Effects of a Transitional Care Program on Premature Infants and their Mothers

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Abstract: This study tested the effects of a researcher-developed transitional care program for mothers of premature infants on the mothers' transition from hospital to home, and their infants' physical illness, growth and development. Participants included 72 mothers and 81 premature infants who were randomly assigned into an experimental or a control group. The experimental group received the transitional care program, which included: preparation of the mothers for transition from hospital to home; preparation of family members (i.e. grandmothers/grandfather and fathers) who would serve as caregivers, along with the mothers, of the premature infants; preparation of the mothers' primary health care providers, in the community, to serve as resources, after the mothers' and infants' discharge from the hospital; and provision of follow-up care after the mothers' and infants' hospital discharge. Those in the control group received only routine care from the hospital nurses.

The results revealed mothers in the experimental group had significantly higher mean transition scores than those in the control group at eight and 16 weeks after they and their infants were discharged from the hospital. In addition, significantly fewer ill infants were found in the experimental group than in the control group at the 8th and 16th week post-hospital discharge. Although the increase in body length of the infants in the experimental group was significantly higher than among infants in the control group at the 8th week, no significant difference was noted between the two groups with respect to body length at the 16th week. Also, no significant differences were found, regarding an increase in weight and head circumference of infants, in either the experimental group or the control group at the 8th and 16th week post-hospital discharge.

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Background

Due to the immaturity of multiple systems functioning, premature infants encounter increased risk of neonatal morbidity and, frequently, require long-term care for visual, auditory, neuromuscular, cognitive, verbal, behavioral, and growth and development problems that may persist through adolescence and into adulthood, compared with term

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infants.[1, 2, 3, 4] An infant is considered to be premature when born less than 37 weeks gestation,[2, 5] while an infant born between 37 and 42 weeks gestation is considered full term.[6] Even premature infants who are considered "healthy" often need special post-discharge care due to their increased risk for delayed growth and development, especially during their first year of life.[4, 5, 7 - 9] The Committee on Fetus and Newborn of the American Academy of Pediatrics has recognized that premature infants' optimal outcome ultimately depends on the capacity and effort of caregivers to provide adequate care.[8] Thus, continuous care, education and support of mothers of premature infants is essential during their hospitalizations, as well as after discharge, in order to maintain their maternal roles and their infants' health.

The birth of premature infants often places their mothers in stressful situations as they face a variety of potential physiological and psychological problems, and situational transitions. The birth of a premature infant usually is unexpected, leading to the mother often experiencing emotional distress, depression, anxiety, guilt, and grief.[10, 11]

Prior studies have found that mothers of premature infants frequently lack essential knowledge and skills, as well as psychological and social support, to provide needed care for their newborns after discharge from the hospital.[9, 12] Their psychological problems may continue for three to six weeks, or longer, after their infants are discharged, which in turn negatively impacts the mother-infant interactions and the infants' health, growth, and development.[13, 14, 15] Thus, to decrease their stress and anxiety, promote the quality of care for their premature infants, and help build their self-confidence and self-esteem, as they provide care for their vulnerable babies, it is essential to provide these mothers, prior to their transition from the hospital to home, information about their maternal role and infant care, as well as encourage meaningful social support from their family caregivers and health care providers.[11, 16, 17]

A mother's transition from hospital to home, with a premature infant, has been shown to impact her physical, mental, emotional, and social life.[11, 13] Such transition often requires a mother to incorporate new knowledge, alter her behavior and change her definition of self within a new social context.[18, 19] Mastery of skills and behaviors needed to manage care for her newborn infant and integrate a reformulated identity (i.e. dynamic vs. stable) are required for a mother to successfully transition, from hospital to home, with her premature infant.[18] If a mother achieves mastery of the skills and behaviors necessary to provide essential care for her infant, and is successful in integrating her infant's care and identity into her life, she has an increased chance of improving the health, and enhancing the growth and development, of her premature infant.[20]

Analysis of the content and interventions of previously conducted Thai studies[21- 28] revealed mothers of premature infants have received, while hospitalized, information regarding care skills, behaviors, and social support. However, most often, their family members and the health care services in their communities are not examined. Therefore, mothers of premature infants frequently receive limited care instructions and support after hospital discharge.

Although prior studies have shown that transitional care programs improve the functional ability and quality of life of stroke survivors,[29] persons with schizophrenia,[30] and patients with COPD,[31] no study could be located that has examined the effects of a transitional care program on mothers of premature infants. Thus, this study sought to test the effects of a researcher-developed transitional care program (TCP) for mothers of premature infants on the mothers' transition from hospital to home, and their infants' physical illness, growth, and development.

The researchers expected the TCP would enhance a healthy transition for the mothers of premature infants, as well as provide them with the tools needed to master care of their infants, accept

themselves as mothers of premature infants, feel comfortable in their other roles, and, consequently, have premature infants who would have fewer illnesses and progressive growth and development. Therefore, the following research hypotheses were posed: a) Mothers in the TCP group, at eight and 16 weeks post-hospital discharge, will have a higher level of healthy transition than mothers in the control group; b) Premature infants in the TCP group, at eight and 16 weeks post-hospital discharge, will show fewer physical illnesses than premature infants in the control group; c) Premature infants in the TCP group, at eight and 16 weeks post-hospital discharge, will have greater body weight, body length, and head circumference than infants in the control group; and, d) Premature infants in the TCP group, at eight and 16 weeks post-hospital discharge, will have normal development, compared to premature infants in the control group.

Conceptual Framework

Transition is a passage or movement from one context or condition to another, and has been shown to disrupt bodily function, mood, and cognition.[18] Mothers of premature infants simultaneously face development and situational transitions. First, mothers change from being pregnant to, unexpectedly, being mothers of premature infants with immature anatomy and physiology. Later, they become major caregivers, at home, who are required to deliver complete care to their infants. The TCP, developed for this research, was based on the Experience Transition Theory of Meleis and colleagues[18] and focused on assisting mothers in development of a healthy transition, from hospital to home, through mastery in mothering and delivering care to their babies.

According to Meleis' and colleagues' theory,[18] transitions consist of: types, patterns, and properties of transitions; transition conditions (i.e., facilitators and inhibitors); patterns of response (i.e., process and outcome indicators); and, nursing therapeutics. Types of transitions are identified as developmental, situational, health/illness, and organizational, while patterns of transition include whether the transition is single, multiple, sequential, simultaneous, related, or unrelated. The properties of transitions, which are complex and interrelated, include awareness, engagement, change and difference, time span, and critical points and events. Facilitating and inhibiting transition conditions refer to those personal (i.e., meanings, cultural beliefs and attitudes, socioeconomic status, and preparation and knowledge), community (i.e., access to resources, relevant or contradictory information, presence or absence of role models, adequate or inadequate social support, advice or lack of advice from respected sources, hassles of being stereotyped, and trust or distrust) and societal conditions (i.e., gender inequity, marginalization, and cultural attitudes) that can either help or hinder progress toward achieving a healthy transition. Patterns of response refer to process indicators (i.e., feeling connected, interacting, location and being situated, developing confidence, and coping) and outcome indicators (i.e., mastery and fluid integrative identities). Finally, nursing therapeutics refers to all activities in which nurses engage to assist clients/patients in dealing with their particular health/illness situations.

Method

Design: A randomized controlled trial (RCT) design was used.

Ethical Considerations: Prior to implementation, approval to conduct the study was obtained from the Research Ethics Committee of the primary investigator's (PI) academic institution and the Research Ethics Committee of the hospital used as a study site. All potential subjects received written and verbal explanations about: the nature of the study; voluntary participation; what study involvement would entail; anonymity and confidentiality issues; and, the right to withdraw from the study, at any time, without

repercussions. Those consenting to taking part in the study were asked to sign a consent form.

Study population and sample: The target population consisted of mothers and their respective premature infants, who were being cared for in a hospital in a northern province of Thailand. Inclusion criteria for mothers were: having a premature infant born between 32 weeks and 36 weeks and 6 days of gestation, as assessed by a physician using a Ballard score;[32] personally caring for the infant during the first three months of life; being literate; delivering the infant at the hospital used as a study site; living within 20 kilometers of the hospital selected as the study site; being willing to participate in the study; having a family member to assist, post-hospital discharge, in care of the premature infant; and, being willing to be telephonically contacted and visited at home, by the researchers, for the purpose of follow-up sessions after hospital discharge. Inclusion criteria for the premature infants were: maintaining a normal body temperature, when fully clothed, in an open bed and exposed to normal ambient temperature; not experiencing cardio-pulmonary problems while being fed; not experiencing apnea or bradycardia; and, not receiving oxygen therapy.

The sample size was determined based on a power analysis with a desired power of 0.80, significance level of 0.05, and effect size of 0.70,[33] giving an estimated sample size of 32 mother/infant dyads per group (i.e. experimental and control). Based on a previous study's dropout rate,[34] 20% more subjects were added to cover potential attrition. Therefore, the sample was to consist of a total of 78 mother/infant dyads, with 39 in both the experimental and control groups. Once a mother consented to be in the study, the mother/infant dyad was assigned, using a table of random numbers, to either the experimental or control group. Unfortunately, six mother/infant dyads dropped out during the study because of: moving out of the province (n=3); not completing the entire research process (n=2); or, the mother failing to provide care to her infant (n=1). Therefore, 72 mother/infant dyads remained in the study: 36 in the control group and 36 in the experimental group. Five mothers in the control group and four mothers in the experimental group had twin premature infants. As a result, there were 81 premature infants in the study: 41 in the control group and 40 in the experimental group.

No statistical differences were found, between the experimental and control groups, regarding the demographic characteristics of either the mothers (see **Table 1**) or the infants at birth and discharge, with the exception of the one minute Apgar score being higher in infants in the control group compared to infants in the experimental group (see **Table 2**). Overall, the mothers in both groups, predominately, were: in their early twenties; middle or high school graduates; married; and, housewives. They also had a median monthly family income of 8,500 baht. The premature infants, in both groups, who tended to be female and the first child, predominately had a/an: gestational age of 36 weeks; appropriate size, at birth, for the gestational age; birth weight of 2,001 to 2,500 grams; body length, at birth, of 42 to 46.99 centimeters; head circumference, at birth, of 29 to 31.99 centimeters; variety of health care issues; Apgar score between 6 and 10 at both one minute and five minutes; hospital stay of two to 14 days; corrected gestational age, at discharge, of 36 weeks; weight, at discharge, of 1,685 to 2,500 grams; body length, at discharge, of 44 to 46.99 grams; head circumference, at discharge, of 30.60 to 32.59 centimeters; and, neurological risk score, at discharge, of zero. Significant differences were found, between the control and experimental groups, regarding the family members who assisted the mothers in providing care to their premature infants (see **Table 3**). In the control group, family caregivers, primarily, were grandmothers/grandfathers, while in the experimental group they were husbands. As a result, the median age of family caregivers, in the control group, was 42 years, while the median age of family caregivers in the experimental group was 27 years.

Table 1 Demographic Characteristics of Mothers of Premature Infants

Demographic Characteristics	Control Group (n = 36)		Experimental Group (n = 36)		χ^2	p-value
	n	%	n	%		
Age (years)						
Median (Range)	21 (14 - 39)		20 (14 - 36)		2.36	.308
14-19	14	38.90	17	47.20		
20-29	13	36.10	15	41.70		
30-39	9	25.00	4	11.10		
Educational level						
Elementary education	8	22.20	4	11.10	1.69	.428
Middle and high school	20	55.60	24	66.70		
Diploma or vocational certificate	7	19.40	7	19.40		
Graduate school	1	2.80	1	2.80		
Marital status						
Married	33	91.70	31	86.10		.710
Separated/Widowed	3	8.30	5	13.90		
Occupation (during time of pregnancy)						
Housewife	16	44.40	21	58.30	2.30	.680
Worker/Agriculture	12	33.30	7	19.40		
Student	5	13.90	4	11.10		
Personal Business	2	5.60	3	8.30		
Government officer/ Office worker	1	2.80	1	2.80		
Family income (baht/month)						
Median (Range)	8,250 (0 - 30,000)		8,750 (0 - 30,000)		5.24	.155
None	2	2.8	6	8.3		
1- 10,000	22	30.6	22	30.6		
10,001-20,000	10	13.9	4	5.6		
10,001-30,000	2	2.8	4	5.6		

Table 2 Demographic Characteristics of Premature Infants

Demographic Characteristics	Control Group (n = 41)		Experimental Group (n = 40)		χ^2	p-value
	n	%	n	%		
Gender						.505
Male	20	48.80	16	40.00		
Female	21	51.20	24	60.00		
Order of child						
Median (Range)	1 (1 - 4)		1 (1 - 4)			
1	28	68.30	26	65.00	.58	.902
2	10	24.40	12	30.00		
3	2	4.90	1	2.50		
4	1	2.40	1	2.50		
Gestational age (weeks)						
Median (Range)	35 (32 - 36)		35 (32 - 36)		1.87	.759
32	5	12.20	5	12.50		
33	3	7.30	2	5.00		
34	6	14.60	8	20.00		
35	14	34.10	9	22.50		
36	13	31.70	16	40.00		
Classification of infants' size for gestational age						
Small for gestational age	10	24.40	5	12.50	1.89	.168
Appropriate for gestational age	30	73.20	35	87.50		
Large for gestational age	1	2.40	0	0		
Birth weight (grams.)						
Median (Range)	2,020 (1,140-3,180)		1,965 (1260-2,690)		4.44	.218
1,140 - 1,500	7	17.10	3	7.50		
1,501 - 2,000	13	31.70	18	45.00		
2,001 - 2,500	19	46.30	14	35.00		
2,501 - 3,180	2	4.90	5	12.50		
Body length at birth (centimeters)						
Median (Range)	45 (32 - 51)		45 (37 - 48)		6.35	.096
32.00-36.99	3	7.30	0	0.00		
37.00-41.99	8	19.50	6	15.00		
42.00-46.99	15	36.60	24	60.00		
47.00-51.00	15	36.60	10	25.00		
Head circumference at birth (centimeters)						
Median (Range)	30 (26 - 34)		30 (27 - 35)		.53	.769
26.00-28.99	8	19.50	7	17.50		
29.00-31.99	27	65.90	29	72.50		
32.00-35.00	6	14.60	4	10.00		

Table 2 Demographic Characteristics of Premature Infants (Continued)

Demographic Characteristics	Control Group (n = 41)		Experimental Group (n = 40)		χ^2	p-value
	n	%	n	%		
Medical diagnoses						
Twin	10	24.40	8	20.00		.790
Low birth weight	39	95.10	35	87.50		.264
Endocrine problems	12	29.30	15	37.50		.485
Respiratory problems	14	34.10	13	32.50		1.00
Cardiac problems	3	7.30	1	2.50		.616
Infections		22.00	15	37.50		.149
Gastrointestinal problems	17	41.50	16	40.00		1.00
Hematological problems	2	4.90	1	2.50		1.00
Apgar Score at 1 minute						
0- 5	0	0.00	6	15.00		.012
6-10	41	100.00	34	85.00		
Apgar Score at 5 minutes						
6-10	41	100.00	40	100.00	.012	.912
Duration of hospitalization (days)						
Median (Range)	8 (2 - 28)		10 (4 - 28)		2.48	.481
2-7	17	41.50	12	30.00		
8-14	11	26.80	17	42.50		
15-21	6	14.60	6	15.00		
22-28	7	17.10	5	12.50		
Corrected age at discharge (weeks)						
Median (Range)	36 (33 - 39)		36 (34 - 39)		.655	.418
33	1	2.40	0	0		
34	3	7.30	3	7.50		
35	7	17.10	7	17.50		
36	20	48.80	17	42.50		
37	7	17.10	9	22.50		
38	2	4.90	2	5.00		
39	1	2.40	2	5.00		
Weight at discharge (grams)						
Median (Range)	2,010(1,740-3,140)		2,100(1,685-2,615)		.96	.619
1,685 - 2,000	20	48.80	16	40.00		
2,001 - 2,500	18	43.90	19	47.50		
2,501 - 3,140	3	7.30	5	12.50		
Body length at discharge (centimeters)						
Median (Range)	45.00 (41 - 49)		44.75 (42 - 49)		.05	.977
41.00-43.99	7	17.10	7	17.50		
44.00-46.99	25	61.00	25	62.50		
47.00-49.00	9	22.00	8	20.00		

Table 2 Demographic Characteristics of Premature Infants (Continued)

Demographic Characteristics	Control Group (n = 41)		Experimental Group (n = 40)		χ^2	p-value
	n	%	n	%		
Head circumference at discharge (centimeters)						
Median (Range)	31 (26 - 34)		31 (29 - 35)		1.26	.737
26.00-28.59	1	2.40	0	0		
28.60-30.59	15	36.60	13	32.50		
30.60-32.59	21	51.20	22	55.00		
32.60-34.59	4	9.80	5	12.50		
Discharge neurobiological risk score						
0	27	65.90	16	40.00	5.48	.140
1	10	24.40	17	42.50		
2	2	4.90	4	10.00		
3	2	4.90	3	7.50		

Table 3 Demographic Characteristics of Family Caregivers

Demographic Characteristics	Control Group (n = 36)		Experimental Group (n = 36)		χ^2	p-value
	n	%	n	%		
Family Caregivers						
Husbands	7	19.40	24	66.70		.000
Grandmothers/ Grandfathers	29	80.60	12	33.30		
Caregiver's age (years)						.
Median (Range)	42 (20 - 60)		27 (15 - 56)		13.48	.001
15-20	1	2.80	12	33.30		
21-40	15	41.70	15	41.70		
41-60	20	55.60	9	25.00		

Instruments: Four instruments were used to obtain data. They included the: researcher-developed Demographic Data Form (DDF); researcher-developed Premature Infant Mothers' Healthy Transition Questionnaire (PIM-TQ) that was adapted from two existing instruments; [35, 36] researcher-developed Physical Illness Assessment Form (PIAF); and, growth and development assessment tools (i.e. digital weight scale, tape measure and Thai version of the Denver II[37]). The DDF requested information on: the mother's age, educational level, marital status, occupation and family monthly income (mother and father's combined incomes); the age and relationship of the family member providing care, along with the mother, to the infant; and, the infant's gender, order in the family, gestational age, weight at birth and at discharge, body length at birth and at discharge, head circumference at birth and at discharge, medical diagnoses, Apgar scores at one and five minutes, duration of hospitalization, corrected age at discharge, and neurobiological risk score at discharge. Each mother completed information on the DDF regarding herself and the family caregiver, while the PI obtained, from the medical records, information related to each mother's respective premature infant(s). It took approximately five to ten minutes for a mother and the PI to complete their portion of the instrument.

The researcher-developed PIM-TQ consisted of two parts: assessment of the premature infant mothers' mastery (PIM-MQ) and assessment of the fluid integrative identities of premature infant mothers (PIM-FQ). Part I (the PIM-MQ) was adapted, by the PI, from the "Parental Beliefs Scale" [35] for the purpose of assessing the perception and beliefs of mothers of premature infants regarding their competency to care for their infants (i.e., knowledge and care giving skills). The adaptations involved making items that requesting two types of responses into two separate items. There were 19 items that required possible responses ranging from 1 = "strongly disagree" to 5 = "strongly agree." Examples of items were: "I know what characteristics are common in premature babies" and "I know what behaviors are common in premature babies." A total score, which could range from 19 to 95, was obtained by summing the numerical responses across all items. Part II (the PIM-FQ) was adapted, by the PI, from the questionnaire entitled "What Being the Parent of a New Baby is Like."[36] Adaptations involved deleting questions that were similar in nature to questions in Part I (the PIM-MQ). The PIM-FQ was used to assess the mothers' perceptions and acceptance of being mothers of premature infants, as well as their comfort levels in assuming other roles in their life. There were 20 items in the questionnaire that required responses on a five-point semantic differential scale (1 = "not at all satisfying to 5 = "completely satisfying"). Examples of items were: "How satisfying has it been to be the parent of a new baby?" and "How satisfying is your life with your husband?" The total score for the PIM-FQ, which could range from 20 to 100, was calculated by summing the numerical values of the responses across all items. To calculate a total score for the entire instrument (the PIM-TQ), which could range from 39 to 195, the total score for Part I (the PIM-MQ) and the total score for Part II (the PIM-FQ) were summed. High scores (117.1 to 195.0) suggested the presence of a healthier transition, on the part of the mothers, from hospital to home. Prior to use in this study, five experts (one neonatologist and four neonatal nursing instructors) assessed and approved the instrument's content validity (content validity index = 0.92). The reliability for the PIM-TQ, in this study, was 0.80. It took an average of 20 minutes for each mother to complete the instrument.

The researcher-developed PIAF was an assessment form used to record the number of illnesses each infant had encountered by the 8th and 16th week after hospital discharge. Data were obtained by questioning each mother about her infant's illnesses,

conducting a physical assessment of the infant, and checking the infant's medical records. Data then were classified into two categories: having no illnesses or having illnesses. It took the PI approximately 3-5 minutes to complete the PIAF.

The instruments used for assessing the premature infants' growth and development, at the 8th and 16th week after hospital discharge, consisted of: a digital scale for determining body weight; a tape measure for determining body length and head circumference; and, the Thai-version of the Denver II [37] for assessing the infants' level of personal-social, fine motor adaptive, language, and gross motor development. Body weight was carried out by placing the nude infant on the digital scale and recording the weight in grams. The length of the infant was determined by placing the infant on a flat surface, with the head at the zero mark on the tape measure, and then straightening the infant's legs and holding the ankles together with the toes pointing directly upward on the tape measure. The circumference of the head was determined by placing the infant on a flat surface or in a seated position, on the lap of a caregiver, and then placing the tape measure above the infant's supraorbital ridges and the pinna of the ears, and over the occipital protuberance of the skull. A measurement was repeated three times, with an average value being calculated from the three measurements. Finally, the Thai version of the Denver II,[37] derived from the original Denver II instrument developed by Frankenberg and Dodds,[38] consisted of 125 functional tasks arranged into four sectors: personal-social (25 items); fine motor adaptive (29 items); language (39 items); and, gross motor (32 items). Examples of the tasks included: smiling spontaneously; grasping; responding to a bell by vocalizing; and lifting the head 45 degrees. Scoring the instrument involved indicating whether the infant "passed" or "failed" in performing each of the functional tasks. Responses then were compared to a chart that listed the normal expected range, for each task, based upon the child's age. As a result of where the infant's overall scores fell on the chart, he/she was classified as "normal" or "suspect" in regards to development. Prior to use of the Thai version of the Denver II, the PI was trained, by Kotchabhakdi,[37] in its use, using ten infants. The inter-rater observer reliability (index of agreement) was found to be 1.00. It took approximately 30 minutes for the PI to complete the growth and development assessments of each infant.

Intervention: The researcher-developed intervention consisted of the Transitional Care Program (TCP) that was based upon the Experience Transition Theory of Meleis and colleagues.[18] The TCP consisted of four parts that included: preparation of the mothers for transition from hospital to home; preparation of family members (i.e. grandmothers/grandfathers and husbands) who would serve as caregivers, along with the mothers, of the premature infants; preparation of the mothers' primary health care providers, in the community, to serve as resources after the mothers' and infants' discharge from the hospital; and, provision of follow-up care after the mothers' and infants' hospital discharge.

The first part of the TPC, mothers' preparation for transition from hospital to home, was conducted four days prior to their respective infants' discharge from the hospital. The PI taught the mothers in a classroom setting that lasted approximately $1^{1/2}$ to 2 hours. The class session was held in the education room of the hospital's Pediatric unit. Information was presented via: a video; a question/answer session; a discussion session; and, printed materials. A 70 minute video ("Premature Infant Care"), developed by the PI and based upon review of the literature, was shown during the class session. The video served as the major content medium and focused on: behaviors/characteristics and nutritional needs of premature infants (16 minutes); kangaroo care: holding the infant skin-to-skin with an adult (7 minutes); physical and

mental development of infants (13 minutes); daily infant care and the assessment/care of early signs/symptoms of infant illnesses (20 minutes); and, home environment, first aid, CPR, and accessible primary health care resources for babies (14 minutes). Following the video, the PI: lead a discussion about problems encountered in caring for premature infants; answered the mothers' questions regarding the video; had the mothers practice breastfeeding, kangaroo care, infant bathing, and CPR with an infant mannequin; and, encouraged the mothers to share their thoughts and feelings about caring for their babies. In addition, at the close of the class session, the mothers were provided a handbook, prepared by the PI, addressing the same content as the video.

The second part of the TPC involved preparation of family members who would serve, with the mothers, as premature infant caregivers. The PI presented this part of the program, in a group setting, also four days prior to the infants' hospital discharge. The family members received information, for 1½ to 2 hours, in the education room of the hospital's Pediatric unit. The educational content was presented via: the same video ("Premature Infant Care") shown to the mothers; a question/answer session; a discussion session; and, a demonstration/return demonstration regarding how to provide cardio-pulmonary resuscitation (CPR) and kangaroo care using an infant mannequin. At the end of the session, the PI answered questions regarding the video content, and had family members discuss infant care problems and their thoughts and feelings about caring for premature babies.

Part three of the TPC involved preparation of the mothers' primary health care providers, in the community, so they could serve as resources after the mothers' and infants' discharge from the hospital. This part of the program involved the PI: requesting primary health care providers to serve as resources to the mothers regarding care of their premature infants; and, sending, electronically (via the hospital's Contracting Unit of Primary Care), the medical history and information about each infant's potential health problems to each mother's respective community-based primary health care provider. This information was sent upon the mothers' and infants' hospital discharge.

Part four of the TPC involved provision of post-hospital discharge, follow-up care. The post-hospital discharge activities, provided by the PI, included a one-hour home visit during the 1st and 3rd week after discharge of each infant, as well as a 10 to 15 minute telephone call during the 2nd and 4th week. In addition, the PI had a one-hour session with each mother, during the 8th week post-discharge of each respective infant, to reinforce the infant care information provided during Part I of the TCP, and to discuss the degree of attainment the mothers had achieved regarding their maternal role.

Prior to implementation, the content of the TPC was assessed by the same five experts who assessed the PIM-TQ. The experts' agreed on the content of the program, but recommended minor language changes in the video and handbook that would make the information clearer and more precise. The suggested changes were made.

The refined program then was implemented with five mothers and their respective family caregivers, who were similar to the subjects used in the study. Based upon the program implementation no further changes were made in the program.

Procedure: After the mothers consented to participate in the study and were randomly assigned to either the experimental or control group, the PI administered, in their respective hospital rooms, the PIM-TQ (baseline measurement) and the component of the DDF that applied to them and their respective family caregivers. In addition, at the time of the infants' discharge, the PI completed the information on the DDF that referred to the infants. When the mothers returned to the hospital, after their discharge, to visit

their premature infants, they were administered, four days prior to their infants' discharge, Part I of the TCP, while their respective family infant caregivers were administered Part II. After their respective infants were discharged, the mothers' primary health care providers, in the community, were administered Part III of the program. Finally, upon completion of the first week after the infants' hospital discharge, the mothers were administered the various components of Part IV of the TCP.

Women assigned to the control group received only routine care. Routine care involved verbal instructions from a registered nurse, on the day of discharge, about providing care to a premature infant and post-discharge home visits, by a public health nurse, if the infants' needs required such visits.

During the 8th and 16th post-hospital discharge weeks, when the infants were seen by their respective physicians, the PI administered the PIM-TQ and the PIAF to the mothers in both groups. In addition, the mothers' respective infants were assessed in terms of body weight, body length, head circumference and developmental tasks (i.e. Thai version of the Denver II [37]). All of these activities were carried out in the education room of the hospital's Pediatric Department.

Upon completion of the program, the PI provided the mothers in the control group 20 to 30 minutes of verbal information regarding infant care, nutrition, development, and first aid. In addition, the mothers were given an opportunity to discuss their concerns about caring for their respective infants with the PI.

Data Analysis: Descriptive statistics were used to: assess the mothers' and infants' demographic characteristics; calculate the scores of the PIM-TQ; and, determine the number of infants, at 8 and 16 weeks post-discharge, with/without illnesses and with/without normal development. Differences, between the experimental and control group, regarding demographic characteristics were assessed via Chi-square. The independent t-test was used to compare the experimental and control group mothers' scores on the PIM-TQ at baseline, and at 8 and 16 weeks post-hospital discharge. Repeated measures ANOVA was used to compare between and within subject differences regarding the mothers' scores on the PIM-TQ. Fisher's exact test was used to compare differences in the presence of infant illnesses, between the experimental and control group, at 8 and 16 weeks post-hospital discharge. The independent t-test was used to compare differences, between the experimental and control group, regarding the infants' weight, body length and head circumference at 8 and 16 weeks post-hospital discharge. Finally, differences in normal development, between the experimental and control group, at 8 and 16 weeks post-hospital discharge, were assessed using Fisher's exact test.

Results

As noted in **Table 4**, the mean scores of the mothers' healthy transitions, as measured by the PIM-TQ, were not significantly different, at baseline, between the experimental and control group. However, the mean scores of mothers' healthy transitions showed a significant difference between the two groups 8 and 16 weeks after discharge of their infants. Mothers in the experimental group demonstrated a significantly healthier transition than those in the control group (see **Table 5**).

Table 4 Comparison of Healthy Transition Scores between Experimental and Control Group at Baseline, and Eight and Sixteen Weeks Post-Hospital Discharge

Mothers' Healthy Transition	Control Group (n= 36)	Experimental group (n= 36)	t test	p-value
	$\overline{X}$ ± SD	$\overline{X}$ ± SD		
Baseline	117.19 ±14.87	114.00 ±16.30	-.869	.194
8th week	124.47 ±17.34	143.78 ±13.77	5.23	.000
16th week	133.00 ±13.35	152.39 ±14.77	5.84	.000

Table 5 Comparison between Groups and Time of Measure of Within and Between Mothers' Mean Healthy Transition Scores

Mother's Healthy Transition	Analysis of Variance				
	SS	df	MS	F^r	p-value
Within subject					
Time	27623.361	1.79[a]	15440.18	105.48	.000
Time x Group	6097.58	1.79[a]	3408.27	23.28	.000
Error	18331.06	125.23[a]	146.37		
Between subject					
Group	7561.50	1	7561.50	17.79	.000
Error	29742.33	70	424.89		

Note: r = 2-way repeated measures ANOVA.
a = Greenhouse-Geisser, used to adjust degrees of freedom.

As shown in **Table 6**, a significant difference in physical illness was found between the infants in the experimental and control group 8 and 16 weeks after the infants' hospital discharge. Infants in the experimental group had a significantly lower number of illnesses in both time frames.

Table 6 Comparison of Physical Illnesses among Infants in the Control and Experimental Groups

Physical Illnesses	Control Group		Experimental Group		*p*-value
	n	%	n	%	
Illness at 8th week	40	49.4	27	33.3	.000[a]
Illness at 16th week	39	48.1	29	35.8	.007[a]

Note: a = Fisher's exact test

As shown in **Table 7**, no significant difference was found, between the experimental and control group 8 and 16 weeks after hospital discharge, in the infants' weight and head circumference gain. There also was no significant difference in the infants' body length gain between the two groups 16 weeks after hospital discharge. There was, however, a significant difference in the infants' body length gain between the two groups 8 weeks after hospital discharge, with infants in the experimental group showing a greater gain in length than infants in the control group.

Table 7 Comparison of Gain in Weight, Body Length, and Head Circumference among Infants in the Control and Experimental Groups

Increasing Growth	Control Group (n= 41)	Experimental Group (n= 40)	t	*p*-value
	$\overline{X}$ ± SD	$\overline{X}$ ± SD		
At 8th week				
Weight	2,000.12±362.84	1,954.52±418.04	-.52	.300
Length	7.13±1.99	8.55±1.65	3.48	.000
Head circumference	5.19±1.09	5.5±1.11	1.27	.104
At 16th week				
Weight	3,511.10±632.07	3,538.67±665.20	.191	.424
Length	13.21±1.99	13.88±2.11	1.46	.073
Head circumference	8.00±1.20	8.20±1.28	.719	.237

Regarding normal infant development (see **Table 8**), no significant difference was found, between the experimental and control group, 8 or 16 weeks after hospital discharge. However, infants in the control group showed a higher percentage of "suspect" delayed development than infants in the experimental group.

Table 8 Comparison of Normal Development among Infants in the Control and Experimental Groups

Development	Control Group (n = 41) n (%)	Experimental Group (n = 40) n (%)	*p*-value
Normal development at 8th week	34 (42.0)	38 (46.9)	.083[a]
Normal development at16th week	36 (44.4)	37 (45.7)	.370[a]

Note: [a] = Fisher's exact test

Discussion

The results revealed the researcher-developed Transitional Care Program (TCP) appeared to have an impact on: the mothers' healthy transition from hospital to home; the number of physical illnesses of the premature infants, eight and 16 weeks after hospital discharge; and, the infants' body length eight weeks after hospital discharge. The fact the mothers' healthy transition from hospital to home was enhanced by the researcher-developed TCP was similar to prior research that found the use of a TCP can facilitate improvement in functional ability and increase quality of life in stroke survivors,[29] improve quality of life in persons with schizophrenia,[30] and improve well-being in patients with chronic obstructive pulmonary disease (COPD).[31] Since the TCP focused on the mothers' preparation to care for their premature infants, this most likely enhanced their positive beliefs about personal abilities, knowledge, and skills regarding care for their babies. This, no doubt, enhanced the mothers' sense of confidence. The fact preparation of the family caregivers and primary health care providers, in the community, was part of the program may have served as a facilitator in assisting the mothers to believe they could adequately handle the demands of their infant caregiving and maternal skills. In addition, experiencing home visits, telephone calls, and visits to the hospital appeared to serve as support mechanisms that helped the mothers accept their maternal role, as well as their other roles in life.

It was not a surprise that the premature infants, whose mothers had been involved in the TCP, had fewer physical illnesses, at eight and 16 weeks after hospital discharge, than infants whose mothers were not involved in the TCP. This finding is consistent with prior findings regarding patients with COPD[31] and schizophrenia,[30] who have been exposed to a TCP, having lower readmission rates than patients with COPD or schizophrenia who had not been involved in such a program. In addition, Taya[18] found mothers receiving education on infant care, home visits, and telephone follow-up calls had infants with significantly better health outcomes, one month after hospital discharge, than infants of mothers who had not received education, home visits or telephone follow-up calls. The fact mothers involved in the TCP program had increased knowledge and skills about how to care for their fragile infants' needs, most likely assisted them in being better able to provide appropriate infant care. Provision of appropriate infant care can lead to the presence of healthier babies who have a decreased incidence of physical illnesses.[7]

The findings reveal that the only significant difference in growth, between infants in the experimental and control group, was at 8 weeks post-hospital discharge, with infants in the experimental group having a greater gain in body length than infants in the control group. None of the other growth indicators demonstrated a significant difference between the two groups. The fact there was a significant difference in body length for infants in the experimental group compared to infants in the control group may have been due to differences in the quality and quantity of food each infant received. For example, prior research has suggested that using food supplements before the age of four months may influence an infant's weight and height.[39] Since mothers in the control group did not have the same knowledge level regarding nutrition as mothers in the experimental group, it is possible that the control group mothers were more likely to inappropriately feed (i.e. quality and quantity) their babies compared to the experimental group mothers. The fact none of the other growth indicators showed a significant difference, between the two groups, may have been due to the fact that some family caregivers forbid mothers in the experimental group to do kangaroo care, as they believed this procedure might cause the babies to have difficulty breathing or become uncomfortable. This was unfortunate since it

has been noted that kangaroo care, which serves as a means to stimulate an infant, is an important technique to use with premature infants. Kangaroo care has been shown to enhance cognitive development, normalize growth, have positive effects on motor development, enhance bonding, increase parental confidence, and enhance a mother's breast milk production and feeding.[40]

No significant differences were found, between the experimental and control group, regarding the infants' normal development at either the 8th or 16th week after hospital discharge. It is interesting to note that mothers in the experimental group indicated to the PI, during home visits and follow-up telephone calls, that they believed infant developmental was an automatic process. As a result, these mothers were not concerned about delayed development because they believed their babies would be able to do many activities "once they grew up." This belief was relevant to the work of Ruangdaraganon and colleagues[41] who stated that the type of parenting activities provided by significant caregivers can have an impact on an infant's first year of development. Finally, as previously mentioned, since some of the experimental group mothers were prohibited, by their family caregivers, from carrying out kangaroo care, it is possible this factor had an influence on the experimental group infants' cognitive and motor development, and normalized growth.[40]

Limitations and Recommendations

When applying the findings, the limitations of the study need to be taken into consideration. Since the subjects were all taken from one hospital located in one province in northern Thailand, the findings may not be applicable to mothers and premature infants located in other provinces throughout Thailand. In addition, the quantity or quality of infant care provided by mothers, family caregivers and community-based primary health care providers was not monitored. Thus, it is possible that a wide variation in quality and quantity of care could have occurred, which ultimately could have influenced the infants' growth and development. Given the quantity and quality of feeding was not monitored, it is possible that a wide variation in breastfeeding and supplemental feeding may have occurred, which could have influenced the infants' growth and development. Since the family caregivers were not assessed prior to participating in the study, there is no way of knowing if their caregiving beliefs, attitudes, and abilities influenced the type and quality of care they delivered to the infants. The fact the family caregivers in the control group were much older than the family caregivers in the experimental group also may have had an effect on the type of care the infants received.

Future research studies need to consider: replicating this study in multiple provinces, throughout Thailand, using a variety of hospitals for accessing potential subjects; monitoring the quantity and quality of infant feeding that takes place once the premature infant is discharged from the hospital; monitoring the type of infant care delivered by the mothers, family caregiver, and community-based primary health care providers, once the mothers and infants are discharged from the hospital; and, assessing the beliefs, attitudes, and abilities of the family caregivers to determine in what way they may influence the delivery of adequate and appropriate infant care after the infant is discharged from the hospital.

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ผลของโปรแกรมการดูแลในระยะเปลี่ยนผ่านสำหรับมารดาและทารกเกิดก่อนกำหนด

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บทคัดย่อ: การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อทดสอบผลของโปรแกรมการดูแลในระยะเปลี่ยนผ่านสำหรับมารดาของทารกเกิดก่อนกำหนดต่อการเปลี่ยนผ่านของมารดา ความเจ็บป่วยทางกาย การเจริญเติบโต และพัฒนาการของทารก กลุ่มตัวอย่างเป็นมารดา จำนวน 72 ราย และทารกเกิดก่อนกำหนด จำนวน 81 ราย สุ่มตัวอย่างเข้ากลุ่มทดลอง และกลุ่มควบคุม กลุ่มทดลองได้รับโปรแกรมการดูแลในระยะเปลี่ยนผ่านซึ่งประกอบด้วย การเตรียมมารดา การเตรียมผู้ช่วยมารดา การเตรียมเจ้าหน้าที่ในหน่วยบริการสุขภาพระดับปฐมภูมิเพื่อเป็นแหล่งประโยชน์ให้กับมารดาภายหลังจำหน่ายทารกออกจากโรงพยาบาล และการดูแลต่อเนื่องภายหลังจำหน่ายออกจากโรงพยาบาล กลุ่มควบคุมได้รับการดูแลตามปกติจากพยาบาลประจำหอผู้ป่วย

ผลการวิจัยพบว่ามารดาในกลุ่มทดลองมีค่าเฉลี่ยคะแนนการเปลี่ยนผ่านมากกว่ามารดาในกลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติในสัปดาห์ที่ 8 และ 16 ภายหลังจำหน่ายทารกออกจากโรงพยาบาล จำนวนทารกในกลุ่มทดลองมีการเจ็บป่วยทางกายน้อยกว่าทารกในกลุ่มที่ควบคุมในสัปดาห์ที่ 8 และ 16 อย่างมีนัยสำคัญทางสถิติ ความยาวของทารกในกลุ่มทดลองเพิ่มขึ้นมากกว่าทารกในกลุ่มควบคุมในสัปดาห์ที่ 8 อย่างมีนัยสำคัญทางสถิติแต่ในสัปดาห์ที่ 16 ไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติ น้ำหนัก และเส้นรอบศีรษะที่เพิ่มขึ้น และจำนวนทารกที่มีพัฒนาการปกติระหว่างกลุ่มควบคุม และกลุ่มทดลองทั้งในสัปดาห์ที่ 8 และสัปดาห์ที่ 16 ไม่มีความแตกต่างอย่างมีนัยสำคัญทางสถิติ

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คำสำคัญ: มารดาของทารกเกิดก่อนกำหนด การดูแลในระยะเปลี่ยนผ่าน การเจ็บป่วย การเจริญเติบโต และพัฒนาการของทารกเกิดก่อนกำหนดภายหลังจำหน่ายออกจากโรงพยาบาล

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