room.
___ I took my child to the doctor or emergency room.

8. If you checked your child's temperature, which site did you use?

___ oral
___ armpit
___ rectum

9. If you checked your childs temperature, at what time(s) did you check it and what was the reading?

time	reading	time	reading
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

10. If you gave your child medication for fever, which medication did you give? (check all appropriate answers)

___ aspirin
___ acetaminophen (Tylenol, Tempra, Liquiprim, aspirin-free)
___ other (please specify) _____

11. If you gave medication, what dose did you give?

_____

12. If you gave medication, how often did you give it?

_____

13. If you sponged your child, what kind of solution did you use? _____

14. If you sponged your child how long did you sponge?

_____

15. If you sponged your child, what were the results?

_____

16. If you contacted your doctor or the emergency room, what made you decide to seek advice? _____

_____

17. If you contacted your doctor or the emergency room, what instructions were you given? _____

_____

18. Did you follow these instructions? ___ yes ___ no

If no, please explain. _____

_____

19. What other things did you do for your child's fever?

_____

_____

20. If you child's fever lasted more than one day, did you do anything differently after the first day?
___ yes ___ no

If yes, please describe what you did differently.

_____

_____

23. How would you describe your efforts at treating this episode of childhood fever?

a. successful
b. partly successful
c. unsuccessful
d. unsure

APPENDIX E

Letter of Consent

The Impact of Nursing Intervention on Parental Knowledge and Behavior in the Management of Childhood Fever

Dear Parent,

This letter is to introduce you to a study which is being conducted by Pat Baumgartner RB, BSN, a graduate student at Michigan State University, College of Nursing.

Parents frequently become alarmed when their child develops a fever and are unsure about the best way to treat fever. This research study is being done to determine how nurses can help parents understand childhood fever and treat it safely and effectively.

The various parts of this study will each take about ten minutes of your time. You are asked to complete and return questionnaires about yourself and your family and fever at the beginning of the study. A questionnaire about fever will be repeated later in the study. You are also asked to complete and return a short record about how you treat your child each time he/she has a fever during the next five months. As a part of this study, you may also be chosen to have a thirty minute home visit with the nurse to discuss childhood fever and how to treat it. For those who do not receive a home visit, fever information and instruction guidelines will be provided at the end of the study.

Participation in this study will result in no physical risk or expense to you or your family. Your information will remain confidential and your identity anonymous. No information that could identify you will be used in the publication of research data. The results of this study will be made available to you at the completion of the study.

If you have any concerns or questions, feel free to ask them now or call me at 782-3971. Thank you for your time and consideration. Your participation in this study will be greatly appreciated.

Sincerely,

Pat Baumgartner

Pat Baumgartner RN, BSN
Family Clinical Nurse Specialist Candidate
Michigan State University
College of Nursing

The Impact of Nursing Intervention on Parental Knowledge and Behavior in the Management of Childhood Fever

Parents frequently become alarmed when their child develops a fever and are unsure about the best way to treat the fever. As a registered nurse and graduate student at Michigan State University, College of Nursing, I am conducting a study to determine how nurses can help parents understand and treat their child's fever.

In this study you will be asked to answer a number of questions about fever and how you would treat it. You will also be asked a number of questions about yourself and your family such as age, sex, and education. In addition you will also be asked to fill out records over a five month period about what you do for your child when he/she actually has a fever. You may also be chosen to receive a homve visit from the nurse to discuss childhood fever and how to treat it. To arrange this visit you will be contacted by phone.

Thank you for your assistance.

Pat Baumgartner RN, BSN
Family Clinical Nurse Specialist Candidate
Michigan State University
College of Nursing

By signing this form, I understand that:

1. I have freely consented to take part in this study.
2. The study has been explained to me. I understand the explanation that has been given to me and what my participation will involve.
3. I am free to discontinue my participation in the study at any time without penalty.
4. My responses will be treated with the strictest confidence and all participants will remain anonymous.
5. I will be responding to written information.
6. It will take me approximately ten minutes to complete the questionnaires. The home visit will last approximately 30 minutes.

7. I am not guaranteed any beneficial results from my participation in this study.

8. Results of the study will be made available to me upon request.

9. I understand that the care my child and I receive at this agency will not be affected by my decision of whether or not to participate in this study.

"I understand that if I am injured as a result of my participation in this research project, Michigan State University will provide emergency medical care if necessary, but these any any other medical expenses must be paid from my own health insurance program."

Signed: _____

Date: _____

Witness: _____

APPENDIX F

Letter of Explanation

Dear

As you may know, I am currently a graduate student at MSU. As part of my educational program, I am conducting a research study entitled The Impact of Nursing Intervention on Parental Knowledge and Behavior in the Management of Childhood Fever. I have been given the opportunity to utilize the Ambulatory Care Department to recruit participants for this study. In order to approach families about participating in this study, I am asking all nurses involved in triage to assist me in this phase of the study.

Families meeting the following criteria should be introduced to the study and asked to participate as they present at triage for the treatment of their sick child.

1. The child must be between the ages of 2 months and 4 years.

2. The parent must be able to speak, read, and write English.

3. The family must be able to be contacted by telephone.

Once a family is identified as eligible to participate, the following steps should be taken to enroll them in the study.

1. A letter of explanation should be given to the parent , read, and retained by them.

2. If the parent is willing to participate, they should then read and sign the consent form and return it to the triage nurse.

3. Once the consent form is signed, the parent should complete the sociodemographic questionnaire, and return it to the triage nurse.
4. Each consenting family should be given a fever questionnaire in the stamped, self-addressed envelope.

5. In appreciation for their assistance, consenting parents will be given a thermometer and an age appropriate sample of Tempra.

I realize the added burden this requires on your part as the triage nurse, especially during busy times. So, I sincerely appreciate your efforts in assisting me in recruiting participants for my study. I hope the data I collecting during this study, which I will share with you upon completion of the study, will be interesting and useful to you as a professional nurse who frequently encounters this particular problem in your clinical setting.

If you have any questions about your part in the study, please feel free to call me at 782-3971 or ask Sharon Caler if she is available. Once again, I appreciate your time and assistance.

Pat Saunders

APPENDIX G

Letter of Instruction

113 Myrlice Ct.
Jackson, Michigan
October 1, 1986

Dear Parent,

These are the instructions for completing the "fever study" you so generously agreed to participate in. You may want to keep this large mailing envelope and mark it fever study in order to keep the enclosed materials on hand for the next five months.

Enclosed you will find several Fever Records. Please complete one of these forms each time your child, age 2 months through 4 years has a fever duringthe next five months beginning October 1, 1986 and ending February 28, 1987. It is necessary to keep the record for only the first 24 hours during each fever episode.

You will also find five slips of paper which state that your child(children) did not have fever. If your child(children) did not experience fever during a particular month, fill in the month on the blank.

Five stamped, self-addressed envelopes, one for each month of the study, are enclosed. At the end of each month, mail the fever records completed for that month or the slip stating no fever was experienced during that month to me. If you require additional fever records or you have any further questions regarding the completion of the study, please contact me immediately and I will send you more fever records as soon as possible and answer your questions.

Once again, thank you for your participation in this study.

Sincerely,

Pat Baumgartner R.N. B.S.N.
782-3971

Code: ____

My child (children) did not experience any episodes of fever during the month of _____.

Date: _____

Code: ____

My child (children) did not experience any episodes of fever during the month of _____.

Date: _____

Code: ____

My child (children) did not experience any episodes of fever during the month of _____.

Date: _____

APPENDIX H

Notice of Study Completion

113 Myrlice Ct.
Jackson, Michigan
February 24, 1987

Dear

This month concludes the five months of your participation in my research study related to childhood fever. As the final part of this study, you are once again asked to complete the enclosed fever questionnaire. Please return the fever questionnaire, any fever records for the previous five months, and statements of "No Fever" in the enclosed, self-addressed, stamped envelope on Saturday, February 28, 1987!

In the next phase of my research study, I will analyze the information you have provided. This is a complex process involving use of computerized statistical analysis. Once I have compiled and interpreted this information, I will send each of you a brief summary of my findings. In addition, those of you who did not receive a home visit will receive a copy of the Fever Information and Instruction Guidelines I prepared for those people who received a home visit.

Almost 100% of you returned the initial fever questionnaire in August. A similar response for the final questionnaire would be extremely valuable for my study.

As this portion of my research study draws to a conclusion, let me once again express my sincere appreciation for your participation.

Sincerely,

Pat Baumgartner

Pat Baumgartner BSN, RN
Family Clinical Nurse Specialist
Candidate
Michigan State University
College of Nursing

APPENDIX I

Results of the Study

113 Myrlice Ct.
Jackson, Michigan 49203
September 30, 1987

Dear Parent,

A little over one year ago, you agreed to participate in a research study designed to determine what impact a nursing intervention has on parental knowledge and behavior in relation to childhood fever. I have completed the analysis of the data which your participation in this study provided and would like to share those findings with you now.

At the beginning of the study, parents were randomly assigned to two separate groups. One group received a home visit during which we discussed childhood fever and safe and effective measures to use in the management of childhood fever. In addition, the parents in this group received an informational pamphlet on childhood fever. Those of you not receiving the home visit will find the same information enclosed with this letter.

Based on the questionnaires and fever records you completed and returned to me, I was able to determine whether or not the discussion of childhood fever was helpful in increasing knowledge about childhood fever and actual behavior in managing fever episodes. The group of parents receiving the home visit showed an increase in knowledge about childhood fever over that of the group of parents not receiving the visit. On the other hand, there was no difference in the way parents in the two groups actually managed a febrile episode. In other words, the home visit did not appear to have had an effect on the ways parents treated their child's fever.

The interpretation of these findings suggests that nurses can be successful in helping parents learn more about childhood fever. However, it also suggests that in this case the intervention was not as successful in helping parents treat childhood fever more effectively. Perhaps this means that nurses should search for other methods to use in helping parents deal with this particular health care problem.

Once again, I wish to express my appreciation to each one of you , for without your participation, the completion of this study would not have been possible.

Sincerely,

Pat Baumgartner

Pat Baumgartner, R.N., B.S.N.
Family Clinical Nurse Specialist Cand.

APPENDIX J

University Approval

MICHIGAN STATE UNIVERSITY

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING
HUMAN SUBJECTS (UCRIHS)
238 ADMINISTRATION BUILDING
(517) 355-2186

EAST LANSING • MICHIGAN • 48824-1046

June 30, 1986

Ms. Pat Baumgartner
113 Myrlice Ct.
Jackson, Michigan 49203

Dear Ms. Baumgartner:

Subject: Proposal Entitled, "Understanding the Nature of Fever in Illness"

UCRIHS' review of the above referenced project has now been completed. I am pleased to advise that since the reviewers' comments have been satisfactorily addressed, the conditional approval given by the Committee at its June 2, 1986 meeting has now been changed to full approval.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval prior to June 2, 1987.

Any changes in procedures involving human subjects must be reviewed by the UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to our attention. If we can be of any future help, please do not hesitate to let us know.

Sincerely,

Henry E. Bredeck
Chairman, UCRIHS

HEB/jms

cc: Dr. Barbara Given