

## **CHAPTER IV**

### **RESULTS**

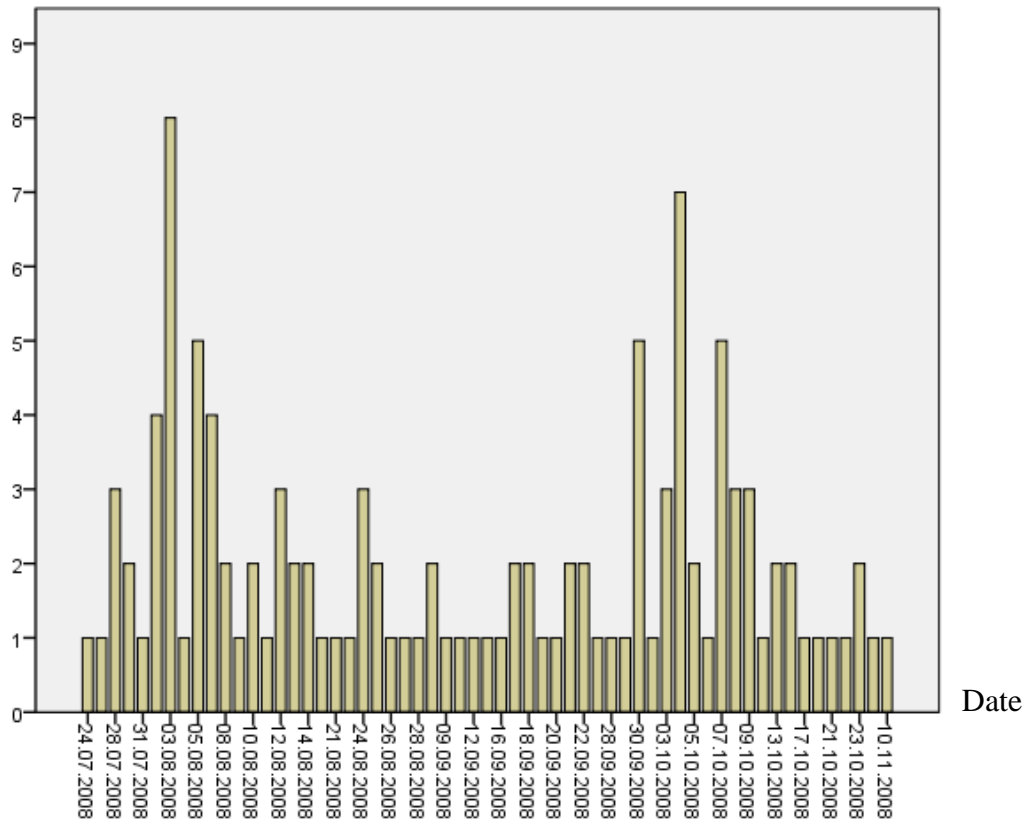
The results of this study are presented as follows:

- 4.1. Demographic characteristic of the study subjects
- 4.2. The relationship between factors and Rotavirus infection
- 4.3. The strength of association between factors and Rotavirus infection

The result of a research concerns the Rotavirus infection in the pediatric wards of a university hospital in Thailand, with all those who were treated 2,677 neonates the Case group of 117 neonates with nosocomial Rotavirus, confirmed cases totaling to 109 (93.2%), Probable cases of 8 (6.8%) were confirmed cases. The genotype by stool samples of neonates 76 (65.0%) were randomly selected for genotyping, of these, 35 were from the neonatal wards, and 41 were from postpartum wards. The genotypes of all of the specimens were G12P[3]. The 342 neonates in the control which were selected randomly via the use of the Table of Random Numbers, and were receiving treatments of other diarrhea. The total number of study adds up to 463 neonates.

A graph of rotavirus outbreaks occurred, two periods, during the first began within late July. Infection is peaking during the period of August, during two. Getting an infection occurred and they peaked in October. The outbreak was over by early November, as shown in Fig 4.1

Number of cases



**Figure 4.1** Case of nosocomial Rotavirus outbreak infection in the pediatric wards, by number of case and date of onset, July 24<sup>th</sup> – November 10<sup>th</sup>, 2008 A.D.

From the information pertaining the Case totaling to 117 cases, it appeared that the infection had spread in various pediatric wards, and 346 neonates in the Control group, as follows:

The Case group had Rotavirus infection in neonates and neonate patients receiving treatments in the pediatric wards. The spread of the Rotavirus was, according to pediatric ward names, most have a distribution of the infections there was the highest number of Rotavirus infection in Phra Sri2 Ward, 61 cases of infection (52.1%), 61 cases (52.1%); Phra Sri 8/1 13 cases (11.1%); Kosol 2, 12 cases (10.2%); Ananthamahidol 4, 6 cases (5.1%), Ananthamahidol 5 respectively.

The Control group which received treatments at the same time as the Case, but was not infected by Rotavirus, were listed according to pediatric ward names as followed: Chaofa Maha Jakri 1, Chaofa Maha Jakri 3, Chaofa Maha jakri 4, Jaofa Maha Jakri 5, Phra Sri 2, Anathamahidol 2, Ananthamahidol 4, Ananthamadhicol 5, Kosol 2 (7.2%, 6.0%, 6.3%, 5.4%, 44.2%, 11.2%, 9.2%, 9.5%, 0.5% respectively), as shown in Table 4.1

**Table 4.1** Number of cases and controls classified by pediatric wards

Ward name	Case group		Control group	
	Number	Percentage	Number	Percentage
Chaofa Maha Jakri 1	2	1.7	25	7.2
Chaofa Maha Jakri 3	2	1.7	21	6.0
Chaofa Maha Jakri 4	2	1.7	22	6.3
Chaofa Maha Jakri 5	2	1.7	19	5.4
Phra Sri 2	61	52.1	153	44.2
Phra Sri 8/1	1	0.8	0	0
Phra Sri 9/2	3	2.5	0	0
Phra Sri 13/2	1	0.8	0	0
Phra Sri 14/2	2	1.7	0	0
Ananthamahidol 2	12	10.2	39	11.2
Ananthamahidol 4	6	5.1	32	9.2
Anathamahidol 5	13	11.1	33	9.5
Kosol 2	1	0.8	2	0.5
Children RCU	2	1.7	0	0
Duty Physicians' office(observe room)	4	3.4	0	0
<b>total</b>	<b>117</b>		<b>346</b>	

## 4.1 Demographic characteristics of the study subjects

### **Age:**

Within the Case's age group made up of 117 neonates, once set into 5 categories would be as followed: there were 40(34.18%), 48(41.02) early neonates of those between 0 to 3, 4 to 7 days old respectively; 9(7.69%) , 5(4.27) late neonates of those between 8 to 14, 15 to 29 days old respectively; 15(12.82%) neonates of those over or equal to 30 days old; (Median 5 days) was of the age between 2-130 days old.

For the Control's age group made of 346 neonates, it could be categorized into 5 age groups as follows: there were 22(6.35%), 128(36.99) early neonates of those between 0 to 3, 4 to 7 days old respectively; 51(14.73%), 67(19.36) late neonates of those between 8 to 14, 15 to 29 days old respectively; 78(22.54%) neonates of those over or equal to 30 days old; (Median 10 days) was of the age between 3-131 days old., as shown in Table 2

### **Gender:**

The gender of the Case group and the Control group comprised of, within the Case group, 59 (50.42%) males, 58 (49.57%) females; within the Control group, there were 194 (56.06%) males, 152 (43.93%) females.

### **Birth weight:**

For the birth weights comprised in the Case group, there were 102 (87.17%) neonates with normal birth weight, 15 (12.83%) with abnormally low birth weight; in the Control group, there were 312 (90.17%) neonates with normal birth weight, 34 (9.83%) neonates with abnormally low birth weight. Once added up the Case group and the Control group together, there were 414 (89.41%) neonates with normal birth weight in total and 49 (10.58%) of those with abnormally low birth weight.

**Gestational age at birth:**

For the gestational age at birth, the Case group comprised of 88 (75.21%) term neonates, with the term GA 37 weeks, 15 (12.82%) preterm neonates of GA less than 37 weeks, and 14 (19.96%) post-term neonates with GA more than 40 weeks. For the control group, it comprises of 299 (66.18%) term neonates with GA of 37 weeks, 28 (8.09%) pre-term neonates of GA less than 37 weeks, and 19 (5.49%) post-term neonates of GA more than 40 weeks.

**Method of delivery:**

As for the birth profile, in the case group there were 65 (55.08%) neonates of normal delivery, 8 (6.83%) deliveries facilitated by equipment (F/E, V/E), 44 (37.60%) neonates of caesarean section; and in the Control group, there were 255 (65.02%) neonates of normal deliveries, 4 (1.15) neonates of deliveries facilitated by equipment (F/E, V/E), 87 (25.14%) neonates of Caesarean deliveries.

**Duration of hospital admission:**

As for hospital admission, within the Case group, there were 7 (5.98%) neonates who came to receive treatments from the hospital for 2 days, there were 110 (94.01%) neonates were admitted into the hospital for more than 2 days; within the control group, there were 45 (13.00%) neonates who came to receive treatments in the hospital for 2 days, and 301 (86.99%) neonates who were admitted to the hospital for more than 2 days.

**Treatment history:**

The data concerning the treatments, within the Case group, a neonate was treated by the placement of nasogastric tube (0.85%); of the 116 (99.14%) neonates did not receive the placement of nasogastric tube, and within the control group there were a neonate received the placement of nasogastric tube (0.28%), with 345 (99.71%) neonates did not receive the placement of a nasogastric tube.

There were 13 (11.11%) neonates treated and received antibiotics within the Case group, 104 (88.88%) neonates did not receive the antibiotics; and within the

Control group there were 11 (3.17%) neonates received antibiotics, 335 (96.82%) neonates did not receive the antibiotics.

**Breastfed history:**

As for the breastfeeding, in the Case group, most are alone breastfed there were 78 (66.66%) neonates, the breastfed and formula-fed combination 17 (14.52%) neonates, the formula-fed alone there were 22 (18.80%) neonates. In the control group, most are alone breastfed there were 317 (91.61%) neonates, the breastfed and formula-fed combination 16 (4.62%) neonates, and 13 (3.75%) were alone formula-fed.

The statistical analysis of the data using Chi-Square Test showed that factors associated with Rotavirus infection include Gestational age associated with Rotavirus infection,  $p\text{-value} = 0.01$ ; Type of delivery associated with Rotavirus infection,  $p\text{-value} < 0.001$ ; Hospital Admission associated with Rotavirus infection,  $p = 0.03$ ; Treatment with antibiotic associated with Rotavirus infection,  $p\text{-value} = 0.003$ ; factors have been associated breastfeeding with Rotavirus infections,  $p\text{-value} > 0.001$  respectively, as shown in Table 4.2

**Table 4.2** Demographic characteristics case group and control group in pediatric wards

Characteristics	Case group (n = 117)		Control group (n = 346)		Total (n = 463)		P-value
	Number	Percentage	Number	Percentage	Number	Percentage	
<b>Age (day)</b>	Min-max = 2-130 Median = 5		Min-max = 3-131 Median = 10		Min-max = 2-131 Median = 7		
0-3	40	34.18	22	6.35	62	13.39	
4-7	48	41.02	128	36.99	176	38.01	
8-14	9	7.69	51	14.73	60	12.95	
15-29	5	4.27	67	19.36	72	15.55	
≥ 30	15	12.82	78	22.54	93	20.08	0.14 <sup>b</sup>
<b>Gender</b>							
Male	59	50.42	194	56.06	253	54.64	
Female	58	49.57	152	43.93	210	45.35	0.33 <sup>a</sup>
<b>Birth weight</b>							
Normal	102	87.17	312	90.17	414	89.41	
Low birth weight	15	12.82	34	9.82	49	10.58	0.36 <sup>b</sup>
<b>Gestational age (weeks)</b>							
Term GA 37 weeks.	88	75.21	299	66.18	387	83.58	
Preterm GA less than 37 weeks.	15	12.82	28	8.09	43	9.28	
Post term GA more than 40 weeks.	14	19.96	19	5.49	33	7.12	0.01 <sup>a</sup>
<b>Type of delivery</b>							
Normal delivery	65	55.08	255	65.02	320	69.11	
Abnormal delivery(F/E,V/E)	8	6.83	4	1.15	12	2.59	
Cesarean Section	44	37.60	87	25.14	131	28.29	<0.001 <sup>a</sup>
<b>Hospital Admission</b>							
2 days	7	5.98	45	13.00	52	11.23	
> 2 days	110	94.01	301	86.99	411	88.76	0.03 <sup>b</sup>

<sup>a</sup> *Pearson Chi-Square Test*<sup>b</sup> *Fisher's Exact Test*

**Table 4.2** Demographic characteristics case group and control group in pediatric wards (cont.)

Characteristics	Case group (n = 117)		Control group (n = 346)		Total (n = 463)		P-value
	Number	Percentage	Number	Percentage	Number	Percentage	
	<b>Treatment</b>						
<b>Nasogastric tube</b>							
No	116	99.14	345	99.71	461	99.56	
Yes	1	0.85	1	0.28	2	0.43	0.44 <sup>a</sup>
<b>Antibiotic</b>							
No	104	88.88	335	96.82	439	94.81	
Yes	13	11.11	11	3.17	24	5.18	0.003 <sup>b</sup>
<b>Breastfed history</b>							
<b>Dietary History</b>							
Breast-feeding	78	66.66	317	91.61	395	85.31	
Formula-feeding	22	18.80	13	3.75	35	7.55	
Breast-feeding and formula-feeding	17	14.52	16	4.62	33	7.12	< 0.001 <sup>a</sup>

<sup>a</sup> *Pearson Chi-Square Test*

<sup>b</sup> *Fisher's Exact Test*

### **Clinical characteristics:**

The data on clinical symptoms of neonates infected by Rotavirus, in the hospital, which expressing clinically, body temperature indicated as having a fever 35 (29.91%) neonates had a body during the temperature of 38°C to 38.9°C; there were 3 (2.56%) neonates whose highest body temperature was over or equaled to 39°C, the remaining 79(67.52%) neonates had a body temperature of those under 38° C.

On the quality of the stool, there were 56 (47.90%) neonates who discharged watery stool, 55 (47.00%) who discharged stool with mucus, and 6 (5.10%) whose stool was infused with blood.

The symptoms nauseous and vomiting found in 27 (23.10%) neonates, while 90 (76.90%) neonates did not exhibit symptoms of nausea and sickness, as shown in Table 4.3

**Table 4.3** Clinical characteristics with nosocomial Rotavirus gastroenteritis in pediatric wards

Characteristics	Case group (117)	
	Number	Percentage
<b>Clinical characteristics</b>		
<b>Fever</b>		
Temp < 38 °C	79	67.52
Temp 38 - 38.9 °C	35	29.91
Temp ≥ 39 °C	3	2.56
<b>Gross stool appearance</b>		
Watery	56	47.90
Mucous	55	47.00
Mucous bloody	6	5.10
<b>Nausea / Vomiting</b>		
No	90	76.90
Yes	27	23.10

## 4.2 Univariate Analysis

To test the relationship between factors of interests and the infection of Rotavirus as analyzed by Univariate Analysis, using binary logistic regression in order to approximate the value of correlation level, Crude odds ratio (crude OR), 95% confident intervals (95% CI) and *p-value* which was set to be statistically significant at  $\leq 0.05$ , as shown in Table 4.4

The factors of birth weight, the low birth weight (OR = 1.34, 95% CI 0.70 - 2.57, *p-value* 0.36) to be no relationship to the infection of rotavirus compared to normal birth.

The factors of gestational age were revealed to be related to Rotavirus infection, the post-term neonates of GA more than 40 weeks (OR = 2.50, 95% CI 1.20 - 5.19, *p-value* 0.01). The pre-term neonates of GA less than 37 weeks (OR = 1.82, 95% CI 0.93 - 3.55, *p-value* 0.08) to be no relationship to the infection of rotavirus compared to term GA 37 weeks.

The factors of deliveries facilitated by equipment (F/E, V/E) (OR = 7.84, 95% CI 2.29 - 26.86, *p-value* 0.001), and the caesarean section (OR 1.98, 95% CI 1.26 - 3.12, *p-value* 0.003) to be related to the infection of rotavirus compared to normal delivery.

The factors of hospital admission, the hospital admission more than or equal 2 days (OR = 0.42, 95% CI 0.18 - 0.97, *p-value* 0.43) to be no relationship to the infection of rotavirus compared to hospital admission less than or equal 2 days.

The factors of treatment by nasogastric tube (OR = 0.34, 95% CI 0.02 - 5.41, *p-value* 0.44) to be no relationship to the infection of rotavirus compared to not treating with the insertion of a nasogastric tube.

The factors of history of being breastfed before Rotavirus infection, factors revealed to be related to the Rotavirus infection, the factors of alone being formula-fed (OR = 6.87, 95% CI 3.31 - 14.25, *p-value* <0.001), and the factors on being formula-fed and breastfed combined (OR = 4.31, 95% CI 2.08 - 8.92, *p-value* < 0.001) compared to breastfeeding.

**Table 4.4** The relationship between factors and Rotavirus infection using univariate logistic regression analysis

Variables	Case (n=117) Number(%)	Control (n=346) Number(%)	CrudeOR	95%CI	p-value
<b>Birth weight</b>					
Normal	102(87.17)	312(90.17)	Reference	-	-
Low birth weight	15 (12.82)	34 (9.82)	1.34	0.70-2.57	0.36
<b>Gestational age</b>					
Term GA 37 weeks.	88(75.21)	299(66.18)	Reference	-	-
Preterm GA less than 37 weeks.	15(12.82)	28 (8.09)	1.82	0.93-3.55	0.08
Post term GA more than 40 weeks.	14(19.96)	19 (5.49)	2.50	1.20-5.19	<b>0.01</b>
<b>Type of delivery</b>					
Normal delivery	65(55.08)	255(65.02)	Reference	-	-
Abnormal delivery (F/E, V/E)	8 (6.83)	4 (1.15)	7.84	2.29-26.86	<b>0.001</b>
Cesarean Section	44(37.60)	87 (25.14)	1.98	1.26-3.12	<b>0.003</b>
<b>Hospital Admission</b>					
2 days	7(5.98)	45(13.00)	Reference	-	-
> 2 days	110(94.01)	301(86.99)	0.42	0.18-0.97	0.43
<b>Nasogastric tube</b>					
No	116(99.14)	345(99.71)	Reference	-	-
Yes	1 (0.85)	1 (0.28)	0.34	0.02-5.41	0.44
<b>Breastfed History</b>					
Breastfeeding	78 (66.66)	317 (91.61)	Reference	-	-
Formula-feeding	22 (18.80)	13 (3.75)	6.87	3.31-14.25	<b>&lt;0.001</b>
Breastfeeding and formula-feeding	17 (14.52)	16 (4.62)	4.31	2.08-8.92	<b>&lt;0.001</b>

*Crude OR = crude odds ratio, 95%CI = 95% confidence interval, p-value of Wald statistics significant  $\leq 0.05$*

### **4.3 The strength of association between factors and Rotavirus infection**

The Multivariate Analysis, with the use of binary logistic regression, using factors correlating to Rotavirus infection, such as the factors on deliveries facilitated by equipment's, the factors on deliveries using a caesarean section, factors on the deliveries of post-term neonates with the GA of over 40 weeks, factors of being alone formula-fed, factors of being formula-fed and breastfed combined, had analyzed the data by the method of Univariate Analysis. And that factor has the statistical significance level at  $\leq 0.05$ , and all factors without collinearity were put into the model at the same time for adjusted confounder and to increase the correlation strength of factors and the Rotavirus infection. The Odds ratio value obtained from Multiple Logistic Regression was a correlation value which controls all factors' result that appeared in, Model (Adjusted OR), 95% confident intervals (95% CI), and *p-value*; with the level of statistical significance at  $\leq 0.05$ . Once the data had been analyzed, it was disclosed that the deliveries facilitated by equipment (F/E, V/E) possessed a correlation to Rotavirus infection, more so than those whose neonates from normal deliveries (adjusted OR = 6.22, 95% CI 1.70-22.80, *p-value* = 0.006); and as for the breastfeeding, the neonates who were alone formula-fed (adjusted OR = 5.67, 95% CI 2.66 – 12.07, *p-value* < 0.001) and those they were breastfed in combination with formula-fed as a neonates had a higher chance the infection of Rotavirus, compared to neonates who were alone breastfed since birth (adjusted OR = 3.56, 95% CI 1.67-7.60, *p-value* < 0.001); similarly to post-term deliveries of GA more than 40 weeks, there were no association to the Rotavirus infection that were of statistical significance, as shown in Table 4.5

**Table 4.5** The strength of association between factors and Rotavirus infection using multiple logistic regression analysis

Variable	Univariate analysis			Multivariate analysis*		
	Crude OR	95%CI	p-value	Adjusted OR	95%CI	p-value
<b>Type of delivery</b>						
Normal delivery						
Abnormal delivery (F/E,V/E)	7.84	2.29-26.86	0.001	6.22	1.70-22.80	0.006
Cesarean Section	1.98	1.26-3.12	0.003	1.53	0.93-2.49	0.08
<b>Breastfed History before diagnosis of RV</b>						
Breast-feeding						
Formula-feeding	6.87	3.31-14.25	<0.001	5.67	2.66-12.07	<0.001
Breast-feeding and formula-feeding	4.31	2.08-8.92	<0.001	3.56	1.67-7.60	<0.001

*Crude OR = crude odds ratio, 95%CI = 95% confidence interval, p-value of Wald statistics significant  $\leq 0.05$*

*Adjusted OR = adjusted odds ratio*

*\*In the multivariate analysis, all variables in the univariate analysis did not have multicollinearity were considered*

## **CHAPTER V**

### **DISCUSSION**

This study is a study on Factors associated with the Nosocomial Rotavirus outbreak in neonates the Pediatric wards at Siriraj Hospital in Thailand 2008 A.D. From Multivariate analysis, it appears that there are 3 factors which correlate the infection of Rotavirus; the research would like to discuss the research's points of discovery to explain and confirm the consistency and differences between points of discovery and the research's hypothesis, and connects the research's result of the past research, as follows:

#### 5.1 Discussion of the research methodology

##### 5.1.1 Research design

##### 5.1.2 Selection of the studied population

##### 5.1.3 Statistical Approach

#### 5.2 Discussion of the research results

#### 5.3 Limitation of the study

### **5.1 Discussion of the research methodology**

#### **5.1.1 Research design**

This study is a case-control study, on the topic of Factors associated with the Nosocomial Rotavirus outbreak in neonates the Pediatric wards, in one of the university hospital. It's objective is to study and analyze factors on the birth profile, the gestational age at the delivery, the birth weight, type of delivery; factors on treatments, the placement of Nasogastric tube; factors on breastfeeding, being alone breastfed, being alone formula-fed, being fed a combination of breastfeeding and formula-feeding, and the Rotavirus infection in the hospital.

It is a retrospective study of data from medical records that already existed; therefore, the format used in this study is probable to the occurrence of bias or systematic error, errors from the collection of data; because there was a usage of retrospective data dating back to July 24<sup>th</sup> to November 10<sup>th</sup>, 2008 A.D. Some of the patient information may be lost, and could not be collected completely. However, because of the OPD Card maintaining system in Siriraj Hospital is a system that capable of preserving the medical history of each patient well; no data of patients appeared missing. And because there were many control groups, and vastly diverse population who were different from each other, **Selection bias** and sampling bias may happen. Thus, research had to randomly select; the method of random selection was to use the Table of Random Numbers, by set it from the last 4 numeral digits of running number until it met the number of reasons established for this study to collected retrospective data, from the period of July 24<sup>th</sup> to November 10<sup>th</sup>, 2008 A.D. Because of the spreading of Rotavirus, an outbreak type, which happened in the wards of pediatric, spread onto other wards, 15 in total, which are: Chaofa Jakri 1, Chaofa Jakri 3, Jaofa Jakri 4, Jaofa Jakri 5, Phra Sri 2, Phra Sri 8/1, Phra Sri 9/2, Phra Sri 13/2, Phra Sri 14/2, Anantamahidol 2, Anantamahidol 4, Anantamahidol 5, Kosol 2, Children RCU, and duty physicians' office, the researcher became interested and had studied and collected information of that particular period of time.

### **5.1.2 Selection of the studied population**

Population who participated in this study, within the Case group, were patients infected by Rotavirus within the period of July 24<sup>th</sup> to November 10<sup>th</sup>, 2008 A.D.; which was an outbreak type of spread that happened in the pediatric wards of Siriraj Hospital. The method used was Purposive Sampling, totaling into 117 neonates; overall there were infections in 15 wards, with retrospective data collection. Of all the patients in the Control group, 342 were patients admitted into pediatric wards, at the same time of the Case group's patients who did not exhibit symptoms in discharging watery stool and of having Rotavirus infection; using the running number drawn at random by the Table of Random Numbers, by using 4 numeral digits and read them top-down until one have enough for the Control group as previously calculated.

### **5.1.3 Statistical Approach**

Used SPSS Version 18.0 (Copyright of Mahidol University) to analyze the data.

Described the quality of the 2 data groups using the method of crosstabs in a frequency distribution, percentages, and mean, Standard Deviation, Median and the Minimum- Maximum.

Univariate Analysis with binary logistic regression was used to approximate the level of correlation, crude odds ratio (crude OR), the 95% confidence intervals (95% CI) and *p-value*, with the level of statistical significance being set at 0.05.

Multivariate Analysis uses binary logistic regression, by selecting all dependent and independent variables without collinearity into the model at the same time. It is a variable selection through the method of Enter for adjusted confounder, and to increase the correlation strength of various factors and Rotavirus contraction; the odds ratio obtained from Multiple Logistic Regression was a value of correlation which control all factors' result that appeared in the model (adjusted OR), 95% confident intervals (95% CI) and *p-value*, with the statistical significance set at  $\geq 0.05$ .

## **5.2 Discussion of the research results**

### **5.2.1 The factors related to rotavirus infection among the pediatric wards**

The factors associated with the infection of Rotavirus in pediatric wards in a hospital in Thailand, once analyzed the data statistically using logistic regression analysis, and had controlled any disruptive variables which may occur during the study, it appears that the delivery profile and the history of breastfeeding, prior to being diagnosed with having the Rotavirus infection by the doctor, have correlations to the contraction of Rotavirus infection. Whereas the gestational age profile and hospital admission profile do not have any relevance to the contraction of Rotavirus statistically.

### **5.2.1.1 Type of delivery**

Within this study, neonates whose deliveries were facilitated by equipment (F/E, V/E) OR=6.22 the chance of Rotavirus infection (95% CI 1.70 – 22.80, *p-value* = 0.006) compared to neonates whose deliveries were normal. The result of this study is consistent to the study of Haley RW (37) on the efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals in 1985 A.D.; then, it appeared that contacts occurred from the usage of medical equipment, and the medical personnel were the most important carrier in exposing the patients to the infection; and medical equipment which were not sterile properly would allow even an easier spread of the infection.

### **5.2.1.2 Breastfed history**

Neonates who were alone formula-fed, and those who were formula-fed and breastfed combined possessed a higher more likely to being infected with Rotavirus, 5.6 times (95% CI 2.66-12.07, *p-value* < 0.001) more so than neonates who were alone breastfed, and 3.57 times (95% CI 1.67 – 7.60, *p-value* < 0.001) respectively, once compared with neonates who were alone breastfed. This result of this study is consistent with 2 other studies, which are Newburg (42), on Human milk glycan's protect neonates against enteric pathogens, in 2005 A.D., in neonates who were breastfed. The result then was that it reduced the rate of falling ill and death rate caused by diarrhea, by receiving antibodies and prebiotic from mothers. Yoken (24), Yoken had also did a study on, Human milk mucin inhibits rotavirus replication and prevents experimental gastroenteritis, in 1992 A.D.; it was on the receiving of mucin, neonates who received passive immunity from their mothers. Mucin that was received will inhibit the fission of Rotavirus, and is capable of mitigating the severity of the illness and the deaths from diarrhea caused by Rotavirus. Furthermore, there are many components in breastfed which prevents infection from Rotavirus, such as lactadherin, which is a type of glycoprotein that has the ability to inhibit being infected by Rotavirus. And after the infection, lactadherin will become the medium which stimulates for phagocytosis of the dead cells, reducing the swelling, and helps treat the infection in the intestine; improving the intestine's condition.

Other study discovers that the profile of gestation age possesses the risk to being infected by Rotavirus, such as the study of Herruzo(43) , who studied Identification of more likely to factors associated with nosocomial infection by Rotavirus P4G2, in a neonatal unit of a tertiary-care hospital, in 2008. The study conducted in La Paz University Hospital revealed that neonates with low birth weight and neonates whose mother's gestational age was less than 37 weeks, are more likely to be infected by Rotavirus compares to those neonates with normal birth weight and those born when the mother's gestational age termed 37 weeks ( $p\text{-value}<0.05$ ). Furthermore, Herruzo also discovered that being admitted into the hospital for a long increased the risk of being infected by Rotavirus ( $p\text{-value}<0.01$ ), but for this study, perhaps because the number of Case was little, it did not appear as a more likely to factors.

### **5.3 Limitation of the study**

This study is a study using information dating back to 2008 A.D., which is beneficial for illnesses which are rare cases. However, for some factors, the retrospective data could not be collected, such as factors concerning the cleansing of hands prior to contacting medical equipment, and contacts made with patients by medical personnel; because these were not recorded.

## **CHAPTER VI**

### **CONCLUSION AND RECOMMENDATION**

This study is a case-control study of the cause, on Factors Associated with Nosocomial Rotavirus outbreak in neonates the Pediatric wards at Siriraj Hospital, In Thailand. By studying the retrospective data dated back to July 24<sup>th</sup> to November 10<sup>th</sup>, 2008 A.D., to search for factors associated with the infection of Rotavirus in the hospital, in Pediatric wards, in a hospital in Thailand. By using the data gathering form in 15 wards, using the data collection method of unmatched case-control ration 1:3 among patients who were infected by Rotavirus, an outbreak type, in the hospital (the case group), and patients who received treatments in the ward at the same time with the case group, which is July 24<sup>th</sup> to November 10<sup>th</sup> 2008 A.D.

Statistics which were used to analyze data consists of descriptive statistics, such as a percentile, means. As for the explanation of the data's general quality's statistical analysis, binary logistic regression from SPSS version 18 (copyright Mahidol University) in analyzing univariate and multivariate, in order to search for the strength of association and the level of significant adjusted OR (Adjusted odds ratio), 95% confident intervals (95% CI) and *p-value*. With the level of statistical significance at  $\leq 0.05$ .

#### **6.1 Conclusion**

This study was made up of individuals who received treatments from a pediatric wards in a hospital in Thailand; the total number being 463 neonates. Once separated into 2 groups, would become a group of 117 individuals who had Rotavirus infection, and a control group of 346 neonates who were not infected by Rotavirus. The research's result that neonates with normal birth profile, within the group infected by Rotavirus there were 55.08%, and within the control group 65.02%; neonates whose deliveries were facilitated by equipment (F/E, V/E) in the group infected by

Rotavirus were 0.83%, and within the control group 1.15%; neonates whose birth profile involved caesarean section, within the group infected by Rotavirus, there were 37.60%, within the control group 25.14%. And the research's result on neonates breastfeeding consumption profile revealed that there were neonates alone breastfed in the group infected with Rotavirus 66.66%, and within the control group 91.61%; neonates that were alone formula-fed within the group infected by Rotavirus were 18.80%, and 3.75% within the control group; neonates who had been formula-fed and breastfed combined, within the group infected by Rotavirus, there were 14.52%, and within the control group 4.62

From multivariable analysis, it appears that factors associated with Rotavirus infection, such as deliveries facilitated by equipment (F/E, V/E), is more likely to have Rotavirus infection compares to neonates whose deliveries were normal (adjusted OR = 6.22, 95% CI 1.70-22.80, *p-value* 0.006); neonates who were alone formula-fed, neonates who had the record of being breastfed and formula-fed combined have a higher more likely to being infected by Rotavirus compares to neonates who were alone breastfed (adjusted OR = 5.67, 95% CI 2.66-12.07, *p-value* < 0.05), (adjusted OR = 3.56, 95% CI 1.67-7.60, *p-value* < 0.001) (respectively).

## 6.2 Recommendation

### 6.2.1 Recommendations based on study results

1. This study discovers a correlation between deliveries facilitated by assistive equipment and Rotavirus infection. Thus, one should comply with the standard set by infection control (IC) (47), in controlling the infection within the hospital more strictly and cautiously, such as:

- Expected behavior of personnel on patients' caretaking according to Contact Precaution's regulation
- Expected behavior for personal items for neonates and medical equipment
- Expected behavior of maintaining the environment

- Expected behavior in pediatric wards, post-delivery/ other wards in the submission of stool samples for examination.

- Expected behavior for Lactation clinic.

- The managing system for the receiving of newborns during the period which problems of newborns having diarrhea

2. By not being breastfed alone, Have the opportunity to Rotavirus infection was increased. Thus, it should be encouraged that newborns are breastfed for 6 months, in order to strengthen the neonates' immune system.

### **6.2.2 Recommendations for future study**

1. For the next study, it should be conducted while there was an incident of Rotavirus; because there may be other factors with association to the Rotavirus infection, the cleansing of hands by official medical personnel etc.

2. Usually, Rotavirus infection would occur in a community; but as there has been an infection within the hospital, there ought to be a comparative study between the study conducted in a hospital and one in a community.

3. Within this study, there may be some factors that appear to have no association to Rotavirus infection, the neonates low birth weight, which may cause the neonates to be unhealthy and more susceptible to infection. The medical personnel ought not to overlook such factors. One might conduct a study in a different area and a different sample group.

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