Development of non-pharmacological pain management (behavioral intervention) model based on family-centered empowerment in toddlers with invasive procedures

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ABSTRACT

Introduction: Communication between parents and health professionals in children about assessing and managing their children's pain with both oral and written instructions still needs to be improved. Children with a relationship with a parent or caregiver may be easier to assess and benefit from non-pharmacological treatment. This study aimed to evaluate the development of non-pharmacological pain management (behavioral intervention) model based on family-centered empowerment in toddlers with invasive procedures.

Methods: This study design is an explanation survey with cross sectional approach. The sample consisted of 115 mothers with toddler-age children subjected to invasive prosedures in Rumah Sakit Islam Surabaya using purposive sampling. The data was analyzed using SmartPLS.

Results: Non-pharmacological pain management model based on family-centered empowerment was formed from the mother factor, nurse factor, filial values, and appraisal. The greatest effect was on the filial values factor, with the T statistic value = 2.777.

Conclusions: Nonpharmacological pain management (behavioral intervention) is formed by the mother factor, nurse factor, filial values, and appraisal, where filial values are the most influential. Therefore, in conducting pain nursing care in the nurse's room, paying attention to the four factors above is necessary to improve the quality of care services, especially in comfort for toddler children who undergo invasive actions.

INTRODUCTION

The presence of parents during invasive procedures is needed in line with the concept of family-centered empowerment. Implementation of family-centered empowerment, in addition to having advantages, there are also obstacles to human resources quality and quantity. Nurses need to be equipped with skills regarding family-centered empowerment. Phenomena in the field of various invasive actions, such as infusion installation, have not involved the family optimally in overcoming pain in children. To relieve pain and enhance patients' quality of life, both children and adults, is one of nursing care's fundamental objectives.[1] Children's pain management should include suitable techniques, especially invasive ones. Children's pain should not just be addressed under high pain circumstances.[2] Major barriers to optimal pediatric pain management include time constraints, lack of applicable rules or policies, staff education, and the need for more parental care and education options.[3]

Research shows that nurses do not have adequate information and skills regarding methods that can be used to relieve painful procedures.[4] In addition, communication between parents and health professionals there is a child about assessing and managing their children's pain with oral and written instructions still needs improvement. It was noted that 64% of patients in the intensive care unit did not receive medicine before to or during a painful surgery, and that 35 to 55% of nurses reportedly underestimated the patient's agony.[5] About 224 nurses participated in the study; 72.3% were unaware of the usefulness of non-pharmacological pain management techniques, and 74.6% did not think kids could gauge their level of pain based on how it felt.[6]

Positive feedback from mothers indicates that the therapies employed to lessen severe pain are resource-constrained. Moms express a wish to actively participate in their immediate comfort during the operation. When parents are actively involved in pain management, children who are with them experience less pain overall than children whose parents are simply present or groups of children who do not have their parents present. The idea of allowing parents to watch their children do the treatment in

the emergency room is therefore gaining popularity.[7]

Poor judgment and treating infant and child pain is still challenging for health care providers and caregivers.[8] The biggest asset in assessing and treating pain in young children is the elderly. Children with a relationship with a parent or caregiver may be easier to assess and benefit from non-pharmacological treatment.[9] Poor family capacity can result in inadequate pain management, which can have detrimental psychophysiological effects, higher healthcare expenses, and chronic pain syndrome depending on the child's reaction to subsequent pain episodes.[10] Effective communication & hope of intense interventions in pain management can increase patient satisfaction. Hospitals that want to increase satisfaction should encourage healthcare providers to improve care about pain management and involve pain control with patients & the elderly.[11]

Efforts to improve the ability of mothers to treat pain due to invasive actions in toddler-aged children are with non-pharmacological pain management (behavioral intervention) based on family-centered empowerment. Non-pharmacological pain management techniques include behavioral therapy, physical activity (massage, heat/cold stimulation, and acupuncture), and cognitive therapy (impainting and impairment), all of which can increase patient happiness.[11] A technique called behavioral intervention directs a child's focus away from operations that cause them discomfort (e.g., video recordings, games, interactive books).[12] Respiratory training, modeling of healthy coping behaviors, desensitization, positive reinforcement, and parental coaching are all included in behavioral intervention. A capacity-building paradigm that stresses family strength and places an emphasis on whole families rather than simply sick children is part of the family-centered empowerment movement.[13]

The family-centered empowerment approach, in which there is a process of knowledge from nurses to mothers about non-pharmacological pain management, can improve the ability of families to cope with pain during child care in the clinic and at home. Nursing measures used for empowerment should align with creating nurse and family participation, reducing risk factors and improving health. Based on this phenomenon, researchers are interested in researching the development of family-based non-pharmacological pain management models (behavioral intervention) on the ability of mothers to treat pain due to invasive actions in toddlers.

METHODS

The design of this study is an explanation survey with cross sectional approach. The sample consisted of 115 mothers with toddler-age children who have taken invasive measures in Surabaya Islamic Hospital used *purposive sampling*. The data was collected using a questionnaire and analyzed using SmartPLS. Independent variable consists of five latent variables, namely child factors (6 indicators: age, gender, health status, experience, psychosocial, social), maternal factors (7 indicators: age, education, occupation, experience, cognitive, motivational, personal threat), nurse factors (3 indicators: enabling, empowering, supporting), filial values (3 indicators: responsibility, respect, care), appraisal, and dependent variables of maternal ability (3 indicators: perceive health, personal growth, existential wellbeing).

RESULTS

Convergent validity measurements are assessed based on loading factor values and Average Variance Extracted (AVE). An instrument is said to meet convergent validity testing if the external loading factor (outer loading) and the AVE value are ≥0.5. The weakest loading factor that can be accepted is 0.40, or close to 0.40 can still be tolerated if the number is not much in a factor (construct), so the AVE value can still be close to or greater than 0.5. Based on Table 1 below, the characteristic indicators of children, including age, gender, health status, previous IV experience, psychosocial, and social in the child's characteristic variable, produce a loading factor value worth less than 0.5. Indicators of age, education, occupation, experience, and discovery on the maternal factor variable have a loading factor value of less than 0.5. Therefore, it can be stated that the indicators are not valid for measuring the variables, so the indicator must be reduced to enter the next stage of analysis.

Reliability tests are needed to measure the stability and consistency of an instrument in measuring a concept or variable. In this study, reliability can be measured by looking at the value of composite reliability.[14] Composite reliability measures the true value of a construction's reliability. It is also mentioned that to be said to be a reliable construction, the rule of thumb that applies is > 0.7 for the composite reliability value. According to Table 2, it is found that all variables have a composite reliability value of ≥ 0.7, meaning that all variables have a reliable construction.

In PLS, structural models are evaluated by calculating goodness of fit (GoF). The reference value of GoF measurements is between 0-1 with interpretations of 0.1 (small GoF), 0.25 (moderate GoF), and 0.36 (large GoF). The following table shows the average value of commonalities and the average value of R-square from to calculate goodness of fit is the average communalities x average R-square, and obtained the calculation of the average communalities value of 0.8298; while the average R-square is 0.782; so GoF = 0.8298x0.782 = 0.8055 (big GoF). This means that the combined performance between the measurement model (outer model) and the structural model (inner model) is to have a large performance (Table 3 and 4).

Predictive relevance (Q2) can be used to measure how well the model generates the observation value and the estimation of its parameters. A Q2 value greater than 0 (zero) indicates that the model is said to be good enough, while a Q2 value of less than 0 (zero) indicates that the model lacks predictive relevance. The results in Table 5 show that all variables produce a predictive relevance value (Q2) greater than 0 (zero), indicating that the model is good.

Figure 1 is a final model (fit) of non-pharmacological pain management (behavioral intervention) on a mother's ability to treat pain from invasive procedures in toddlers. Based on the image above, the nurse factor (X3) and appraisal (X5) do not affect the mother's ability (Y1) directly but can affect the mother's filial

Table 1. Convergent validity results in the development of a non-pharmacological pain management model based on family-centered empowerment in toddlers with invasive actions.

Variable	Indicator	*Outer Loading*	AVE
X1. Characteristics of children	Age (X1.1)	0.098	
	Gender (X1.2)	0.007	0.145
	Health status (X1.3)	0.280	
	Previous IV experience (X1.4)	0.218	
	Psychosocial (X1.5)	0.133	
	Social (X1.6)	0.420	
X2. Mother factor	Age (X2.1)	0.183	
	Education (X2.2)	0.326	
	Work (X2.3)	0.067	0.655
	Experience caring for a sick child (X2.4)	0.326	
	Belief (X2.5)	0.878	
	Motivation (X2.6)	0.703	
	Pengetahuan (X2.7)	0.225	
X3. Nurse factor	Enabling (X3.1)	0.642	0.538
	Empowering (X3.2)	0.860	
	Supporting (X3.3)	0.680	
X4. Filial values	Responsibility (X4.1)	0.988	
	Respect (X4.2)	0.975	0.961
	Care (X4.3)	0.963	
X5. Appraisal	Appraisal (X5.1)	1.000	1.000
Y1. Mother's ability	Perceive health (Y1.1)	0.998	0.995
	Personal growth (Y1.2)	0.998	
	Existential well-being (Y1.3)	0.996	

Table 2. Composite reliability results on development of a non-pharmacological pain management model based on family-centered empowerment in toddlers with invasive actions.

Variable	Composite Reliability
X2 (Mother factor)	0.790
X3 (Nurse factor)	0.775
X4 (Filiial Value)	0.983
X5 (Appraisal)	1.000
Y1 (Mother's ability)	0.998

values (X4). This is a new finding or novelty of this study, namely to improve the ability of mothers can not directly through the path of mother factors and nurse factors but the need for mediation through filial values in conducting pain management non-pharmacological behavioral intervention (breathing exercises, parental coaching, reinforcement, desensitization). Furthermore, filial values (X4) can directly affect the ability of mothers not need to go through the appraisal route.

DISCUSSION

The mother's factor is formed from two indicators: cognitive and motivational. The standard to do in the presence of a parent during a painful procedure can make it easier for a child to cope with pain and anxiety. Parental involvement and support during invasive procedures will effectively reduce pain levels in children. The development that needs to be done is to increase the confidence of motivation and involvement of mothers to be physically present with good skills in performing non-pharmacological pain management in overcoming pain in toddler children due to infusion.[7]

The nurse factor is formed from three indicators enabling, empowering, and supporting. Standards that need to be developed, the need for environmental protection from family, friends and health workers provide an influence that includes emotions to behave in a health-promoting nature. The development that needs to be done is the optimization of the role/support of nurses in providing holistic education during the infusion installation procedure so that a non-pharmacological pain management module (behavioral intervention) is needed using an interesting application, up to date that is applicable, easy to understand by the mother to help nurses provide structured education that is mutually agreed upon in the room so that all implementing nurses follow the existing procedures. Nurses need knowledge and good behavior in implementing pain management in the hospital. This is in line with the study's results; there is a knowledge relationship between the behavior of nurses on pain management in children during invasive procedures.[2]

The filial value factor is formed from two indicators of responsibility, respect, and care. Standards need to be developed to minimize pain during procedures with non-pharmacological methods. Behavioral Interventions are behavioral methods that guide the child's attention away from procedure-related pain (e.g., video recordings, games,

Table 3. Hypothesis test results about the development of a non-pharmacological pain management model based on family-centered empowerment in toddlers with invasive actions.

Number of Hypotheses	Influence	Original Sample (O)	T Statistics (|O/STDEV|)	P-values	Conclusion
1.	X2 -> X4	0.591	9.821	<0.001	Significant
2.	X2 -> Y1	0.202	2.536	0.012	Significant
3.	X3 -> X4	0.271	3.967	<0.001	Significant
4.	X3 -> Y1	0.010	1.200	0.231	Not significant
5.	X4 -> X5	0.963	144.632	<0.001	Significant
6.	X4 -> Y1	0.611	2.777	<0.001	Significant
7.	X5 -> Y1	0.525	1.943	0.053	Not significant

Table 4. R Square results in the development of a non-pharmacological pain management model based on family-centered empowerment in toddlers with invasive actions.

Variable	R Square	R Square Adjusted	Communalities
X2 (Mother factor)			0.655
X3 (Nurse factor)			0.538
X4 (*Filiial Value*)	0.424	0.413	0.961
X5 (*Appraisal*)	0.927	0.926	1.000
Y1 (Mother's ability)	0.994	0.994	0.995
Average	0.782		0.8298

Table 5. Predictive relevance results in the development of a non-pharmacological pain management model based on family-centered empowerment in toddlers with invasive actions.

Dependent Variables	SSO	SSE	Q^2 (=1-SSE/SSO)
(X4) *Filial value*	345,000	199,957	0,420
(X5) *Appraisal*	115,000	9.204	0,920
(Y1) Mother's Ability	345,000	6.986	0,980

interactive books). Development can be in the form of implementation of non-pharmacological pain management (behavioral intervention) formed through maternal empowerment through attitudes of responsibility, care and maternal attention by nurses who cooperate to improve mothers' abilities.[12]

Mother self-assessment is one aspect of family empowerment as an increase in the family's ability to assess, influence, and manage situations by using family resources to achieve the desired results. This Caregiver Empowerment Model (CEM) can be used to improve and promote better outcomes in family care. Improve the mother's self-assessment of herself by increasing the basic values of the mother consisting of attitudes, responsibilities, respect and caring skills related to the implementation of non-pharmacological pain management (behavioral intervention).[13]

A mother's ability is formed from three indicators: health, personal growth, and existential well-being. The empowerment model is the concept of empowerment as a process, the need to engage parents to be active agents in every change, and the application of an integrated conceptual framework in empowering parents. Implementation on the ground is a collaboration between nurses and mothers with the same goal of meeting the comfort of toddler children who are installed infusions by using media that are up to date, easy to understand and informative for mothers to be read at any time, especially related to the implementation of non-pharmacological pain management (behavioral intervention) to form positive perceptions, improve skills and resilience.[15] The limitation of this study is the location of the research which is only carried out in one place, so it is less representative.

CONCLUSIONS

The development of a non-pharmacological pain management model (behavioral intervention) to the mother's ability to treat pain due to invasive actions in toddler-age children is directed to optimal mother involvement (family-centered empowerment) to carry out non-pharmacological pain management (behavioral intervention). Family-centered empowerment-based education will affect the improvement of mother knowledge and skills and improve children's comfort. Therefore, behavioral interaction with the patient is needed to increase treatment efficacy. The development of a family-centered empowerment-based non-pharmacological pain management model is formed from five factors, namely mother factors, nurse factors, filial values, appraisal, and maternal ability. Filial values are the most dominant factor.

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ETHICAL CONSIDERATIONS

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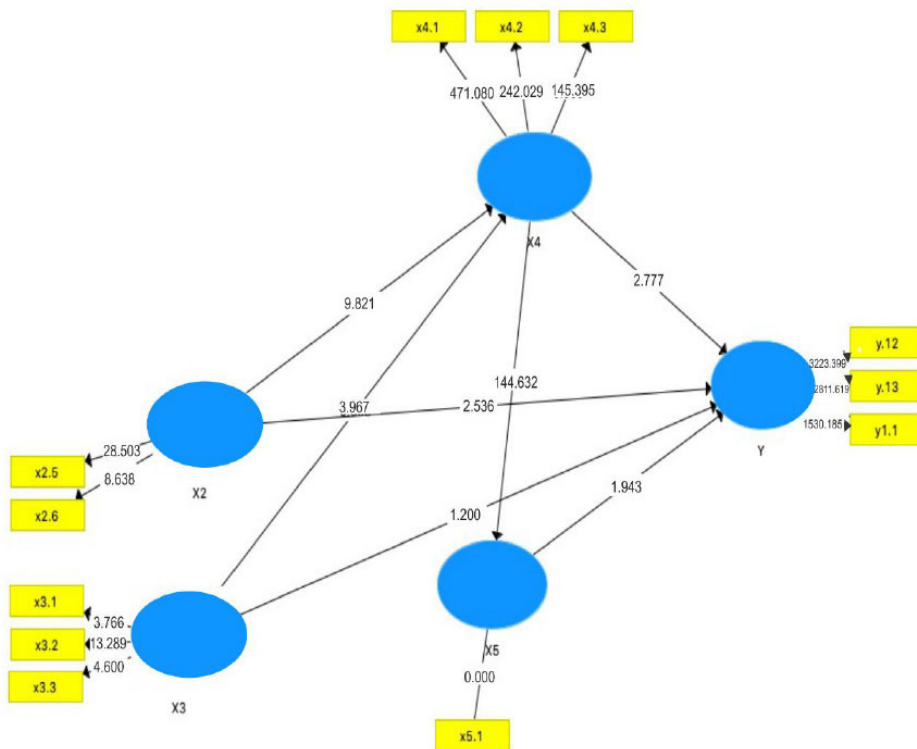
CONFLICT OF INTEREST

The authors claim to have no conflicts of interest.

AUTHOR CONTRIBUTIONS

In conducting research and producing articles, each author made an equal contribution.

Figure 1. Structural model (inner model) development of a non-pharmacological pain management model based on family-centered empowerment in toddlers with invasive actions.

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