Research Papers

Health Literacy and Fever Management in a Community Based Intervention

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Abstract

Objective: To evaluate both the need for and effectiveness of a community-based educational intervention to increase knowledge of fever management for parents identified to be at risk for low health literacy. Design: Prospective, repeated measures intervention design. Sample: Sixty-six parents with children ages 1 month to 5 years. Intervention: Parents participated in a nurse-led A.C.T (Assess-Communicate-Treat) fever management program at a rural community center. Knowledge of fever management, parental confidence with fever management knowledge and skills, and comfort communicating with health care professionals was measured using the Fever Management Questionnaire (FMQ) immediately preceding program participation and then again at 1 and 3 months post-participation. The numeracy portion of the Test of Functional Health Literacy in Adults (TOFHLA) and the Short Test of Functional Health Literacy in Adults (STOFHLA) were administered preceding the program and again at 1-month post intervention. Results: Following the educational intervention, parents had significantly higher FMQ scores at both 1- and 3-months post intervention. FMQ scores remained stable between 1 and 3 months. No changes in overall health literacy were identified. Conclusions: The A.C.T. fever management program was successful in increasing knowledge of fever management knowledge in this at-risk sample.

Key Words
Health literacy, Assess-Communicate-Treat (A.C.T.), Fever Management Questionnaire (FMQ)

Accounting for 19% to 50% of pediatric office visits (Betz & Grunfeld, 2006; Eskerud, Laerum, Fagerthun & Lunde 1992) and a large percentage of after-hours calls (Belman, et al, 2007) elevated body temperature or “fever” is a common occurrence during childhood (Crocetti & Serwint, 2005). Yet, parental knowledge of fever etiology and appropriate management is poor (Walsh & Edwards, 2006). Parental concerns regarding childhood fever often are due to misinformation and a lack of understanding that fever is a symptom or a sign of illness and not a disease (Crocetti, Moghbeli, & Serwint, 2001; Schmidt, 1980). Parents have voiced concern that fever is maladaptive and will likely result in serious harm, such as brain damage or even death (Betz & Grunfeld; Casey, et al, 1984; Crocetti, Moghbeli, & Serwint; Walsh, Edwards & Fraser, 2007). Fears such as these have been termed “fever phobia” (Schmidt).

Multiple studies have identified the benefit of educational interventions on parental fever management knowledge and skills (Broome, Dokken, Broome, Woodring, & Stefelman, 2003; Casey et al, 1984; Liebman & Barnsteiner, 2001; Sarrell & Kahan, 2002). Further, nursing telephone triage has been found to be an effective in helping parents to manage their child’s elevated temperature (Light, Hupcey, & Clark, 2005). Despite these successful interventions, parental fears toward fever persist (Crocetti & Serwint, 2005; Walsh & Edwards, 2006). One possible barrier to the widespread success of educational interventions is parental inadequate health literacy.

Despite the Healthy People 2010 goal of increasing health literacy (US Department of Health and Human Services, 2000) nearly 1/2 of all American adults, an estimated 90 million people, have limited literacy skills and thus may have difficulty understanding and acting upon
health information provided to them (Neilson-Bohlman, Panzer, & Kindig, 2004). Health literacy is defined as a constellation of skills that constitute the ability to perform basic reading and numerical tasks that are required to function in the health care environment (Schwartzberg, 2002). The Short Test of Functional Health Literacy in Adults (STOFHLA) defines health literacy at three levels: adequate (can read and interpret most health texts), marginal (has difficulty reading and interpreting health texts) or inadequate (unable to read and interpret health texts (Parker, Baker, Williams & Nurss, 1995). Persons with inadequate literacy skills have poorer health status, are more apt to be hospitalized, and make more visits to emergency rooms than their more literate counterparts (Baker, Parker, Williams & Clark, 1998) accounting for an estimated increase of $50 to $73 billion dollars per year in healthcare costs (Neilson-Bohlman, Panzer, & Kindig; Schwartzberg, 2002).

Written instructions distributed by healthcare providers are often at reading levels much higher than the average person can accurately understand (Quirk, 2000, Krantz, 2002) making them of little use. Verbal instructions from healthcare providers can be problematic as well as cause parental anxiety and miscommunication can occur when education is provided during a febrile illness (Behar-Horenstein, et al., 2005). For parents with limited fever management knowledge, a febrile illness presents numerous challenges. One of the greatest challenges facing the health care system today is the need to ensure that adequate and accurate health information is available to everyone regardless of literacy level (McCray, 2005). The purpose of this study was to examine the effectiveness of a structured fever management educational intervention for parents at risk of having low health literacy.

Ethical Considerations
The study was approved by the University of Alabama at Birmingham Institutional Review Board. A letter of agreement to participate was obtained from participants. Participants were assured that their decision to participate or not participate would not affect their relationship with center staff or any services they were currently receiving. Further, they were assured that if they choose to participate, they could discontinue at any time without disturbing their relationship with center staff or services they were currently receiving. Participants were given a $10.00 cash incentive at each data collection point.

Methods

Setting and Sample

A partnership between Sylacauga Alliance for Family Enhancement (SAFE) in Sylacauga, Alabama and the University of Alabama at Birmingham was established to conduct this intervention. Most families served by this center are headed by a single female parent and live in poverty, with annual incomes less than $8000 (4,119.46 GBP). About 49% of the families serviced by the center are African-American and about 51% are Caucasian. The community resource center has numerous programs for families with children from age 1 month to 6 years. Potential participants were recruited through verbal interactions with SAFE staff members and recruitment posters placed throughout the building. Posters were also placed at various locations throughout the community, such as grocery stores, physicians’ offices and discount stores. Additionally, recruitment materials were mailed to families already enrolled in SAFE programs.

Procedure

Design
This study is a prospective, repeated measures intervention design. The study was conducted over a 13 month timeframe, from May 2003 to May 2004. Data was collected from participants on 3 different occasions: baseline (immediately preceding the class) and again at 1 and 3 months after completion of the class during a home visit. At baseline each completed a 1) demographic questionnaire, 2) Short Test of Functional Health Literacy in Adults (STOFHLA), 3) numeracy portion of the Test of Functional Health Literacy in Adults (TOFHLA) and the 4) Fever Management Questionnaire (FMQ). The STOFHLA and the numeracy were measured at baseline and 1-month only. Self-assessed level of fever management knowledge, parental confidence in ability to manage a febrile episode and comfort level when communicating with HCP were measured using a Likert-type scale with anchors of 1 and 10.

The purpose of this study was three-fold. The first goal of this research was to measure parental fever management knowledge with a group of parents at risk for having low health literacy levels. Second, we sought to evaluate the effectiveness of a community-based educational intervention to increase parental knowledge of fever management. Finally, we sought to examine the impact of participating in a health education program on overall health literacy.

Measures

The FMQ is a self-administered questionnaire with 36 items intended to measure knowledge of fever management. The instrument has four sections and is meant to elicit knowledge about fever, confidence with managing a febrile illness, and comfort when communicating with health care professionals. Reliability of this instrument was estimated at .92 and .94 in previous studies (Broome, Dokken, Broome, Woodring, & Stefelman, 2003). Literacy levels of
parents/grandparents in these studies are unknown. Content validity was established through expert review.

Health literacy was measured using the STOFHLA. This instrument measures participants’ ability to read passages using printed patient material routinely found in health care settings (e.g. how to prepare for a diagnostic procedure) (Parker, Baker, Williams, & Nurss, 1995). In this 2-part test, the participant reads a scenario and answer questions that measure their understanding of the material. The second part of the test provides passages of text about medical topics and with selected words missing. Participants are asked to “fill in the blank” using a word from a multiple choice list of options. Short TOFHLA scores can range from 0-36, with higher scores indicating better literacy. The 17 item numeracy portion of the (TOFHLA) was administered to assess the individual’s ability to interpret numerical instructions. The TOFHLA and the STOFHLA have been widely used as an effective tool since the 1980s (Baker, et al., 1998). Previous studies had documented the reliability of both the STOFHLA and the TOFHLA at 0.97 (Baker, et al.). Both face and construct validity instrument has been established (Parker, Baker, Williams, & Nurss).

Intervention

The A.C.T. (Assess-Communicate-Treat) fever management education program was provided on-site at the SAFE community center, with key concepts being reinforced during 2 subsequent home visits. The A.C.T. educational program manual was based on information found in Instructions for Parents or Primary Caretakers (Schmitt, 1992) the only recognized standard for educating parents and caregivers about fever management. The A.C.T. course and manual presented the following information:
• Myths and misconceptions about fever
• Medical terminology related to fever assessment and management
• Techniques of temperature taking
• Assessing a child for other symptoms requiring immediate medical attention
• Processes involved in assessing other symptoms that could occur with fever
• How to identify serious symptoms requiring immediate medical attention
• How to communicate with a health professional about the child's symptoms
• Common treatments used to treat fever
• How to monitor a child's response to treatment

Each program participant was provided with an A.C.T. Fever Management program manual and a “fever pack”. The A.C.T. manual contained colorful illustrations to help the participants visualize symptoms related to fever for which they should be concerned (e.g. stiff neck). To ensure readability among parents at various literacy levels, text of the manual was written at the 5th grade level according to a SMOG analysis (McLaughlin, 1969). Included with the manual, were 5 tri-fold pamphlets; each with a list of questions (e.g. Is the child eating? Drinking?) for parental use when assessing their child prior to calling a HCP (Health Care Professional). Space was also provided for parents to write down instructions from the HCP related to medication, fluid intake and follow-up. The “fever pack” contained a bottle of liquid acetaminophen with a measuring spoon for administration of the medication and a thermometer with disposable plastic covers for multiple usage. The A.C.T. program presents parents with information on how to take a standardized approach to childhood fever management. First, parents are taught to first **Assess (A)***. In this step, parents are taught how to correctly measure their child’s temperature using a thermometer. Next, parents are instructed to **Communicate**
findings (C) with healthcare providers if appropriate. Parents are taught how to Treat (T) their child’s elevated temperature with medication and comfort measures.

Each nurse led intervention class was followed with a “question and answer” period to provide an opportunity to clarify any misunderstandings and/or gain additional information. Class sizes were small, ranging from 6 to 18 participants and were approximately 2 hours in duration.

Two newsletters were sent at 1- and 2-months post-intervention, providing information on topics such as child development, nutrition, basic hygiene (e.g. hand washing), medication, reading prescriptions and managing a child’s pain. Each newsletter also contained information to reinforce knowledge of fever management.

Home visits were made by a SAFE staff member at 1 month to all participants of the A.C.T. intervention, just after receipt of the newsletter. Participants were allotted time to ask questions about the information they had been given both in class and via the first newsletter. SAFE staff members were able to clarify any misconceptions regarding fever management with each participant at this visit. Prior to departure from each home, data collection was done by administering the FMQ, STOFHLA and the numeracy portion of the TOFHLA. At three months post intervention SAFE staff conducted a final home visit with all participants. Data collection was done at this visit using the FMQ only and participants were allowed to express thoughts on the A.C.T. intervention and to clarify any misconceptions.

Statistical Analyses

Data were managed and analyzed using SPSS Version 14.0. Descriptive statistics were used to summarize demographic characteristics, fever management knowledge, confidence in ability to
manage a febrile illness and comfort communicating with HCPs. Knowledge of fever management over the 3 evaluation periods (baseline, 1, and 3 months after class) was analyzed using repeated measures analysis of variance. Post hoc analysis was conducted using t-tests (Bonferroni method). Relationships between fever management knowledge, confidence in ability to manage a febrile episode and comfort communicating with health care professionals were examined using Pearson’s correlation coefficients. T-tests were used to evaluate mean differences between health literacy scores.

Results

Sixty-six parents (mothers or grandmothers) participated in the A.C.T. fever management program. “Parent” referred to either the parent or grandparent that was the primary caregiver for the child. Parent age ranged from 19 to 65 ($m = 29.39; sd = 8.97$). Most participants identified themselves as either African American ($n = 29; 43.9\%$) or Caucasian ($n = 29; 43.9\%$). Most parents had not completed high school ($n = 40; 61\%$) and only 2 (3\%) had completed college. Children ranged in age from 6 months to 6 years.

Parents reported relative frequent use of healthcare resources for fever management in the 6 months preceding the intervention. Parents took their child to see their primary health care provider an average of 1.08 times ($sd = 1.19$; range 0 – 4 visits) and to the Emergency Room .70 times ($sd = 1.07$; range 0-5 visits). After-hours calls were also common ($m = .80; sd = 1.24$; range 0 – 5 calls).

Repeated measures ANOVA identified a significant difference between parental FMQ scores over time ($F [1, 31] = 6.67; p = .006$). Mean differences between participant FMQ scores at baseline, 1, and 3 months are presented in Table 1. The mean FMQ score at baseline was
43.91 (sd = 9.20). Twenty percent (n = 13) of parents did not own a thermometer and 11% (n = 7) did not know how to read one. Parents had the most difficulty knowing how long to leave the thermometer in place (n = 35; 53%) and what temperature would be considered elevated (n = 35; 53%). Most believed that the child’s temperature was a better indicator of illness than the child’s activity level and/or behavior (n = 48; 73%). Inadequate knowledge levels regarding the use of antipyretic medications was identified, with nearly 1/3 (n =21) unable to identify the correct acetaminophen dose for their child. Confusion regarding which medications were appropriate for fever management was also present, with 11(16.7%) parents not recognizing ibuprofen (Motrin) or acetaminophen (n = 5; 7.6%) as antipyretics. Seven (10.6%) parents believed aspirin to be an appropriate medication for treating a child’s fever. Parents were most knowledgeable about the appropriate routes (oral, rectal, etc.) for taking a temperature (89.4% to 90.9% depending upon the route) and when to call a HCP (n = 48; 72.7%). Reliability of this instrument at baseline was 68% using Cronbach’s alpha.

Self-assessed level of fever management knowledge, parental confidence in ability to manage a febrile episode and comfort level when communicating with HCP were measured using a Likert-type scale with anchors of 1 and 10. Mean scores and differences between baseline, 1, and 3 months are provided in Table 2. The relationship between knowledge measured by the FMQ and perceived level of knowledge was found to be significantly correlated (r = .47, p < .01). Likewise, the relationship between knowledge (both FMQ and perceived) and confidence in ability to manage a febrile episode were found to be significantly correlated (r = .52 and .56 respectively, p < .01). Further, the relationship between self-reported level of comfort with HCP communication and FMQ scores was also found to be significant (r = .42, p < .01).
Most parents had adequate literacy scores at baseline as measured by the STOFHLA ($M = 33.29; SD = 5.59$) (Table 3). Numeracy scores ranged from 0-17 ($M = 13.09; SD = 3.67$) at baseline. Neither STOFHLA nor numeracy scores increased at 1 month following program participation (Table 1).

Discussion

Findings from this study are consistent with other studies; fever management continues to be a significant challenge for both parents and healthcare providers (Broome, Dokken, Broome, Woodring, & Stegelman, 2003; Crocetti, Moghbeli, & Serwint, 2001; Lagerlov, Helseth, & Holager, 2003; Sarrell, & Kahan, 2002; Walsh, Edwards, & Fraser, 2007). Parental difficulty measuring and treating fever were identified by the parents themselves. Following program participation, both FMQ scores and parental perception of knowledge had significantly improved.

Over-utilization of healthcare resources for febrile episodes is an unnecessary stressor to an already overburdened healthcare system. In our study, 60% ($n =40$) of parents had taken their child to the physician and/or emergency room and 40% had called their physician for fever management in the 6 months preceding program participation for fever management. However, it is unknown if these visits reflect appropriate use of HCP services or not. Prior research has shown that an increase in knowledge of fever management can lead to a decrease in unnecessary utilization of health services (Sarrell & Kahan, 2002). Longitudinal research to evaluate the long term impact of the A.C.T. fever management educational intervention on both parental knowledge and appropriate utilization of services is indicated.
When their child is ill, parents feel the need to “do something”. The belief that fever is harmful leads parents to use antipyretic medications (Lagerlov, Helseth, & Holager, 2003; Walsh, Edwards & Fraser, 2007). However, many parents lack the knowledge and skill to safely administer the medication. Knowing what medication to administer, when to administer the medication and how much of the medication to administer have all been identified as gaps in parental knowledge (Bilenko, Tessler, Okbe, Press, & Gorodischer, 2006; Casey et al, 1984; Sarrell & Kahan, 2003). Further, parents may lack the knowledge and skill to accurately use a thermometer to measure the child’s temperature. Both concerns were identified within this sample. However, the A.C.T. intervention was successful in helping parents to develop these skills.

Improving communication between patients and healthcare providers has been identified as a priority (American Medical Association, 1999). Parental miscommunication with healthcare professionals can result in inappropriate or inadequate care for their sick child. Findings from this study reveal that parental comfort with HCP communication about fever management is related to parental knowledge of fever management. It is likely that increased parental knowledge of fever management will result in more effective communication with HCPs.

Given the risk factors for low health literacy (poverty, minority status, lower educational achievement) (Neilson-Bohlman, Panzer,& Kindig, 2004) it was anticipated that some of the study participants would have inadequate or marginal health literacy. However, most parents had adequate health literacy as measured by the STOFHLA and the numeracy TOFHLA. Nonetheless, managing a childhood febrile episode was a challenge for these parents. Additional research further investigating the relationship between social risk factors, health literacy and parental knowledge of fever management is indicated.
Parental desire to have the knowledge and skill to manage febrile illness was apparent. Many parents expressed approval with the colorful, illustrated program manual. Parents voiced appreciation for the nurse-led classes, especially the opportunity to clarify misconceptions at the end of class. Regardless of literacy level, most individuals prefer health care educational materials to be simple and clear (Journal of Family Practice) Additional research to investigate the relationship between parental satisfaction and motivation to learn and knowledge gained is needed.

The ability to collaborate with SAFE on this project is believed to be a substantial strength of this study. Center staff, working directly with families, added credibility to the study with potential participants. Study consistency was also provided with center staff being involved in the recruitment, intervention and home visits. Center staff was also a resource following project completion for additional information on fever management if needed. However, it may be that existing relationships with center staff may influenced participation, in that only those parents who felt comfortable with their fever management knowledge and health literacy agreed to participate. Knowledge of fever management and health literacy levels of non-participants is unknown.

Study attrition was a challenge with this sample. Parents voiced family responsibilities, needing to work and relocation as reasons for discontinuing participation. Future interventions should investigate methods to improve participant retention.

Given the number of families served by the SAFE center, participation rates for the fever management education program were relatively low. Research investigating individual and program barriers to participation is indicated. The convenience sample limits the ability to generalize the findings. However, the value of the intervention within this sample was clear.
Additional fever management educational interventions using the A.C.T. format would provide further information on program impact and the psychometric properties of the FMQ in diverse populations.

Future Research

While at risk for low health literacy due to socio-economic status, almost all participants in this study had adequate health literacy levels. While the relatively small sample of this study limits the ability to generalize the findings of this study, it does create questions of the relationship between socioeconomic status and health literacy. Further studies on mediating factors between health literacy and socioeconomic status are indicated.

The A.C.T. format for providing fever management education was successful. Future research could expand the A.C.T. model for use with parents of children at risk for illness. A series of classes dealing with multiple illnesses (diarrhea, upper respiratory, etc) would provide parents with the knowledge and skill needed to care for their child with confidence at home when appropriate.

Many participants voiced negative feelings about the length of the class, specifically that it was too long. Additionally, project staff found the attention span of most participants to be between 1 and 1 ½ hours. Future interventions should be designed to be completed in this shorter time frame.

Future replication studies need to be conducted to evaluate the effectiveness of the intervention with diverse populations. Replication with racially diverse populations, with varying literacy levels would provide crucial information about the suitability of the intervention with these populations. Further, replication of the study using a control group would allow for
better evaluation of the unique impact the educational intervention on fever management knowledge.

Conclusion

Parental knowledge of fever management remains a challenge. Findings from this study reveal that parents with limited fever management knowledge benefit greatly from participating in the A.C.T. fever management educational intervention. Following program participation, parents had increased fever management knowledge and increased confidence in their ability to manage and communicate with HCPs about a fever. Health care professionals must ensure that fever management education is delivered in a format and at time that will be most beneficial to parents. As the most represented member of the health care workforce, nurses are the most likely source for appropriate and timely fever management education.

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Bibliography


Appendices

Table 1
Fever Management and Health Literacy Scores

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