

OUTCOMES OF ADVANCED PRACTICE NURSES IN MATERNAL AND CHILD HEALTH CARE IN THAILAND

Kochaporn Singhala^{1*}, Wannee Deoisres¹, Julaluk Baramee¹, Dorothy Brooten²,
and JoAnne M. Youngblut²

¹Faculty of Nursing, Burapha University, Chon Buri 20131, Thailand

²College of Nursing and Health Sciences, Florida International University, Miami, Florida, USA

ABSTRACT

Advanced practice nurses (APNs), initiated into the nursing care system in Thailand in 2003, is still considered a new concept. The purpose of this comparative research was to compare the outcomes of maternal and child care during two periods of APN practice, i.e., one year before APNs were in practice and four years after APNs were in practice. Data were collected from patients cared for one year before APNs practiced (n=143) and four years after APNs were in practice (n=362) using a random selection from the total patients cared for in those years. A one-way ANOVA, and independent t-tests were used to compare the differences in outcomes. Kruskal-Wallis, Chi-square test, and Mann-Whitney test were used for skewed data.

Results indicated that four years after the implementation of APNs in practice: infant gestational ages were higher in the group of women with preterm labor; neonatal complications were lower; the numbers of neonatal admission to the special care nursery or the neonatal intensive care unit were lower; time in the first stage of labor and the amount of blood loss were less; and fasting blood sugar levels at six weeks postpartum were lower compared to the one year period before APNs were in practice.

These findings document the differences APNs make in the outcomes of maternal and child care in Thailand using their in-depth knowledge and skills in this area of practice. Study results document the need to increase the numbers and use of APNs in the Thai health care system in order to improve maternal and child health.

Keywords: Advanced practice nurse; patient outcomes; health service use; outcomes

INTRODUCTION

Maternal and child health is important and declared a top priority for the Thailand National Health Development Plan. The maternal mortality rate (MMR) in Thailand has been lowered from 36.5 to 20.9 per 100,000 live births between 1998 and 2005 (Bureau of Health Promotion, 2004; Bureau of Health Promotion, 2006) but MMR is still above the national target of 18 per 100,000 (Department of Health, 2006). Two other national targets in maternal and child health in Thailand are to increase the proportions of birth weights over 2500 grams, and to increase the hemoglobin level of pregnant women to over 11 g/dl (Bureau of Health Promotion, 2004).

In other countries, especially in the United States, numerous studies have shown that advanced practice nurses (APNs), registered nurses (RN) who have acquired the expert knowledge base, complex decision-making skills and clinical competencies for expanded practice (Schober and Affara, 2006), have been able to improve maternal and child health and lower costs of health care (Brooten et al., 2001; Clark et al., 2001; Garcia-Patterson et al., 2003; Jackson et al., 2003; Ruiz et al., 2001). In one study educational programs provided by APNs were successful overall in increasing the knowledge of mothers (Clark et al., 2001). In another study, examining outcomes of women with twin pregnancies, the group of women who received care by APNs had no newborns of less than 30 weeks gestation and the mean infant birth weight was also higher. In addition, days in the neonatal intensive care unit were reduced from a mean of 17 to 7, and hospital charges were less than \$30,000 per infant (Ruiz et al., 2001).

Using a randomized clinical trial, a model of prenatal care for women with high risk pregnancies (i.e. diabetes mellitus, preterm labor, and chronic hypertension) was tested examining prenatal, maternal, and infant outcomes, and cost of health care for one year after delivery. In this study, half of the usual physician provided prenatal care was provided by APNs in the women's homes. Results showed that in the APN intervention group: the number of infant deaths was lower (2 vs. 9); there were 11 fewer

preterm infants; more multiple pregnancies were carried to term (77% vs. 33%); there were fewer prenatal hospitalizations (41 vs. 49); fewer infant rehospitalizations (18 vs. 24); and shorter maternal lengths of stay compared to women in the control group (Brooten et al., 2001).

In a study of collaborative care between APNs and physicians, results indicated a greater number of normal spontaneous vaginal deliveries and less use of epidural anesthesia (Jackson et al., 2003). In addition, comparison of outcomes between an endocrinologist-based management group and an APN-based management group yielded similar results in various aspects of services, i.e., rates of insulin treatment and perinatal outcome (hypertension, preterm delivery, cesarean section, low Apgar score, macrosomia, newborns of small and large sizes of given their gestational age, obstetric trauma, major malformations, hypoglycemia, hypocalcaemia, polycythemia, jaundice, respiratory distress, and mortality) (Garcia-Patterson et al., 2003).

The assessment of the outcomes of APN practice has become necessary in providing empirical evidence that APNs are significantly contributing to the health care system (Kleinpell, 2009). The model of APN care has been introduced into the health care system in order to improve quality of nursing care in Thailand (Boonthong, 2005), and achieve optimal health outcomes (Hanucharunkul, 2010). According to the Regulation of Specialist Nursing Midwifery Certification 1998, the requirements for an individual RN who wishes to apply for the examination to be certified as an APN are a graduate who holds a master degree level in nursing, or upon the completion of a post-basic nurse practitioner (NP) program accredited by the Thailand Nursing and Midwifery Council (TNC) and has at least three years experiences in a specialty area (Hanucharunkul, 2003). The scope of Thai APN practice involves providing direct care to patients with complex health problems and effectively managing care for specific groups of patients (Hanucharunkul, 2010). Since 2003, some maternal and child APNs have been certified and have delivered care for Thai women and their families. However, there are no published

studies that have examined whether or not maternal and child APNs are able to improve maternal and child health. Thus, the purpose of this study was to compare the outcomes of maternal and child APN care at the same health care settings before and after the introduction of the certified maternal and child health APNs.

CONCEPTUAL FRAMEWORK

A lot of attention has been focused on improving quality outcomes in healthcare organizations across the country. There is an increased use of evidence-based practice in care, as well as transparency surrounding patient outcomes. This has challenged healthcare organizations and executives to pay more attention in the improvement of quality outcomes within their institutions. Many programs are promoting and requiring that specific outcome metrics be met to achieve program accreditation. In order to be considered for this designation, organizations are not only required to meet specific program criteria, but must also demonstrate that specific healthcare outcome metrics are met. A theoretical framework can be used as a tool to guide the understanding of the healthcare accreditation requirements and to monitor institutional progress throughout the process. Donabedian's structure, process, and outcome model can provide such a framework and was used as the framework for this study.

Donabedian's theory (2003), consisting of the three components of structure, process, and outcome emphasized that structure influences process and process influences outcomes. **Structure** is the conditions under which care is provided. These include the attributes of material resources (such as facilities and equipment), human resources (such as the number, variety, and qualifications of professional and support personnel), organizational characteristics, such as the organization of the medical and nursing staff, the presence of teaching and research functions, kinds of supervision and performance review, methods of paying for care, and so on. **Process** refers to the activities that constitute healthcare including diagnosis, treatment, rehabilitation, prevention, and patient education that usually is carried out by

professional personnel, which also includes other contributions to care, particularly by patients and their families. Outcomes are desirable or undesirable changes in either individuals or populations that can be attributed to healthcare. **Outcomes** include changes in health status, knowledge acquired by patients and family members, the behavior of patients or family members that may influence future health, satisfaction of patients and their family members with the care received and its outcomes (Donabedian, 2003).

In this study, structure is the characteristics of APNs' practice settings, i.e., type of hospital, number of specialist physician, and nurses' educational background. Process was divided into two types of care, i.e., care that was carried out by maternal and child care APNs, and care that was carried out by providers before the introduction of the maternal and child care APNs' role. The outcomes, the main focus of the study, are patient outcomes and health service use.

Patient outcomes in this study refer to the effects of care provided for women and their babies during the prenatal, delivery, and postpartum period. Patient outcomes encompass information that demonstrated maternal and newborn health status, and also included safety or freedom from infections, or complications during pregnancy, delivery, and the postpartum period. **Health service use** refers to information regarding the number of times and places that the patient visited or was admitted to the setting in order to receive care, treatment, or advice regarding maternal and child health during the prenatal, delivery, or postpartum period, as recorded in the patient's chart. Information regarding health service use includes the number of hospitalizations.

MATERIALS AND METHODS

This study compared the outcomes of maternal and child health one year before and four years after the introduction of certified APNs at the same health care settings. The study project was approved by the Ethical Clearance Committee on Human Rights of the Institutional Review Boards of the primary author's academic institution and

of the hospitals used as the study sites. Data were collected in the period June and November 2009. The questionnaire and data collection forms were developed and assessed for content validity by five experts including four faculties from Burapha University and one faculty from Mahasarakham University.

The study sample consisted of both APNs and patients. The APN sample included five APNs who had been certified more than one year and were currently active in providing maternal and child care services. Characteristics of the APNs are summarized in Table 1.

Table 1. Maternal and child APNs characteristics by specific area of practice

Item	Preterm labor	Teenage pregnancy	Childbirth preparation 1	Childbirth preparation 2	Gestational diabetes mellitus
Year certified	2004	2004	2006	2006	2007
Clinical experienced as registered nurse (years)	21	13	13	13	20
Clinical experienced as APN (years)	5	5	3	3	2
Unit of employment	Labor unit	Antenatal clinic	Labor unit	Labor unit	Postpartum ward
% of time provided care using APN role	20	40	30	20	20
Type of practice hospital	Provincial hospital	Provincial hospital	Community hospital	Regional hospital	University hospital

The patient sample included women who received health care before ($n = 143$) and after ($n = 362$) the initiation of certified APNs providing maternal and child care practices. Data obtained from women that received maternity care in the year prior to the introduction of certified maternal and child health APNs (assigned as year-1) were analyzed in comparison with those women who received services from certified APNs after the introduction of certified APNs (assigned as year+1, year+2, and year+n, etc.).

The inclusion criteria for women were: 1) obtained antenatal care and delivery at the hospital where the APNs were working; and 2) had a singleton pregnancy. In order to have sample groups with similar characteristics that are associated with pregnancy outcomes, matching was used for maternal age, anemia for the teenage patients, number of deliveries, doctor private case for childbirth preparation

patients, history of cesarean section, and type of gestational diabetes mellitus (GDM).

A smallest number of cases per year (year - 1, year + 1, thru year + n) was used to determine a sample size for other years. The estimated equal sample sizes for individual years were designated as year-1, year + 1, year + 2 thru year + n. Sampling was not done during the year 0 or the starting year as this was considered as an APN transitional year. A number of samples for each group are summarized in Table 2.

Data on patient outcomes and health service use were extracted retrospectively from women's charts, women's outpatient record, labor and delivery summary, registered book, and the electronic database from four APNs' practice settings, i.e., one community hospital, one provincial hospital, one regional hospital in South Thailand, and one university hospital in Bangkok.

Table 2. Sample size of each patient group receiving APNs care.

Group of patient receiving care from maternal and child APNs	year-1	year+1	year+2	year+3	year+4
	n	n	n	n	n
Preterm labor	30	30	30	30	30
Teenage pregnancy	31	31	31	31	31
Childbirth preparation 1*	26	26	26	-	-
Childbirth preparation 2**	10	10	10	-	-
Gestational diabetes mellitus	46	46	-	-	-

* Community hospital ** Regional hospital

Table 3. Outcomes of maternal and child APNs care by APNs' specific area of practice.

	Preterm labor	Teenage pregnancy	Childbirth preparation	Gestational diabetes mellitus	
Patient outcomes	- Gestational age at delivery	- Number of ANC* visit	- Type of delivery	- Maternal complications	
	- Birth weight	- Hematocrit at 32 weeks	- Analgesic use	- Type of delivery	
	- Apgar score at 1 minute	- Maternal complications	- Duration of 1 stage of labor	- Fasting blood sugar at 6 weeks postpartum	
	- Apgar score at 5 minutes	- Gestational age at delivery	- Duration of 2 stage of labor	- Blood sugar 2 hours post load glucose at 6 weeks postpartum	
	- Neonatal complications	- Birth weight	- Estimated blood loss	- Birth weight	
		- Apgar score at 1 minute	- Apgar score at 1 minute	- Apgar score at 1 minute	
		- Apgar score at 5 minutes	- Apgar score at 5 minutes	- Apgar score at 5 minutes	
		- Neonatal complications		- Neonatal complications	
	Health service use	- Maternal rehospitalization	- Maternal rehospitalization	-	- Maternal LOS
		- Maternal LOS	- Maternal LOS		- Neonatal LOS
- Neonatal LOS		- Neonatal LOS		- Neonatal admitted to special care nursery or NICU***	
- Neonatal admission to special care nursery or NICU***		- Neonatal admitted to special care nursery or NICU***			

* ANC = Antenatal care ** LOS = length of stay ***NICU = Neonatal Intensive Care Unit

The 480-bed provincial hospital, which was used as a study setting, had eight obstetricians and 11 pediatricians on services. Approximately 4,300 women gave birth annually. Two APNs whose specific groups of patients were women with preterm labor and teenage pregnancy patients were employed to provide services in two practice areas, the labor and delivery unit and the antenatal care unit. There were 17 registered nurses holding bachelor's degrees in nursing working in the labor and delivery unit. The APN who cared for the preterm labor patients obtained master's degree in nursing, and had been certified as an APN for five years. There were 14 registered nurses that obtained bachelor's degrees in nursing working in the antenatal care unit. The APN that cared for teenage pregnancy patients obtained master degree in nursing, and had been certified as an APN for five years.

The labor unit in a 120-bed community hospital was used as a study setting. Approximately 1,200 women gave birth annually at this site. There was no obstetrician on service. The APN at this site had specialized in childbirth preparation, cared for the childbirth preparation patient group, obtained master degree in nursing, and had been certified as an APN for three years. There were seven registered nurses that obtained bachelor degree in nursing working in the labor and delivery unit.

The 863-bed regional hospital, where approximately 3,500 women gave birth annually, had 10 obstetricians on service. The APN at this site cared for child birth preparation patients, obtained master degree in nursing, and had been certified as an APN for three years. The labor and delivery unit where the APN practiced had 19 nurses, 17 of them obtained bachelor degree in nursing, and two of the 19 had completed a master's degree in nursing.

The 800-bed university hospital, where approximately 4,800 women gave birth annually, had six obstetricians providing services. The APN at this site specialized in providing care to women with gestational diabetes mellitus, obtained master degree in nursing, and had been certified as an

APN for two years. The four postpartum wards where the APN practiced had 47 registered nurses providing services; 42 of the 47 obtained bachelor degree in nursing, while one of the 47 registered nurses had completed the master degree program in nursing. In addition, four of the 47 registered nurses obtained master degree in areas other than nursing.

APNs in this study provided a variety of practices, i.e., an APN that had specialized in preterm labor used APN competencies to provide patient education, educated the nursing staff concerning preterm labor, gave medications and treatments, and coordinated care between nurses and physicians in order to care promptly for preterm labor patients. The APN that specialized in teenage pregnancy provided care for clients using competencies in several practice areas including patient education, nursing staff education, performed treatments, and coordinating care between other healthcare providers and physicians in order to properly provided care for teenage pregnancy patients.

APNs that specialized in childbirth preparation developed childbirth preparation programs, which included both physiological and psychological preparation for the childbirth period. Pregnant women who attended the programs were taught and trained by APNs in several topics such as the process of labor and delivery, relaxation practice, and exercise. APNs also informed staff nurses and physicians concerning childbirth preparation programs.

The APN who was specific population was women with gestational diabetes mellitus (GDM) practiced using coordination and collaboration with many parties. She coordinated care with nurses in the antenatal clinic regarding health education. She collaborated with a dietitian regarding essential dietary education that needed to be taught to the women with GDM. The APN also worked with the hospital diabetic working group to formulate guidelines of care and to determine essential health education content for patients with GDM. In the postpartum ward, GDM patients were trained in

diet and exercises as well as other self-care practices to prevent overt DM.

Descriptive statistics were used to analyze demographics data. ANOVA and t-tests were used to compare the outcomes of maternal and child health care APN practices. Kruskal-Wallis, Chi-square tests, and Mann-Whitney tests were used for skewed data.

RESULTS

Health benefits provided by APNs in preterm labor care were increased, including gestational age at delivery where values of Chi-square = 10.774 and $df = 4$ at $p = 0.029$. Results indicated that the proportion of neonatal complication was decreased including respiratory distress of new born where values of Chi-square = 12.414 and $df = 4$ at $p = 0.015$, neonatal jaundice associated with preterm delivery in which the values of Chi-square = 16.581 and $df = 4$ at $p = 0.002$, unspecified neonatal jaundice with values of Chi-square = 25.608 and $df = 4$ at $p = 0.000$, and a lower proportion of neonatal admissions to the special care nursery or the neonatal intensive care unit (NICU) where values of Chi-square = 12.266 and $df = 4$ at $p = 0.015$.

Based on the multiple comparison procedure, results indicated that the proportion of unspecified neonatal jaundice in 'year+1' was lower than that of 'year-1' where the values of Chi-square = 11.132 and $df = 1$ at $p = 0.000$. The proportion of neonatal admission to special care nursery or NICU in 'year+1' was also lower than that of 'year-1' where the values of Chi-square = 7.547 and $df = 1$ at $p = 0.002$. In the preterm labor patient group, the number of infants with Apgar scores at 1 minute < 7 were reduced from 5 in the year before introduction of APNs to 2, 2, 0, and 0 in one, two, three, and four years, respectively after the introduction of APN practice (data not shown in the Table).

Findings demonstrated that the Apgar score at 5 minutes ($p = 0.009$) and neonatal length of stay (LOS) ($p = 0.021$) were significantly different in the teenage pregnancy patient group. Nevertheless, the results of pos-hoc analysis revealed that

a mean Apgar score at 5 minutes in 'year+3' was lower than that of 'year+2' ($p = 0.004$), and a mean neonatal LOS in 'year+2' was higher than that of 'year-1' ($p = 0.003$). However, there was a trend toward higher mean in hematocrit level, gestation age, birth weight, and Apgar score at 1 minute over year-1, but none reached statistical significance. Findings also indicated that the number of pregnant teenagers with anemia at the first antenatal clinic visit (hematocrit level < 33 %, measured before 20 weeks gestation) were reduced when measured at 32 weeks gestation from 7 in the year before the introduction of APNs to 2, 4, 1, and 0 in one, two, three, and four years, respectively after the introduction of APN practice (data not shown in the Table).

Results showed that the amount of blood loss was significantly different ($p = 0.001$) in the childbirth preparation group at the community hospital. The duration of first stage of labor was significantly different ($p = .039$) for the childbirth preparation group at the regional hospital. Results of pos-hoc analysis revealed that the year after implementation of APNs practice (year+1) the amount of blood loss was lower compared to that of the year before implementation of APNs practice (year-1) at $p = 0.004$, and two years after the implementation of APNs (year+2) blood loss was also lower compared to one year before the implementation of APNs (year-1) at $p = 0.000$. Findings also indicated that the proportions of cesarean sections and instrument birthing were lower but not significantly in the year after the initiation of APNs compared to the year before initiation of the APN role for the childbirth preparation group at the regional hospital.

The values of fasting blood sugar level at 6 weeks postpartum were lower than those before the introduction of APN practice in the gestational diabetes mellitus (GDM) patient group ($p = 0.007$), and fewer women were diagnosed with overt DM at 6 weeks postpartum (3 vs. 5) (data not shown in the Table). The proportion of neonatal complications was also lower than those before the introduction of APN practice in the GDM patient group (Chi-square = 5.301, $df = 1$, $p = .021$).

Table 4. Mean comparisons of outcomes before and after the initiation of APNs practice.

Outcomes	Before	After				p
	year-1 mean	year+1 mean	year+2 mean	year+3 mean	year+4 mean	
Preterm (n = 30 each year)						
<i>Patient outcomes</i>						
- Gestational age at delivery (week)	33.17	34.07	34.47	33.73	34.47	.200
- Apgar score at 1 minute	7.73	8.23	8.30	8.30	8.53	.050
- Apgar score at 5 minutes	8.67	9.10	9.00	8.93	8.97	.289
<i>Health service use</i>						
- Neonatal LOS (day)	11.77	9.80	9.63	11.03	12.63	.945
Teenage (n = 31 each year)						
<i>Patient outcomes</i>						
- Number of ANC visit	7.55	9.13	8.52	8.61	8.58	.303
- Hematocrit at 32 weeks (%)	34.10	34.77	34.50	35.65	35.55	.304
- Gestational age at delivery (week)	37.61	38.81	38.16	38.26	38.45	.277
- Birth weight (gram)	2866.13	3099.68	3120.65	2953.23	3053.87	.141
- Apgar score at 1 minute	8.77	8.81	8.84	8.90	8.81	.886
- Apgar score at 5 minutes	9.74	9.68	9.77	9.39	9.48	.009*
<i>Health service use</i>						
- Maternal LOS (day)	2.82	3.06	3.45	2.85	2.81	.300
- Neonatal LOS (day)	2.61	3.48	3.71	4.26	2.97	.021*
Childbirth preparation 1^a (n = 26 each year)						
<i>Patient outcomes</i>						
- Duration of 1 st stage of labor	562.08	597.17	857.25	-	-	.127
- Duration of 2 nd stage of labor	21.29	16.04	16.29	-	-	.422
- Estimated Blood loss (milliliter)	264.00	160.42	152.08	-	-	.001*
- Apgar score at 1 minute	9.15	9.04	9.08	-	-	.119
- Apgar score at 5 minutes	9.92	9.85	9.85	-	-	.695
Childbirth preparation 2^b (n = 10 each year)						
<i>Patient outcomes</i>						
- Duration of 1 st stage of labor (minute)	536.25	576.25	380.00	-	-	.032*
- Duration of 2 nd stage of labor (minute)	27.00	16.50	10.50	-	-	.234
- Estimated Blood loss (milliliter)	225.00	187.50	150.00	-	-	.345
- Apgar score at 1 minute	8.90	9.10	8.90	-	-	.275
- Apgar score at 5 minutes	9.80	9.80	9.80	-	-	.793
GDM (n = 46 each year)						
<i>Patient outcomes</i>						
- FBS at 6 weeks postpartum (mg/dl)	100.67	93.61	-	-	-	.007*
- BS 2 hours post load glucose at 6 weeks postpartum (mg/dl)	140.78	137.57	-	-	-	.426
- Birth weight (gram)	3259.57	3208.52	-	-	-	.485
- Apgar score at 1 minute	7.73	8.23	-	-	-	.249
- Apgar score at 5 minutes	8.67	9.10	-	-	-	.167
<i>Health service use</i>						
- Maternal LOS (day)	5.37	4.98	-	-	-	.212
- Neonatal LOS (day)	11.77	9.80	-	-	-	.230

Note: * $p < .05$; LOS = Length of stay; ANC = Antenatal care; GDM = Gestational diabetes mellitus; FBS = Fasting blood sugar; BS = Blood sugar; a = community hospital; b = regional hospital

Table 5. Comparison of proportions of outcomes before and after the initiation of APNs practice.

Outcomes	Before		After			Chi-square	df	p
	year-1 (%)	year+1 (%)	year+2 (%)	year+3 (%)	year+4 (%)			
Preterm labor (n = 30 each year)								
<i>Patient outcomes</i>								
- Gestational age at delivery ≥ 37 weeks	0.0	6.7	16.7	6.7	23.3	10.774	4	.029*
- Birth weight < 2500 grams	83.3	53.3	73.3	66.7	56.7	8.100	4	.088
<i>Health service use</i>								
- Maternal rehospitalization	13.3	26.7	16.7	26.7	43.3	8.670	4	.070
- Neonatal admission to special care nursery or NICU	93.3	60.0	70.0	83.3	63.3	12.266	4	.015*
Teenage (n = 31 each year)								
<i>Patient outcomes</i>								
- Maternal complication	48.4	25.8	45.2	38.7	41.9	3.925	4	.416
- Gestational age at delivery < 37 weeks	22.6	6.5	16.1	6.5	6.5	6.663	4	.155
- Birth weight < 2500 grams	12.9	0.0	9.7	6.5	9.7	4.155	4	.385
<i>Health service use</i>								
- Maternal rehospitalization	19.4	22.6	16.1	22.6	32.3	2.583	4	.630
- Neonatal admission to special care nursery or NICU	9.7	6.5	16.1	16.1	6.5	3.039	4	.551
Childbirth preparation 1^a (n = 26 each year)								
<i>Patient outcomes</i>								
- V/E, F/E, C/S	7.7	7.7	0.0	-	-	2.108	2	.349
Childbirth preparation 2^b (n = 10 each year)								
<i>Patient outcomes</i>								
- V/E, F/E, C/S	70.0	50.0	40.0	-	-	1.875	2	.392
- Analgesic use	16.7	50.0	12.5	-	-	2.889	2	.236
GDM (n = 46 each year)								
<i>Patient outcomes</i>								
- Maternal complication	21.7	17.4	-	-	-	.069	1	.973
- V/E, F/E, C/S	43.5	39.1	-	-	-	.045	1	.832
- Neonatal complication	58.7	32.6	-	-	-	5.301		.021*
<i>Health service use</i>								
- Neonatal admission to special care nursery or NICU	26.1	19.6	-	-	-	.247	1	.620

Note: * p -value < .05; NICU = Neonatal intensive care unit; V/E = Vacuum extraction; F/E = Forceps extraction; C/S = Cesarean section; GDM = Gestational diabetes mellitus a = community hospital; b = regional hospital

DISCUSSION

This study found that there were positive health outcomes after the implementation of maternal and child health APNs into the Thai healthcare system. When comparing outcomes during the period before and after implementation of APNs, there were significant differences in infant gestational age (higher), shorter duration of first stage labor, lower blood loss at delivery, lower fasting blood sugar (FBS) levels at 6 weeks postpartum, lower proportion of neonatal complications, and lower proportion of neonatal admissions to the special care nursery or the NICU. Study results in improvement in patient outcomes and health service use after implementation of APNs are consistent with those of the earlier studies by Brooten et al. (2001), Garcia-Patterson et al., (2003), Jackson et al. (2003), and Ruiz et al. (2001).

There was also a trend toward positive outcomes, i.e. higher hematocrit level, higher birth weight, higher Apgar score at 1 minute, lower cesarean section and instrument birthing, over year-1, although none reached statistical significance. These results are consistent with the systematic review of APN outcomes by Newhouse et al. (2011) that reported when comparing certified nurse-midwives (CNM) and physicians, the certified nurse-midwives groups have lower rates of cesarean section, similar infant Apgar score, and equivalent levels of low birth weight infants.

The outcomes of this study also provide evidence of the influence of APNs' practice competencies such as care management, direct care, empowering, educating, coaching, mentoring, collaboration (Thailand Nursing and Midwifery Council, 2010) in providing health care for their clients.

Donabedian emphasized that structure influences process and process influences outcomes. In this study, it was found that the outcomes were not significant difference after the introduction of APN practice, which may explained the Donobedian's theory as follow. Structures recognized in this study included characteristics of the APNs' practice settings, i.e., type of hospital, number of specialist physicians, and nurses' educational background. The

hospitals where participating APNs are working comprised of community, general, regional, and a university hospital, where numbers of specialist physicians are varied by types of hospital. For example, the community hospital normally did not have any specialist physician on service, whereas general, regional, and university hospitals have a number of specialist physicians working depending on hospital size. Thus, determining the outcomes of APN care in each practice setting in this study can be difficult since APNs often provide care as part of the healthcare team or in collaborative practice (Kleinpell and Gawlinski, 2005).

Furthermore, the role of APN is a new form of certification for nurses in Thailand. The first APN cohort in Thailand was certified by the Thailand Nursing and Midwifery Council (TNC) in 2003, while the scope of practice and competencies of the APN role recently reached consensus and was issued by the TNC in 2008 (Thailand Nursing and Midwifery Council, 2010). APNs participating in this study comprised of the second (certified in year 2004), the fourth (certified in year 2006), and the fifth (certified in year 2007) cohort of APNs certified by the TNC. In addition, the study time frame was set during two to five years after the first cohort of APNs role was introduced into Thai healthcare system. Thus, it could be that the APNs that participated in this study were pioneers in introducing the APN role in Thailand, and may have faced problems during the process of APN practice (Langkarpint, 2005).

There are many factors that have been identified that impede APN role development, including lack of role models and mentors, lack of clear role definitions and boundaries, unclear expectations of role, lack of understanding of the APN role, lack of a peer network, increase workloads, increase in administrative tasks, lack of effective inter-professional relationships, lack of resources, and nursing staff shortages (Jones, 2005; Lindeke, 2005).

Wongpratoom et al. (2010) studied role development of APNs in Thailand and found that the greatest barriers in the role development were lack of a clearly delineated organizational structure and

unclear organizational policies, work assignments not reflective of advanced practice nursing and uncooperative behavior by members of multidisciplinary teams, and work assignments in non-advanced practice situations. Thus, undoubtedly, APNs in this study may have to face various barriers to APN practice as described above and this may influence outcomes of APN care.

As pioneer APNs in Thailand, the APNs in this study may well have faced barriers such as lack of role models and mentors, lack of clear role definitions and boundaries. Consequently, confusion about the scope and nature of APN roles may have serious implications for job satisfaction, performance, and development of the APN role (Bonsall and Cheater, 2008). As reported in the study on successful APN practice in Thailand, APNs who clearly understood the scope of practice and APN competencies usually could identify desirable outcomes for their APN practice (Hanucharurnkul et al., 2008).

Moreover, like others APNs in Thailand, APNs in this study usually were assigned many tasks in addition to their primary responsibility (Wongkpratoom et al., 2010) including hospital quality development, and functioning as assistant head nurse. Additionally, APNs indicated that they had only 20 to 40 percent of their time allocated to provide APN care for clients in the APN role. This finding suggests that the APNs may not have had adequate time to provide continuity of care for their clients. As Brooten and colleagues (2003) found, patient groups that had greater mean time with an APN and greater APN contact per patient, had greater improvements in care outcomes and greater healthcare cost saving. Thus, APNs' health care services in the current study may not have been sufficient to reach optimum health care goals.

In summary, the benefits of maternal and child APNs' practices are documented in the maternal and newborn outcomes in this study. Results indicated that four years after the implementation of APNs in practice: infant gestational ages were higher in the group of women with preterm labor; neonatal complications were lower; the numbers of neonatal admission to the special care nursery or the neonatal

intensive care unit were lower; time in the first stage of labor and the amount of blood loss were less; and fasting blood sugar levels at 6 weeks postpartum were lower compared to the one year period before APNs were in practice.

These findings document the differences APNs made in the outcomes of maternal and child care in Thailand using their in-depth knowledge and skills in this area of practice. Study results document the need to increase the numbers and use of APNs in the Thai health care system in order to improve maternal and child health.

There were some limitations to the study. First, this comparative study used retrospective document review. As such, it is constrained by the quality of the recorded documents and cannot fully control for bias in the initial recording of document data (Brink and Wood, 1998). Second, it has limited external validity and generalizability due to the small sample size of APNs' patient groups. Third, the study sample is heterogeneous being comprised of groups of preterm labor patients, teenage pregnancy patients, childbirth preparation patients, and gestational diabetes mellitus patients. As a result, differences in patient outcomes and health service use by group should be interpreted cautiously. While the investigator did not present the results of the study as a whole due to differences in sample characteristics by patient group and differences in outcomes by patient group, study findings provide important information to help fill the knowledge gap about effects of maternal and child APN care on outcomes of pregnant women and newborns in Thailand.

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