

Original Article

Evaluation of donor recruitment integrated plan and blood component distribution effectiveness of the five lower-northern provinces of Thailand in 2018

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Abstract:

Introduction: Uncertainty and limitation of number of mobile units in each province are the major causes of inconsistency blood procurement and frequent blood shortage. The Regional Blood Centre VIII, Nakhonsawan, Thai Red Cross Society in cooperation with the Provincial Red Cross Chapters and regional hospitals in the five lower-northern provinces of Thailand has integrated the provincial blood recruitment plan into the regional plan to help solving problems. **Objective:** To evaluate the number of blood procurement from mobile units after an integration of the five lower-northern provinces Nakhonsawan, Uthaitхани, Pichit, Chainat and Tak : Mueang, Wangchao, Samngao and Bantak districts, including their blood component distributions to other hospitals within the Regional Blood Centre VIII, Nakhonsawan territory in the year 2018. **Materials and methods:** To investigate the number of blood procurement from mobile units and blood components delivery to other hospitals by analyzing the data of the blood procurement combined with laboratory testing and blood component distribution of the Regional Blood Centre VIII, Nakhonsawan in 2018. The three strategies of an integrated plan had been established as: the donor recruitment plan, the management of mobile units and the public relation and campaign. **Results:** The total number of blood procurement in 2018 was 73,064 units (3.01% of population in this area), which 49,353 units (67.55%) of total blood donation were collected from integration of mobile units. It was increased when compared to that of the previous years without integration program; however, there was no statistically significant difference ($p > 0.05$). Nakhonsawan had the highest numbers of blood donation 23,812 units (48.33 %), followed by Pichit, Chainat, Uthaitхани and some parts of Tak which were 10,561 (21.4%), 5,934 (12.02%), 5,709 (11.57%), and 3,297 units (6.68%), respectively and the 611 mobile blood drives were held in this year. For the distribution of blood components to other hospitals, it appeared that the distribution of cryoprecipitate, platelet product, fresh frozen plasma and red blood cells were 100, 99.38, 99.24 and 85.76%, respectively. **Conclusion:** The three strategies of the integration of blood recruitment was implemented in the five lower-northern provinces of Thailand revealed that 67.55% of total blood donation in this area was supported from mobile units with 100% voluntary non-remunerated blood donors. Of all blood components from the Regional Blood Centre VIII, Nakhonsawan were distributed directly to other hospitals in the responsible area in accordance with the need more than 80%. However, the continuous improvement of the integration plan will bring more success and sustainable outcome.

Keywords : ● Donor recruitment ● Blood shortage ● Integration

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Introduction

The major goal of blood services is to sufficiently procure safe blood. The blood availability is related to blood donor management while the safety of blood is related to quality management standard¹. World Health Organization recommended that each country should at least procure blood at 3% of the population or 4-5% for the high- density population countries². National Blood Centre, Thai Red Cross Society in cooperation with Ministry of Public Health formulated the National Blood Policy in 2010 which aimed to ensure easily accessible and adequate supply of blood from voluntary non remunerated regular blood donors³. It had been reported that overall altruism is related to charity giving, but not to blood- donation behavior⁴. Worldwide blood supply in 2015 indicated that among 117.4 million blood donations, 42% were collected in high-income countries, home to 16% of the world's population. The median blood donation rate in high-income countries was 32.6 donations per 1,000 people. This compares with 15.1 donations per 1,000 people in upper-middle-income countries, 8.1 donations per 1,000 people in lower-middle-income countries, and 4.4 donations per 1,000 people in low-income countries⁵.

In Thailand, in 2018⁶ National Blood Centre (NBC) collected 677,100 units of blood which was equivalence to 11.93% of population in Bangkok⁷ and for Nakhonsawan province in 2015 collected 34,635 units of blood or 3.23% of its total population which met the WHO standard.

More than 50% of blood collected in Thailand were from mobile units. This was corresponded with the data from NBC in 2018 and Regional Blood Centre VIII, Nakhonsawan in 2015 that blood collected from mobile units were 51.63% and 57.84%, respectively. Due to limitation in number of mobile unit, only average of 1-3 mobile units operated per week. This had impact to blood procurement especially platelet component which has short shelf life (5 days). In addition, cancellation and postpone of mobile schedule frequently encountered. All of these incidents led to the inconsistency of monthly blood procurement.

Then Regional Blood Centre VIII, Nakhonsawan in cooperated with Red Cross chapter and the provincial hospitals of five lower-northern provinces: Nakhonsawan, Uthaitхани, Pichit, Chainat and Tak : Mueang, Wangchao, Samngao and Bantak districts to integrate the provincial blood recruitment plan into the regional plan in order to formulate policy to increase blood supply in the region. In addition, to evaluate the effectiveness of Regional Blood Centre VIII, Nakhonsawan blood component distribution.

Materials and methods

1. Information for the study

This was the prospective study by using the data from Regional Blood Centre VIII, Nakhonsawan Hematos II G information system. The period of the study was during January-December 2018.

1.1 Data on blood collection for the five lower-northern provinces Nakhonsawan, Uthaitхани, Pichit, Chainat and Tak : Mueang, Wangchao, Samngao and Bantak districts.

1.2 Data on Regional Blood Centre VIII, Nakhonsawan blood screening requested from the hospitals in Regional Blood Centre VIII, Nakhonsawan territory.

1.3 Data on Regional Blood Centre VIII, Nakhonsawan blood component preparation and distribution.

2. Development of the regional blood recruitment plan

The integration of blood donor recruitment at mobile units included the 3 strategies as follows:

2.1 Establish regional blood collection year plan to solve the shortage of blood supply in each province. The target of blood collection from mobile units should be exceeded 60% of total blood procurement in the whole region. The regional monthly plan was set up according to the above mentioned year plan. The number of blood collection and the number of mobile unit were fixed for each month. This will solve the inconsistency - blood supply problem for each province.

2.2 Mobile unit management

The alteration of monthly plan may be done by Regional Blood Centre VIII, Nakhonsawan according

to situation and appropriateness to obtain the closest number of blood in each week. Regional Blood Centre VIII, Nakhonsawan is responsible body to coordinate with Red Cross Chapter in each province one month in advance. The followings were taken into consideration:

2.2.1 The donation due date of the donors in each area. The donor selection criteria indicated that the next donation of each donor should not be sooner than 12 weeks. However, in some circumstances donor may be allowed to donate at 8 weeks after previous donation but the total donation per year should not exceed 4 times.

2.2.2 Number of mobile unit, there will be 1-3 units per each official day. This could depend on the estimated number of blood collection in each area. In addition, the mobile units should also be operated during weekend or long public holidays.

2.2.3 Be ready to set up other mobile blood collection place to replace the emergency cancellation or postponed one in order to avoid the impact on the total number of blood procurement.

2.3 Public relation and blood donor campaign

Public relation and blood donor campaign is the tool to promote accomplishment of the donor- recruitment regional plan, in terms of quantity and consistency of blood donation. The aim was to build up the awareness and social trend in blood donation as follows:

2.3.1 Blood donor communication was aimed to deliver the information, knowledge and activities related to the blood services correctly through various media eg. Cable TV, radio, billboard, poster, brochure, manual and social media. All of these were important for direct and yet rapid delivery to the donors. In addition, SMS was also used to send the information on the mobile unit activities to the donors by mobile phone 3-7 days in advance.

2.3.2 Blood donor recruitment for the new donors and promote the new donors to be regular donors using proactive policy as follows:

1) Deliver knowledge on blood donation to the personnel in the mobile unit institution, eg. companies, schools, etc. This will enable them to be well prepared for pre and post-donation periods. They would have positive attitude towards blood donation and be able to transfer these information to others.

2) Conduct the activity for the blood donor recruitment in the special occasions. These will make the donors happy as well as having moral values. Regional Blood Centre VIII, Nakhonsawan had conducted such special activities along with the NBC throughout the year .

3. Data analysis

Data analysis was performed by using SPSS Program (version 19, SPSS Inc., Chicago, IL, USA.) and using one-way ANOVA for comparison of the population mean when the data showed normal curve distribution. $p < 0.05$ = statistically significant difference.

Results

Blood collection of the five lower-northern provinces Nakhonsawan, Uthaitхани, Pichit, Chainat and Tak: Mueang, Wangchao, Samngao and Bantak districts in 2018, it was found that among a total of 73,064 units collected, 49,353 units (67.55%) were from mobile units of 5 provinces after an integration regional plan. All of them were voluntary- non remunerated regular blood donors. In addition, Nakhonsawan, Uthaitхани, Pichit, Chainat and Tak blood collection from mobile units were 23,852 (48.33%), 10,561 (21.40%), 5,934 (12.02%), 5,709 (11.57%) and 3,297 (6.68%) units, respectively (Table 1).

Regional Blood Centre VIII, Nakhonsawan collected a total of 38,836 units (78.69%) and the 5 provincial hospitals collected totally 10,517 units (21.31%).

There were total of 611 mobile units operated in 2018 or about 50 mobile units per month. The collection in official and unofficial days were 569 units (93%) and 42 units (7%), respectively. Regional Blood Centre VIII, Nakhonsawan collected 259 units (42.39%). Regional Blood Centre VIII, Nakhonsawan and provincial hospitals

Table 1 Mobile blood drive and blood donation of the five lower-northern provinces in 2018

Province	Number of mobile unit (drives)				Number of blood donation (units)						
	RBC VIII	RBC VIII & RH	RH	Total	Mobile unit (voluntary donors)			Donor clinic (inhouse)			Grand total
					RBC VIII	RH	Total	RBC VIII	RH & CH	Total	
Nakhonsawan	259	NA	87	346	16,629	7,223	23,852	8,482	5,707	14,189	38,041
Uthaitхани	NA	54	11	65	3,833	1,876	5,709	NA	1,531	1,531	7,240
Pichit	NA	86	NA	86	10,561	NA	10,561	NA	1,922	1,922	12,483
Chainat	NA	62	1	63	5,865	69	5,934	NA	2,867	2,867	8,801
Tak*	NA	20	31	51	1,948	1,349	3,297	NA	3,202	3,202	6,499
Total	259 (42.39%)	222 (36.33%)	130 (21.28%)	611 (100%)	38,836 (78.69%)	10,517 (21.31%)	49,353 (100%)	8,482	15,229	23,711	73,064

Tak* : Mueang, Wangchao, Samngao and Bantak district; RBC VIII : Regional Blood Centre VIII; RH : Regional hospital; CH : Community hospitals; NA : Not available; & : collaboration with

Table 2 Number of activities for blood donor recruitment in 2018

Topic / Place	Academy	Government agency	Company	Temple	RBC VIII	Total
Training	1	2	NA	NA	NA	3
Education	5	NA	1	NA	NA	6
Project	4	NA	1	3	7	15

RBC VIII : Regional Blood Centre VIII; NA : Not available

Table 3 Mobile blood donor of 5 provinces from 2016 to 2018

Year	Mobile blood donor (units)												Total donor	%	
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC			Total
2016	3,189	3,352	3,337	3,708	3,203	3,654	3,690	4,673	3,251	4,517	4,654	4,169	45,397	73,038	62.16
2017	3,784	3,689	3,774	3,862	3,450	4,469	4,349	4,629	3,934	4,299	4,146	3,629	48,014	70,674	67.94
2018	4,199	3,800	3,562	3,530	3,844	3,751	4,744	4,502	3,870	4,857	4,344	4,350	49,353*	73,064	67.55

* $p = 0.235$

operated mobile units together and provincial hospitals alone collected 222 and 130 units (36.33% and 21.28%), respectively. There were activities to promote the blood donation (Table 2). These functions were conducted within Regional Blood Centre VIII, Nakhonsawan premise, other government and private sectors for totally 16 premises with 24 events. There were 3 trainings for coordinators. In addition, delivered information and knowledge on blood donation for 6 activities, including conducted blood donor recruitment program in special occasions for 15 events which were belong to mobile units for 8 events.

The number of blood collections according to this integrating plan was increased insignificantly as compared to the previous 2 years, $p = 0.23$.

The distribution section of the Regional Blood Centre VIII, Nakhonsawan received blood components from Regional Blood Centre VIII, Nakhonsawan itself, the NBC and other Regional Blood Centre for a total of 63,724 units. The numbers of red blood cells, fresh frozen plasma, platelets and cryoprecipitate were 52,276, 8,280, 2,118 and 1,050 units, respectively (Table 4). These blood components were prepared by Regional Blood

Table 4 Number of received blood components from blood centers in 2018

Place	Blood components (units)								Total	%
	PRC	LPRC	LD-PRC	SDR	LPPC	SDP	FFP	CRYO		
Regional Blood Centre VIII	29,889	16,346	NA	NA	1,933	NA	7,980	NA	56,148	88.11
National Blood Centre	2,334	3,126	13	6	168	17	300	1,050	7,014	11.01
Other Regional Blood Centre	531	31	NA	NA	NA	NA	NA	NA	562	0.88
Total	32,754	19,503	13	6	2,101	17	8,280	1,050	63,724	100

PRC : Packed red cells; LPRC : Leukocyte poor red cells; LD-PRC : Leukodepleted packed red cells; SDR : Single donor red cells; LPPC : Leukocyte poor pooled platelet concentrate; SDP : Single donor platelet; FFP : Fresh frozen plasma; Cryo : Cryoprecipitate; NA : Not available

Table 5 Percentage of blood components dispatched from the Regional Blood Centre VIII in 2018

Blood components	Blood request	Blood distribution	% of blood distribution
Red blood cells	60,724	52,078	85.76
Platelet products	1,938	1,926	99.38
Fresh frozen plasma	5,283	5,243	99.24
Cryoprecipitate	1,050	1,050	100

Centre VIII, Nakhonsawan, the NBC and other Regional Blood Centre for 88.11%, 11.01% and 0.88%, respectively. Cryoprecipitate was the highest components to be sent to the hospitals (100%), while platelets, fresh frozen plasma and red blood cells were sent to the hospitals for 99.38%, 99.24% and 85.76 %, respectively (Table 5).

Discussion

The five lower-northern provinces Nakhonsawan, Uthaitani, Pichit, Chainat and Tak : Mueang, Wangchao, Samngao and Bantak districts blood procurement in 2018 was 73,064 units or 3.01% of its population (2,423,932 peoples). The blood collected from mobile units was 49,353 units (67.55%). This was closed to Nakhonsawan province blood collection in 2014 to 2015 which 56-58% of total blood collection were from mobile units⁸. The outcome of the integration plan of 5 provinces mobile units as compared to blood collection prior to implement the mentioned plan revealed no statistically significant difference ($p > 0.05$). The main cause of this finding could be due to public relation not thorough distributed. The donors in local area did not be informed for the mobile unit working schedule in advance.

In addition to the routine measure for donor communication, social media such as Facebook, Line as well as other applications should be used in order to increase blood donation. The other problem was the frequent change of coordinator. The regular training on blood donor recruitment should be performed for the coordinators. This would render them to work in the same direction. In 2018, it was observed that number of mobile unit and number of blood collection per day or per month were not much different. The previous data showed that the difference between the high and low number of blood collection per month was more than 50% for some provinces. In addition, the turn around time of the request for blood components was decreased for at least 1-2 days when compared with the previous operation. It was noticed that most of the provincial blood collection schedules for Monday and Friday were less than other week days. This would affect the number of blood collected per day for mobile units. In addition, there was the decreased trend for blood collection during January to June as compared to July to December. It was due to the student examination and school were closed afterwards. This finding was corresponded with Regional

Blood Centre VIII, Nakhonsawan previous report during 2007-2011 that 33.9% of first time donors were young age group¹⁰. Then more public relation and blood donor recruitment program should be emphasized during that period for mobile units as well as in side the hospitals. This method could solve the problem in short term, however, drive to build up social good blood donation attitude could lead to sustainable problem solving.

Blood component distribution for 42 hospitals in Regional Blood Centre VIII, Nakhonsawan territory, it was found that almost all hospitals tried to request red blood cells as much as possible without any clear target and often beyond the actual need for their patients. At the same time, they may try to keep some for the stock. To cop with this situation, Regional Blood Centre VIII, Nakhonsawan had to request red cell components for 12% from NBC including from other Regional Blood Centre. Siriraj Hospital had also reported the same observation that the provincial hospitals would request patient family members to donate blood or requested blood from NBC whenever the shortage of blood was encountered¹¹.

FFP was normally sufficient for the patients, except emergency request for plasma exchange patient which required large amount of plasma at once. In order to solve this problem, the number of FFP in the stock should be increased to be more than the request number (100%). For platelet, the hospital that sent in the order within the allowed time would receive the component in the same day or the next morning, otherwise would receive the product in the following day. Regional Blood Centre VIII, Nakhonsawan then increased blood collection by using quadruple bag for 50% of total blood collection to prepare more leukocyte poor pooled platelet concentrate (LPPC) and to increase production of cryoprecipitate. Even though Regional Blood Centre VIII, Nakhonsawan could distribute more than 80% of the hospital request

for blood components, the hospital blood banks should figure it out the number of blood components to be kept in the stock appropriately. In addition, those who were in the blood collection team should recruit more donors both for mobile units and inside the hospitals.

It was found that the integration plan enabled the hospital blood banks in providing blood components to meet the patient need, reduce outdated blood and got along well with the development of national health services in the hospitals of all levels.

Conclusion

The three strategies of the integration plan of blood recruitment were implemented in the five lower-northern provinces of Thailand. The applied 3 strategies were developed regional recruitment plan and blood mobile unit management including blood donor campaign. It was found that total blood obtained from mobile units were 67.55% of total blood collected in the whole region. All of them were voluntary non- remunerated blood donors. Nakhonsawan province was the highest and be able to collect 48.33% of blood from mobile units and the Regional Blood Centre VIII, Nakhonsawan was able to deliver blood components to meet more than 80% of requests from the hospitals in the territory. There was an increased trend of the blood collection from mobile units. Even though the increase was non- statistically significant, further development of the integration of blood recruitment plan for donor recruitment should be continually performed.

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