

Original Article

PARACETAMOL DISPENSING PRACTICE OF GOVERNMENT HEALTH CLINICS POST INFANTS' VACCINATION IN MALAYSIA

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ABSTRACT

Objective: This study obtained information on Paracetamol (PCM) Dispensing Practice of Government Health Clinics (GHC) post infants' vaccination in Malaysia as well as identify its possible factors.

Methods: This descriptive cross-sectional retrospective study (with convenient sampling) using a data collection form (DCF) to collect data. The pharmacist who is the representative of the GHC filled the DCF. Potential risk factors were evaluated by Pearson chi-square tests (expected count < 5 is < 20%) for an independent sample.

Results: A total number of 254 samples were collected all over Malaysia within the period of data collection, but only 248 that met inclusion criteria. The PCM dispensing practice of GHC in Malaysia for a total period of 3 y back (from 2015-2017), tend not to give PCM post-immunization with respect to age of the upon vaccination and types of vaccination, conversely for gender. Trends of PCM dispensing practice were increasing for "Not Give PCM" with respect to gender, age of the baby upon vaccination, and types of vaccination from 2015 till 2017. The PCM dispensing practice had no association with no statistically significant value ($p=0.804$) on genders and a weak positive association with statistically significant value ($p<0.05$ each) on age of the baby (≤ 1 year) upon vaccination and types of vaccination.

Conclusion: Future research which may include the actual practice in which practices of prescribers or mother may be conducted in determining more accurate data on the giving PCM post infant's vaccination.

Keywords: Paracetamol, Dispensing, Infants, Vaccination

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INTRODUCTION

Increased utilization of paracetamol (PCM) for the prevention and treatment infant post-vaccination has received widespread attention in the past decade. This attention is reflected in news coverage of research as well as in its safety issues [1]. Paracetamol use post infants' vaccination not only may cause the vaccine less effective [1], but also its use in infancy and childhood was associated with the development of asthma, rhinoconjunctivitis, and eczema in 6- to 7-year-old children, where the associations seemed to be dose-responsive for childhood paracetamol exposure [2]. However, until today, there are no updated clinical practice standards worldwide.

Generally, there are no data regarding PCM dispensing practice post infant's vaccination available worldwide for baseline reference. In Malaysia, the government health clinics (GHC) usually dispense PCM post infants vaccination according to the current recommendations of both the American Academy of Pediatrics in 2003 [3] and the Advisory Committee on Immunization Practices (ACIP) in 2002 [4] as well as College of Paediatrics, Academy of Medicine of Malaysia in 2001 [5] and the Public Health Department, Ministry of Health Malaysia (PHD, MOH) in 2008 [6] note the option to give PCM prophylaxis for childhood vaccinations, but neither promote nor discourage routine use of prophylaxis [7]. Other than that, the statement from the American Academy of Pediatrics, 2003 stated that 'Elective administration of acetaminophen or other appropriate antipyretic at the time of immunization with DTaP and at 4 and 8 h after immunization may decrease the subsequent incidence of fever and local reactions' [3]. The statement from the Advisory Committee on Immunization Practices (ACIP), 2002 stated that 'Acetaminophen has been used among children to reduce the discomfort and fever associated with vaccination [4].

In Malaysia, national guideline stated that 'Paracetamol is used in helping relieving discomfort because of local reactions post-vaccination. Paracetamol also is used to reduce unpleasant systemic symptoms' [5]. 'Paracetamol may be given before or after vaccination and repeated every 4-6 hourly as required' [5]. 'The dose of Paracetamol is 15 mg/kg body weight, per dose, up to a maximum of 5 doses in 24h'. The statement from the PHD, MOH, 2008 stated that 'Paracetamol 15 mg/kg/dose for every 4-6h is included in the adverse events management of Diphtheria, Pertussis and Tetanus (DPT) (for fever < 38.5 °C which occurs within 48h after immunization), Measles/Measles, Mumps, and Rubella (MMR) (for fever which occurs 6-10d after immunization) and Rubella (for fever which occurs within 3w after immunization) vaccination'.

However, some general and private health clinics in Malaysia may show different for PCM dispensing practices post all types of infant's vaccination regardless of age of the baby upon vaccination and gender, generally. Meanwhile, some of them dispensed based on types of vaccination. Thus, the data regarding the practices of PCM post infant's vaccination need to be collected and analyzed from both private and government settings.

This study aims to study the current practice on the use of PCM post infant's vaccination in Malaysia. Up to the researcher knowledge, to date, the extent of the patterns of PCM dispensing practice for treatment or prophylaxis post infant's vaccination in community settings with local samples not yet was reported. This study also identifies the possible factors for PCM dispensing practice post infant's vaccination of GHC in Malaysia.

Immunization is compulsory for those babies seen as GHC. The researchers sought to study the PCM dispensing practices post infants vaccination at GHC in Malaysia.

MATERIALS AND METHODS

Methods

Study design and time frame

This is a retrospective cross-sectional study that obtained secondary data from GHC on the PCM dispensing practice in Malaysia from 2015 to 2017. The datum was collected conveniently by email and follow-up by phone calls between December 2017 to September 2018. This study was used to characterize the PCM dispensing practice patterns post infants vaccination. Trends were depicted as the total of 3 y periods of study percentage for PCM dispensing practice post infants' vaccination according to age of the baby upon vaccination, gender and types of vaccination.

Data sources

A letter was sent to each State Health Department, Ministry of Health Malaysia to obtain approval for the collection of data regarding PCM dispensing practice post infants' vaccination.

A descriptive data collection form (DCF) was used to collect data related to the objectives of this study was created by the researcher and reviewed by experts. The DCF comprised 2 sections. The first section included the name and address of the Mother and Child Health (MCH) Clinics involved, date of data collected as well as name of the pharmacist in charged. The second section of the DCF was information about PCM dispensing practice of each clinic for the studied year, 2015 till 2017 with regards to the age of the baby upon vaccination, gender and types of vaccination. The data collected were based on the experience of healthcare professionals in the GHC in Malaysia.

Population and sample

This study involved five types of vaccines based on Malaysian Immunization Programme for infants from 2015 till 2017. The populations include the babies up to 1 y of age who received the vaccination at GHC in Malaysia. The study subjects were the pharmacist of the GHC (that had attached MCH clinics).

Inclusion and exclusion criteria

The inclusion criteria were age of the baby up to one year who received immunization at GHC that had attached MCH Clinics and pharmacist. Incomplete data on the age of the baby upon vaccination and gender and types of vaccination will be excluded in this study. Sample with incorrect data such as gave the reported number of prescriptions prescribed also excluded in this study. Sample collected from Rural Health Clinics (RHC) also were excluded because there was no pharmacist in charge there. The Measles vaccine also will be excluded since it is given before age one year in Sabah only.

Sample size calculation

The estimated samples are calculated via Rao soft Software (2004). The sample size n and margin of error E are given by:

$$x = Z(c/100)2r(100 - r)$$

$$n = N x / ((N - 1)E^2 + x)$$

$$E = \text{Sqrt}[(N - n)x/n(N - 1)]$$

Where N is the population size, r is the fraction of responses that the researcher interested in, and $Z(c/100)$ is the critical value for the confidence level c .

This calculation is based on the normal distribution and assumes this study has more than about 30 samples. This calculation is also based on the agreement of margin of error of 5%, Confidence Interval of 95%, Population Size of 692 and Response Distribution is 50%. We need to obtain $n=248$ samples of the pharmacist.

According to personal communication, via the person in charge of each district, there were a total of 692 GHC that had attached MCH Clinics as well as a pharmacist in charge in Malaysia. Among them, a total of calculated samples of 248 pharmacists were included in this study during the study period. The data collection for this study took about 10 mo for an estimated 248 approved samples of pharmacists. One DCF for one clinic. These samples met inclusion criteria for this present research.

Variables (Independent and dependent)

The DCF collected dependent variables which include PCM dispensing practice post infants' vaccination in Malaysia (either give PCM, not give PCM or not sure/don't know), meanwhile the independent variable collected include gender, age of the baby upon vaccination and types of vaccination.

Statistical analysis

Descriptive statistics using frequency and percentages were used to report the PCM dispensing practice of MCH Clinics in Malaysia based on the age of the baby upon vaccination, gender and types of vaccination. They present into bar chart using Microsoft Excel 2013. The difference in the bar chart may give a brief idea on PCM dispensing practice post infants vaccination.

This study explored the age of the baby upon vaccination, gender and types of vaccination received as well as identified the possible factors for PCM dispensing practice post infant's vaccination in Malaysia retrospectively from 2015 till 2017 using the Crosstabs function in SPSS Statistics Version 22.0. Potential risk factors were evaluated by Pearson chi-square tests (expected count < 5 is < 20%) for an independent sample. The hypotheses are as below:

H0: There is no association between age of the baby upon vaccination, gender and types of vaccination towards PCM practice post infant's vaccination.

Ha: There is an association between age of the baby upon vaccination, gender and types of vaccination towards PCM practice post infant's vaccination.

This study assumed a significance level at a p -value less than 0.05. [8] The data were managed and analysis conducted using SPSS Statistics version 22. This study followed Cohen (1988) recommendations in the interpretation of effect size for behavioral sciences which stated that there is a statistically significant measure with a small effect size or greater to indicate difference for the study. The researcher used Phi Coefficient for correlation coefficients in determining whether the factors showed -1.0 to -0.7 or -0.7 to -0.3 or -0.3 to +0.3 or +0.3 to +0.7 or +0.7 to +1.0 which is interpreted as strong negative association or weak negative association or little or no association or weakly positive association or strong positive association respectively [9]. These values of analyses of statistics may be important in giving the baseline data on possible associations on the PCM dispensing practice post infants' vaccination.

RESULTS AND DISCUSSION

A total number of 254 samples were obtained from all over Malaysia within period of data collection, but only 248 respondents (pharmacists) included in this study since the other 6 samples received did not meet the inclusion criteria of this study in which 1 of them reported number of prescriptions and the other 5 were reported from RHC.

Trends of paracetamol dispensing practice

Total data collected from DCF for gender category was $N=1488$, age of the baby upon vaccination category revealed $N=5852$ and types of vaccination category discovered $N=2976$ responses while each group collected $N=744$ responses.

Data collection details

Table 1: Region of data collection

States	Estimated number of GHC*	Number of respondents	Number of respondents that met inclusion criteria	Response rate of approved respondents (%)
Johor State Health Department	91	75	74	81.32
Negeri Sembilan State Health Department	49	20	20	40.82
Melaka State Health Department	27	10	10	37.04
Selangor State Health Department	65	43	43	66.15
Perak State Health Department	2	0	0	0
Perlis State Health Department	9	9	9	100
Kedah State Health Department	55	24	24	43.64
Penang State Health Department	27	0	0	0
Kelantan State Health Department	158	35	30	18.99
Terengganu State Health Department	43	0	0	0
Pahang State Health Department	58	20	20	34.48
Sabah State Health Department	46	0	0	0
Sarawak State Health Department	44	18	18	40.91
Total	692	254	248	35.84

*this value referred to GHC that had attached MCH Clinics and pharmacists

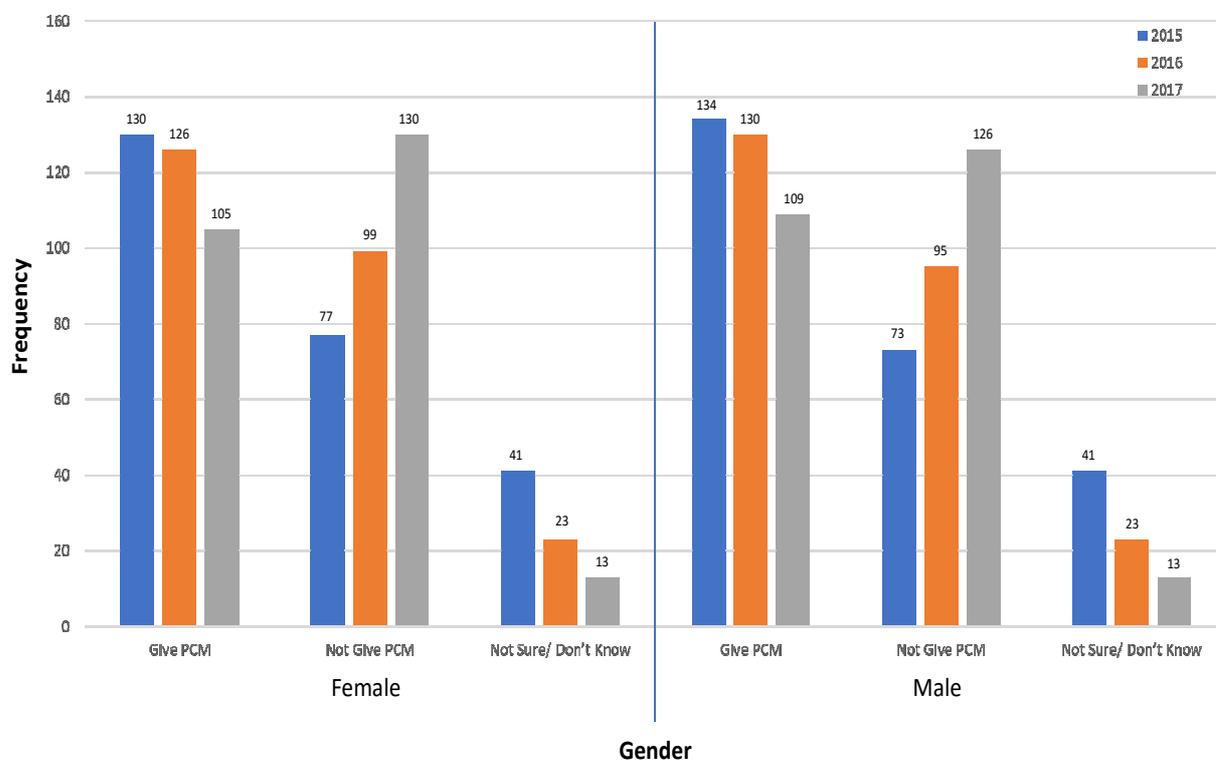


Fig. 1: Trends of paracetamol dispensing practice for respective years according to gender

Table 2: Paracetamol dispensing practice for 3 y period of study (viz. 2015-2017)

Variables	Paracetamol dispensing practice	Frequencies, n	
Gender		1488	
	Female		744
		Give PCM	361
		Not Give PCM	306
	Male	Not Sure/Don't Know	77
			744
Give PCM		373	
Age of the Baby Upon Vaccination	Not Give PCM	294	
	Not Sure/Don't Know	77	
		5852	
	0 mo BCG		744
		Give PCM	70
		Not Give PCM	552
	0 mo Hepatitis B	Not Sure/Don't Know	122
			744
		Give PCM	77
	1 mo Hepatitis B	Not Give PCM	551
		Not Sure/Don't Know	116
			744
	6 mo Hepatitis B	Give PCM	133
		Not Give PCM	564
		Not Sure/Don't Know	47
	3 mo DTaP/Hib/IPV		744
		Give PCM	151
		Not Give PCM	544
	3 mo DTaP/Hib/IPV	Not Sure/Don't Know	49
			744
		Give PCM	395
	5 mo DTaP/Hib/IPV	Not Give PCM	300
		Not Sure/Don't Know	49
			744
	12 mo MMR	Give PCM	380
		Not Give PCM	312
		Not Sure/Don't Know	52
Types of Vaccination		744	
	Give PCM	385	
	Not Give PCM	310	
	Not Sure/Don't Know	49	
		744	
	Give PCM	250	
	Not Give PCM	437	
	Not Sure/Don't Know	57	
		2976	
	BCG		744
	Give PCM	95	
	Not Give PCM	550	
Not Sure/Don't Know	99		
Hepatitis B		744	
Give PCM	148		
Not Give PCM	545		
Not Sure/Don't Know	51		
MMR		744	
Give PCM	249		
Not Give PCM	443		
Not Sure/Don't Know	52		
DTaP/Hib/IPV		744	
Give PCM	394		
Not Give PCM	299		
Not Sure/Don't Know	51		

n=total number of babies; different babies across gender, age of babies upon vaccination and types of vaccination included in this study. Thus, multiple logistic regression cannot be done.

N=248; total number of DCF distributed among subjects in this study. Since the data collected were for 3 consecutive years, (2015-2017) thus, the total available samples for each item in different variables were 744.

These were retrospective data (2015-2017) collected conveniently by email and follow-up by phone calls between December 2017 to September 2018; based on experience of a representative of

healthcare professionals in the GHC in Malaysia. The data collected might not be accurate because the healthcare professionals in charged might be different every year.

Table 2 showed that PCM dispensing practice of GHC in Malaysia for a total period of 3 y back, tends not to give PCM post immunization with respect to age of the baby upon vaccination and types of vaccination. This result also suggested that the age of the baby upon

vaccination and types of vaccination possible factors for PCM dispensing practice post infant's vaccination of GHC in Malaysia. Gender was not a possible factor of PCM dispensing practice since it showed moderate percentages between "give PCM" and "not give

PCM" (table 2). Additionally, there was very little discrepancy in the counts across genders, contrary there was considerable discrepancy in the counts across age of the baby upon vaccination and types of vaccine.

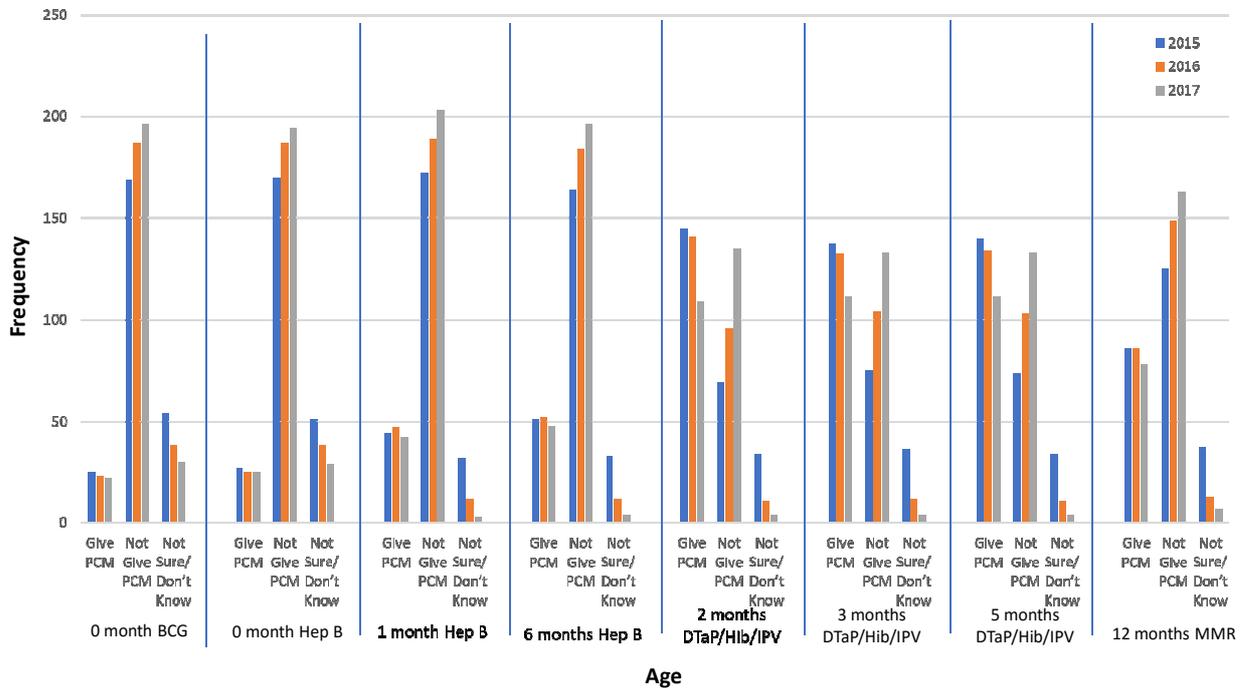


Fig. 2: Trends of paracetamol dispensing practice for respective years according to age of the baby upon vaccination

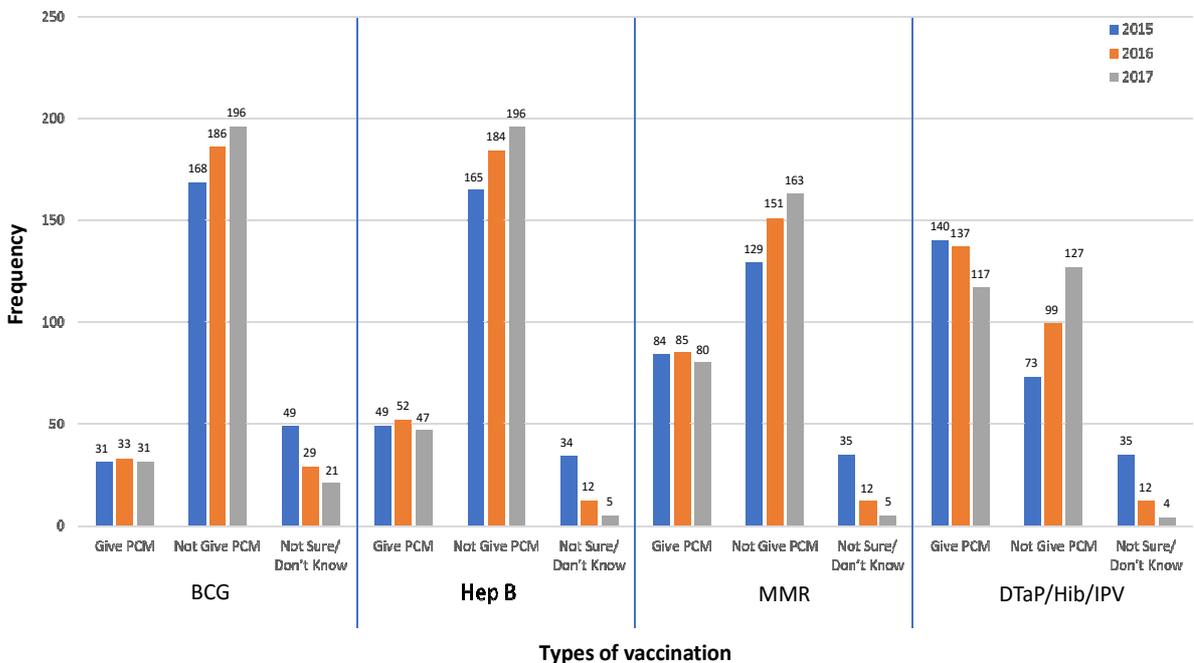


Fig. 3: Trends of paracetamol dispensing practice for respective years according to types of vaccination

Refer to fig. 1 till 3 for year 2015 till 2017, according to gender, age of the baby upon vaccination and types of vaccination, the trends of PCM dispensing practice was increasing for "Not Give PCM" and on the other

hand it was decreasing for "Give PCM" over three years of 2015 till 2017 (fig. 1-3). This might be due to the counterproductive effect of PCM on the vaccine injected which may cause the vaccine less effective.

Factors associated with paracetamol dispensing practice

Table 3: Factors associated with paracetamol dispensing practice

Variables	n	Give PCM n	Not give PCM n	Not sure/Don't know n	X ² statistic (df)	p-value ^a	Phi coefficient ^b	Cramer's V value	Magnitude of effect size ^c	Decision for H ₀
Gender	1488	-	-	-	0.436 (2)	0.804	0.017	0.017	Small	Not reject H ₀
Male		373	294	77		Not statistically significant	no association			
Female		361	306	77						
Age of the Baby Upon Vaccination	5952	-	-	-	940.715 (14)	<0.001	0.398	0.281	Small	Reject H ₀
0 mo BCG		70	552	122		Statistically significant	Weak positive association			
0 mo Hep B		77	551	116						
1 mo Hep B		133	564	47						
6 mo Hep B		151	544	49						
2 mo		395	300	49						
DTaP/Hib/IPV										
3 mo		380	312	52						
DTaP/Hib/IPV										
5 mo		385	310	49						
DTaP/Hib/IPV										
12 mo MMR		250	437	57						
Types of Vaccination	2976	-	-	-	351.777 (6)	<0.001	0.344	0.243	Small	Reject H ₀
BCG		65	550	99		Statistically significant	Weak positive association			
Hep B		148	545	51						
MMR		249	443	52						
DTaP/Hib/IPV		394	299	51						

^aPearson Chi-Square test, significant at p<0.05, ^bSimon, 2010, ^cCohen, 1988

This study proved that there is no association between gender and PCM dispensing practice of GHC in Malaysia post infant's vaccination ($p=0.804$) with a small effect size (table 3). It also was found that there are weak positive associations between age of the baby upon vaccination as well as types of vaccination and PCM dispensing practice of GHC in Malaysia post infants' vaccination ($p<0.001$ each) with small size effect (table 3). This finding concluded that there is an association between age of the baby upon vaccination and types of vaccination towards PCM practice post infant's vaccination, however conversely for gender, there is no association between gender and PCM dispensing practice post infants' vaccinate.

CONCLUSION

Trends in PCM dispensing practice of GHC were increasing for "Not Give PCM" and decreasing for "Give PCM" with respect to gender, age of the baby upon vaccination, and types of vaccination from 2015 till 2017. The PCM dispensing practice had no association on genders (with a small effect size) as well as a weak positive association with age of the baby upon vaccination and types of vaccination (with a small effect size). This study may give a baseline data in the patterns of PCM dispensing practice post infants vaccination in Malaysia.

LIMITATION

The data collected might not be accurate because the healthcare professionals in charged might be different every year. In comparing the PCM dispensing practices post infants vaccination, the data might be more accurate if prescribers and infants mothers involved in the study.

ETHICS

This study was reviewed and approved by the Medical Research Ethics Committee (MREC) on December, 19 2017 with registration number NMRR-17-2573-38799(IIR). All the data are restricted to the principal investigators and solely used for research purposes. The study was conducted in compliance with ethical principles

outlined in the Declaration of Helsinki and Malaysia Good Clinical Practice Guideline.

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AUTHORS CONTRIBUTIONS

Nurain Suleiman wrote the manuscript. Siti Hadijah Shamsudin, Razman Mohd Rus and Samsul Dramanread and approved the final manuscript. All authors have complete access to the study data that supports the publication.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest

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