Research Article

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Common illnesses in tropical Asia and significance of medical volunteering

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Abstract: This study was conducted to provide practical information for actual preparation of medical volunteering in tropical Asia, mainly the distribution of common illnesses encountered during mission. From 2012 to 2017, we visited two rural areas of Eastern Cambodia for medical volunteering missions, Cham Lak and Khsoem. Neither area has electricity or public water. We classified the common cases encountered during missions into six groups (upper respiratory infection, gastroenteritis, vaginitis and/or cystitis, dermatitis, work-related pain and parasite prevention) and assessed the distribution. In Cham Lak and Khsoem, 558 and 371 people were treated, respectively. The most commonly encountered cases in children under age of 18 were upper respiratory infection, followed by parasite control and dermatitis, in both areas. There was no significant difference in distribution between the two areas. For adults, the most common illnesses in Cham Lak area were vaginitis and/or cystitis, followed by gastroenteritis and work-related pain. In Khsoem area, the common illnesses were work-related pain followed by gastroenteritis, and upper respiratory infection. The distribution between the two areas differed significantly ($p < 0.001$). The difference might be due to the water source and main crops of agriculture. Successful preparation of a medical volunteering needs deep understanding of the destination community.

Keywords: Volunteerism; Cambodia; Asia; General practice

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1 Introduction

Health-care workers in developed countries frequently volunteer to serve medical missions in developing countries with medically underserved populations. Most missions are conducted for short periods, carrying out simple surgical interventions or prescribing medication for acute symptomatic diseases [1-4]. Some researchers have criticized these missions because they usually lack sustainability, are low in cost-effectiveness, and lack understanding and respect for local people and health-care providers [5-9].

Despite the criticism, global medical missions are becoming more frequent [9, 10]. In addition to health benefit, these services have the advantage of allowing doctors in developed countries, who engage in highly specialized daily work, to remind their role as physicians treating whole humans in needs of medical help. Furthermore, the missions enhance the self-confidence of people in the developing world by giving them a sense of solidarity [11-13].

Our volunteer team has been conducted annual medical missions in the rural villages of Cambodia since November 2012. During a preparation for the mission, the literature related to actual preparation of medical volunteering was limited, while most of the literature was focused on semantic regards. Furthermore, the most common destinations of medical volunteering described in the literature were Africa or Latin America, whereas information about tropical Asia was scarce [10].

Below we report on our experiences in rural areas of Eastern Cambodia, provide helpful information for pre-

paring an actual mission, and discuss the conceptual aspects of medical volunteering based on our experience.

2 Materials and methods

2.1 Overview of Cambodia

Cambodia is a country located in the southern part of the Indochina Peninsula in Southeast Asia. It is 181,035 square kilometers in area and has a population of 15,957,223. Cambodia won independence from France in 1953. From 1975 to 1979, when the Khmer Rouge held power, almost 2 million civilians were killed, including significant numbers of health-care providers [14, 15].

Cambodia remains one of the poorest countries in Asia, although it achieved dramatic economic growth in recent decades; the gross domestic product per capita was $608 in 1993, increased to $2,454 in 2012. It also struggles with severe income inequality, poor job prospects, and endemic corruption. The lack of basic infrastructure in rural areas, where 80% of the population lives, is another serious problem [14, 16].

From a health perspective, Cambodians' life expectancy at birth is 72 years as of 2012 [11]. The physician density rate is 0.17 per 1000 people, which puts Cambodia in the lowest quartile of the world's countries [9]. Health care is provided by both public and private practitioners. Trust in the health-care system is still recovering after most of the doctors were killed by the Khmer Rouge about 40 years ago [17].

2.2 Details of volunteering activities

Our volunteer team has been conducting medical volunteering missions on an annual basis since 2012: the first two times in the Cham Lak area in Kampong Cham province, and the next three times in the Khsoem area in Kratie province. All missions lasted for seven days. The Cham Lak area is 122 kilometers northeast of Phnom Penh (Cambodia's capital and largest city) and consists of six villages, each with 120 to 150 families. The Khsoem area is about 240 kilometers northeast of Phnom Penh. It consists of four villages with 150 households, 200 households, 300 households, and 400 households, respectively. Both areas have agriculture as their main industry, and they do not benefit from basic infrastructure such as electricity, water, and gas.

Our team ran only a medical clinic during the first two missions; starting with the third mission, we also performed various community-friendly activities. Our non-medical volunteers (NMV) were recruited for those activities, and they painted mural paintings at local kindergartens during the third and fourth missions. On the fifth mission, they taught children in local kindergartens and educated local teachers. Our NMVs consisted of experts for each activity and young volunteers to assist them. For interpreting and medical consultation, Cambodian doctors and college students studying medicine or midwifery were hired. Table 1 summarizes the composition of our team during the five missions.

Our list of medications is organized in collaboration with Korean doctors, including dermatologist, specialists in internal medicine, pediatrician, and radiation oncologist, and a Cambodian doctor. A medicines list used in our fifth mission is shown in Supplement Table 1; this can serve as an example for preparation of a medical volunteering mission.

Ethics approval. This study was approved from the Institutional Review Board (IRB) of Ansan Hospital, Korea University Medical Center, Gyeonggi-Do, Korea (IRB No: 2017AS0087). Patients' consent was waived with consideration because there was no potential risk to the patient,

Table 1: Number and occupation of personnel in missions

No.	Period	Destination area	Korean volunteers				Cambodian participants		
			Doctors	Dentists	Nurses	NMVs	Doctors	Translators	Total
1	November 2012	Cham Lak	2	0	2	0	0	2	6
2	January 2014	Cham Lak	2	0	0	0	1	3	6
3	March 2015	Khsoem	1	1	0	4	1	2	9
4	February 2016	Khsoem	2	1	1	5	0	2	11
5	February 2017	Khsoem	4	2	1	5	1	4	17

NMV, non-medical volunteers

no information that could be personally identifiable was used, and owing to language barriers and lack of contact methods (e-mail, telephone, etc.). All volunteers (including medical and non-medical volunteers) who participated in this study agreed to the academic publication of this study. Otherwise, we recognized and adhered the World Medical Association Declaration of Helsinki.

2.3 Data collection and statistical analysis

Since both of our destination areas had no electricity, all the procedures, including prescribing and checking the quantity of medicines, medical treatment, and charting, were done by hand. We used a self-designed medical chart, based on our experiences in the first mission. This chart is designed to ask about symptoms related to the five most common illnesses we encountered in our first service, which are upper respiratory infections, gastroenteritis, vaginitis and/or cystitis, work-related symptoms, and dermatitis. The chart also included questions about the need for parasite prevention, mainly to prescribe anthelmintic drugs to children. The clinical data from the first, third, and fourth missions were provided to the local public health department, and the data from the second mission in the Cham Lak area and the fifth mission in the Khsoem area were used for this study.

We analyzed the distribution of illnesses by categorizing the cases that our team most commonly encountered into the six groups, as we mentioned above: upper respiratory infection, gastroenteritis, vaginitis and/or cystitis, dermatitis, work-related pain and parasite prevention. Work-related pain is defined as the pain of a knee, a waist, or a shoulder that typically worsens with farming labor is relieved when resting. Differences in disease distribution in the two villages were analyzed using chi-square tests. All analyses were performed using SPSS version 23.0 (SAS Institute Inc., Cary, NC, USA).

3 Results

On the Cham Lak-area mission, we treated 558 patients, of whom 72.7% were female and 56.1% were children under 18 years of age. On the Khsoem-area mission, we treated 371 patients, of whom 55.0% were female and 24.6% were children under 18 years of age.

The distribution of cases encountered among patients during the two missions is summarized in Tables 2 and 3 for children under 18 and adults, respectively. For children under 18, the most common case was upper respiratory infection, which usually was presented as a common cold. The next most common cases were parasite control, for the children with anal pruritis or as a preventive measure. The third most common case was dermatitis. The order of the three most common cases was the same in both areas, in Cham Lak and Khsoem, and was not statistically significant.

For adults, the most common illnesses at the mission in the Cham Lak area were vaginitis and/or cystitis, followed by gastroenteritis and work-related pain (back pain, knee pain, and headache). On the other hand, the most common illnesses at the mission in the Khsoem area were work-related pain, followed by gastroenteritis and upper respiratory infection. There was a statistically significant difference between these distributions ($p < 0.001$).

4 Discussion

4.1 Summary and analysis of experience

Our research provides information on common illnesses that could be encountered in medical missions in the rural

Table 2: Common cases of patients under the age of 18

Ranking	Illnesses	Number (%)	p value
2012 Mission (Cham Lak area)			
1	Upper respiratory infection	166 (41.0%)	
2	Parasite control	72 (17.8%)	
3	Dermatitis	61 (15.1%)	
etc*	Insect bite (2.2%)		
Total	Diagnosed illnesses	405	
	Patients	313	
2017 Mission (Khsoem area)			
1	Upper respiratory infection	63 (50.8%)	
2	Parasite control	28 (22.6%)	
3	Dermatitis	10 (8.0%)	
etc	Headache (4.0%)		
Total	Diagnosed illnesses	124	
	Patients	93	
	Distribution difference between 2012 and 2017 missions of three most common diseases		0.058

*Illnesses with frequency <5%

Table 3: Common illnesses of the adult patients

Ranking	Illnesses	Number (%)	p value
2012 Mission (Cham Lak area)			
1	Vaginitis and/or cystitis	109 (29.8%)	
2	Gastroenteritis	66 (18.0%)	
3	Work-related pain*	38 (10.4%)	
4	Upper respiratory infection	33 (9.0%)	
5	Dermatitis	22 (6.0%)	
etc**	General weakness (3.0%)		
Total	Diagnosed illnesses	366	
	Patients	245	
2017 Mission (Khsoem area)			
1	Work-related pain	137 (33.0%)	
2	Gastroenteritis	106 (25.5%)	
3	Upper respiratory infection	36 (8.7%)	
4	Vaginitis and/or cystitis	24 (5.8%)	
5	Dermatitis***	13 (3.1%)	
etc	Neurological symptoms (1.2%)		
Total	Diagnosed illnesses	415	
	Patients	278	
	Distribution difference between 2012 and 2017 missions of five most common illnesses		<0.001

*Includes back pain, knee pain, or headache aggravated by farming work.
**Illnesses with frequency <5%
***The frequency of dermatitis is <5% but is included for comparison.

areas of tropical Asia. Although the two regions where we conducted the missions are not so far apart and have similar climates, the distribution of common illnesses was different. It was unexpected to find this, because we thought the main illnesses in these areas would be caused by a lack of infrastructure such as water supply or sanitation facilities, and there was no big difference between the two areas in that regard.

After consulting with the Cambodian doctor, we suggested a hypothesis for the cause of this difference. In the Cham Lak area, where we conducted the first two missions, people use the nearby lake as their main water supply. They use lake's water for laundry, bathing, and sanitation. For drinking purposes, they use small wells belonging to the village. For the people of the Khsoem area, where we performed the third, fourth, and fifth missions, their main water supply is water pumps (which drain ground water from much deeper than village wells do). People of the Khsoem region also buy water for drinking purposes. Additionally, people living in the Cham Lak area are engaged mainly in rice farming, while those living in the Khsoem area mainly farm a crop called kawa, which must be dig out including roots from the ground and whose harvest can thus cause musculoskeletal pain. The differences between the two villages in terms of water supply and farming style seem to have caused the difference in illnesses.

There are few health literature reports on the rural areas in Eastern Cambodia where we have conducted volunteer work. Thus, we carefully discussed our volunteering experiences with recent health studies targeting Kratie and Kampong Cham provinces regionally, where our destinations are located. Some researchers have reported that helminth infection, such as *Opisthorchis viverrini* or *Schistosoma mekongi*, is not uncommon in this area [18, 19]. These might reflect the need of parasite medication, such as albendazole, in our services. It is also reported that water and food in this area contain heavy metals such as mercury and arsenic, as well as harmful chemicals such as phthalate esters [20-22]. The relatively high incidence of gastrointestinal disorders in our missions might be related with an absence of systemic management for food and water, and that refrigerators are not commonized. Moreover, people in this area, who live in houses made with thin, hand-made wooden boards and engaged in farming, are difficult to protect themselves from insects including mosquitoes, and the occurrence of dengue fever is not uncommon [23]. This is difficult to be differentiated from upper respiratory infection only by clinical symptoms, especially when a language barrier existed.

Physicians in developed countries tend not to be aware of the ways in which situations in the rural areas of low-income countries can differ. Even when different rural areas have similar climates and levels of infrastructure, teams planning medical missions might need to take into consideration their specific circumstances.

4.2 Common critiques of short medical volunteering

The duration of medical missions varies, but more than 70% of missions have been short-term (less than four weeks) [10]. These short medical volunteering missions have been criticized for their possible negative impact and lack of sustainability [24-26]. "First do no harm" is the primary principle, which we agree, in preparing a short medical volunteering mission [25]. If supporting facilities

are insufficient and continuous follow-up is impossible, extensive procedures or invasive treatments should be avoided. It is also essential to educate participants about the lifestyle of community, its medical problems, and effectiveness and safety of intervention for both practitioners and the patients [27].

Cost-effectiveness is important for significance and sustainability of the medical volunteering [10, 28, 29]. Maki *et al*. reported that the average expenditure of medical missions performed by 543 organizations was $50,000 per mission [8]. Abdullah noted skeptically that on one mission, a 10-person medical team spent $30,000 on travel and hotel costs in a country where a 30-bed hospital could be built for $60,000 [5]. Our medical volunteering has been performed with small finance, and we knew the cost-effectiveness was very important for sustainability. On our fifth mission, our team including 17 participants spent approximately $10,000 in all. This budget was possible because we were staying in a local house belonging to a church and living with local people and interpreters. Staying with the locals helps to promote cooperation as well as financial savings.

Volunteer physicians in developed countries often lack in-depth understanding of poverty and local social and economic contexts [7, 30, 31]. Since low-income countries often have an unfortunate history and might be sensitive about their environment in poverty, volunteers should be careful with and respectful to locals.

4.3 Travel information for volunteering in rural areas of Eastern Cambodia

Volunteering mission should be accompanied by a cooperative local director, and a leading physician who is well experienced with medical volunteering. Potential team members should be told about the standards for accommodations, food, and drink before they commit to participating.

Herein, we share our advice based on experience because there is very limited literature regarding information related to travel in rural areas other than those around Cambodia's major cities (Phnom Penh, Siem Reap). In rural areas of Eastern Cambodia, there is no public electricity and tap water available. In order to use electric medical devices, it is necessary to use a rechargeable device or a portable generator. Internet is usually unavailable even with use of local universal subscriber identity module (USIM) card. It is difficult to maintain the freshness of the food because the weather is consistently hot through the year and the refrigerator is unavailable. As mentioned in the above section, water or food might

Figure 1: Medical station in volunteering

not be free from heavy metals, harmful chemicals [20-22], or other contaminants. One should follow the local coordinators' instructions for food, however, if no such help is present from the trustable local coordinators, it is safer to prepare food from the neighboring town. Drinking water is recommended to be prepared in advance at a nearby town; one can drink canned beverage sold in local stores in rural areas. Insects and worms are prevalent during rainy seasons, usually from June to November. Insect repellent and allergy medicine should be prepared for susceptible people. The best period for volunteering is between November and February, during which time the weather is not overly hot, and rain is infrequent. The average daily temperature in Cambodia is over 30 degrees Celsius through the entire year [32]. However, since houses in rural areas are mostly built of thin, hand-made woods, blankets or extra garments might be necessary to keep body temperature at night.

4.4 Benefit of short medical volunteering

If we consider the medical impact of a single medical mission, it is easier to criticize than to find the benefits. Therefore, the benefit of the medical volunteering should be considered from a longer-term perspective.

We visited Cambodia on an annual basis and have performed symptom-based treatment, as well as prescribing medications and conducting health education in cooperation with interpreters. Definitely, annual mission is not enough to manage the diseases caused by a lack of infrastructure, poor hygiene, and working conditions. Management of chronic disease represents another difficult concern. As our visit was only once a year, we did not prescribe hypertension or diabetes medication, because prescribing drugs for long-term use can lead to overuse and misuse.

However, we consider our previous five missions as the beginning of the journey. Through our experience with past missions, we have trusting relationships with the Cambodian branch of the Korean Mission Society, which is in charge of local co-ordination, and with Cambodian doctors and college students who participated in interpretation and medical consultation. After assisting with one mission, the Cambodian participants want to help with the next, whenever they are able to. Some of them have been participating in our missions without receiving fees, and want to be colleagues of our team. Our NMVs have played a leading role in harmonizing and building relationships with local people. Based on this trust and cooperation, we are able to plan medical activities that can provide more sustained and practical help in the future.

Volunteer missions are beneficial for health-care professionals in developed countries to find their role of caring humans, who might suffer poverty and nescience, in crucial needs of medical help. Also, it provides solidarity and confidence to local people [5, 12, 33]. All the participants in our missions clearly felt gratitude for their assignments and became more dedicated to their role. At the end of the second mission, the teacher in charge of the church kindergarten told us: "It was a great pleasure to have you with us, eating meals together, talking and laughing, and playing with our children; those moments were more than happy, and it really improved our confidence." These words summarize the significance of our mission and will motivate us to prepare for the future.

4.5 Limitations and conclusion

We conducted five medical volunteering missions for five years, but only used data sets of two missions, because we provided data sets of other three missions to the local health department for the supplement of the health data in Cambodia. In addition, detailed diagnosis was not possible and the diagnosis was made mainly according to physicians' impression, because the tools available for diagnosis were very limited.

5 Conclusion

Our research provides information on common illnesses that can be encountered in medical volunteering in the rural areas of Eastern Cambodia. Medicines for parasite control, antibiotics for vaginitis and cystitis, antacids and other gastrointestinal remedies, anti-inflammatory and painkillers are to be prepared primarily. As most illnesses might be reduced modifying lifestyles, relevant educations should be prepared in cooperation with translators. When preparing the medical volunteering, participants should be thoroughly educated beforehand about the local socioeconomic circumstances, and the activities should be prepared considering the specific lifestyle of the region. Cost-effectiveness and sustainability should be carefully considered; staying together with the locals might provide solidarity to the locals and improve cost-effectiveness, which will help planning future activities.

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References

[1] Min J. International Medical Mission Facing Global Increase of Chronic Disease: 2-Year Experience in Bangladesh. J Korean Med Sci. 2016;31(2):326-328
[2] Elnawawy O, Lee AC, Pohl G. Making short-term international medical volunteer placements work: a qualitative study. Br J Gen Pract. 2014;64(623):e329-335
[3] Chiu YW, Weng YH, Chen CF, Yang CY, Chiou HY, Lee ML. A comparative study of Taiwan's short-term medical missions to the South Pacific and Central America. BMC Int Health Hum Rights. 2012;12:37
[4] Rovers J, Andreski M, Gitua J, Bagayoko A, DeVore J. Expanding the scope of medical mission volunteer groups to include a research component. Global Health. 2014;10:7
[5] Abdullah F. Perspective of West Africa: why bother to "mission"? Arch Surg. 2008;143(8):728-729
[6] Roberts M. A piece of my mind. Duffle bag medicine. JAMA. 2006;295(13):1491-1492
[7] Mangum SS. Learning perioperative nursing in Guatemala. AORN J. 2001;74(5):706-711
[8] Maki J, Qualls M, White B, Kleefield S, Crone R. Health impact assessment and short-term medical missions: a methods study to evaluate quality of care. BMC Health Serv Res. 2008;8:121
[9] Sykes KJ. Short-term medical service trips: a systematic review of the evidence. Am J Public Health. 2014;104(7):e38-48
[10] Martiniuk AL, Manouchehrian M, Negin JA, Zwi AB. Brain Gains: a literature review of medical missions to low and middle-income countries. BMC Health Serv Res. 2012;12:134
[11] Schober M. Nurse practitioners provide care in El Salvador. J Am Acad Nurse Pract. 1999;11(2):51-55
[12] Buchman S. Tariro: finding hope in Zimbabwe. Can Fam Physician. 2007;53(11):1971-1973
[13] Dowell J, Blacklock C, Liao C, Merrylees N. Boost or burden? Issues posed by short placements in resource-poor settings. Br J Gen Pract. 2014;64(623):272-273
[14] CIA World FactBook. https://www.cia.gov/library/publications/resources/the-world-factbook/geos/cb.html, accessed March 2017
[15] Country statistics and global health estimates by WHO and UN partners, (http://who.int/gho/mortality_burden_disease/en/) Last updated: January 2015
[16] Ministry of Health Cambodia, PMNCH, WHO, World Bank, AHPSR and participants in the Cambodia multistakeholder policy review (2014). Success Factors for Women's and Children's Health: Cambodia
[17] Ozawa S, Walker DG. Comparison of trust in public vs private health care providers in rural Cambodia. Health Policy Plan. 2011;26 Suppl 1:i20-29
[18] Muth S, Sayasone S, Odermatt-Biays S, Phompida S, Duong S, Odermatt P. Schistosoma mekongi in Cambodia and Lao People's Democratic Republic. Adv Parasitol. 2010;72:179-203
[19] Miyamoto K, Kirinoki M, Matsuda H, Hayashi N, Chigusa Y, Sinuon M, et al. Field survey focused on Opisthorchis viverrini infection in five provinces of Cambodia. Parasitol Int. 2014;63(2):366-373
[20] Cheng Z, Li HH, Wang HS, Zhu XM, Sthiannopkao S, Kim KW, et al. Dietary exposure and human risk assessment of phthalate esters based on total diet study in Cambodia. Environ Res. 2016;150:423-430
[21] Cheng Z, Wang HS, Du J, Sthiannopkao S, Xing GH, Kim KW, et al. Dietary exposure and risk assessment of mercury via total diet study in Cambodia. Chemosphere. 2013;92(1):143-149
[22] Wang HS, Sthiannopkao S, Chen ZJ, Man YB, Du J, Xing GH, et al. Arsenic concentration in rice, fish, meat and vegetables in Cambodia: a preliminary risk assessment. Environ Geochem Health. 2013;35(6):745-755
[23] Kumaran E, Doum D, Keo V, Sokha L, Sam B, Chan V, et al. Dengue knowledge, attitudes and practices and their impact on community-based vector control in rural Cambodia. Plos Neglect Trop D. 2018;12(2)
[24] Hardwick KS. Volunteering for the long-term good. Compend Contin Educ Dent. 2009;30(3):126, 8
[25] Bishop RA, Litch JA. Medical tourism can do harm. Brit Med J. 2000;320(7240):1017
[26] Bezruchka S. Medical tourism as medical harm to the Third World: Why? For whom? Wild Environ Med. 2000;11(2):77-78
[27] Suchdev P, Ahrens K, Click E, Macklin L, Evangelista D, Graham E. A model for sustainable short-term international medical trips. Ambul Pediatr. 2007;7(4):317-320
[28] Darmstadt GL, Bhutta ZA, Cousens S, Adam T, Walker N, de Bernis L, et al. Evidence-based, cost-effective interventions: how many newborn babies can we save? Lancet. 2005;365(9463):977-988
[29] Cobey JC. Physicians and surgeons volunteering in developing countries: a personal perspective. Clin Orthop Relat Res. 2002(396):65-72
[30] Krienitz D. Making a difference, one child at a time. MLO Med Lab Obs. 1998;30(12):40-43
[31] DeVargas RK, Drew L, Snith J. Trip to Haiti changes lives of patients and volunteers. Health Prog. 2007;88(5):62-65
[32] Weather statistics, National Enviroenment Agency of Singapore. Avilaible at: http://www.nea.gov.sg/weather-climate/climate/weather-statistics
[33] Bermudez LE. Humanitarian missions in the third world. Plast Reconstr Surg. 2004;114(6):1687-1689; author reply 9

Supplement materials

Supplement Table 1. Medicine list of our fifth mission
We provide example of medicines list that can be used in medical volunteering. This list of medications is based on anticipated number of 700 patients (based on the largest number of patients in our previous missions).
Abbreviations: NSAID: non-steroidal anti-inflammatory drug. GI: gastrointestinal. T: tablet.

Category	Ingredient	Brand name	No. of patients	Average periods of using drug (days)	Common usage	Total amount
Anthelmintic	Albendazol 400mg	Zentel	300	1	1T qd	300T
NSAID	Acetaminophen 80mg	Tylenol for children (chewing tablet)	100	3	2T tid	1800T
	Ibuprofen 20mg/ml	Ibufen syrup	100	3	7cc tid	6300cc
	Acetaminophen 650mg	T ylenol ER	250	3	1T tid	2250T
	Aceclofenac 100mg	Aclofen	120	7	1T bid	1680T
	Acetaminophen 325mg & Tramadol 37.5mg	Ultracet	20	7	1T tid	420T
Antibiotics	Amoxicillin sodium 250mg & Potassium clauvanate 125mg	Augmentin 375mg	80	7	1T tid	1680T
	Amoxicillin Sodium 25mg/ml Potassium Clavulanate 6.25mg/ml	Augmentin syrup 156.25mg/ml	30	7	3cc tid	1890cc
	Cefaclor 250mg	Cefaclor	70	7	1T tid	1470T
	Cefaclor 25mg/ml	Cefaclor syrup	30	7	3cc tid	1890cc
	Ciprofloxacin 250mg	Ciprobay 250mg	50	7	1T bid	700T
GI drugs	Cimetidine 200mg	cimetidine	200	7	2T bid	5600T
	Levosulpride 25mg	Levopride	50	5	1T tid	750T
	Cultured Bacillus subtilis/Streptococcus faecium 125mg	Medilac-s	50	5	1T tid	750T
	Biodiastase 2000 50mg Lipase 100 15mg Panprosin SS 20mg Pancellase SS 30mg Pancreatin Enteric Granule 78.6mg Ursodesoxycholic Acid 10mg Simethicone 40mg	Bearse	50	5	1T tid	750T
	Dioctahedral Smectite 3mg/20ml	Smecta (liquid in packs)	30	3	20cc tid	5400cc
	Magnesium Hydroxide 500mg	Magmil	30	5	1T bid	300T
Vaginitis	Clotrimazole 100mg vaginal tab	Canesten vaginal Tab	35	6	1T qd	210T
	Fluconazole 50mg	Difulcan	35	1	3T qd	105T
Drugs for colds	Guaifenesin 50mg Chlorpheniramine Maleate 1.5mg Dihydrocodeine T artrate 5mg DL-Methylephedrine HCl 17.5mg	Codenal	40	3	1T tid	360T
	Dihydrocodeine Bitartrate 50mg Dl-methylephedrine Hydrochloride 131.25mg Chlorpheniramine Maleate 15mg Guaifenesin 375mg per 100ml	Codenal syrup	100	3	7cc tid	6300cc
	Triprolidine HCl 2.5mg Pseudoephedrine HCl 60mg	Actifed	40	3	1T tid	360T
	Pseudoephedrine Hydrochloride 600mg Triprolidine Hydrochloride 25mg per 100ml	Actifed syrup	70	3	5cc tid	3150cc

Muscle relaxant	Eperisone HCl 50mg	Eperison	70	7	1T bid	980T
Dermatological drugs, topical medication & steroids	Prednicarbate 2.5mg/g	Dermatop oint 0.25%	20	1	1 tube (10g)	20 tube
	Terbinafine Hydrochloride 10mg/g	Lamsil cream 1%	20	1	1 tube (15g)	20 tube
	Isoconazole Nitrate 10mg Diflucortolone Valerate 1mg	Rapael cream	20	1	1 tube (20g)	20 tube
	Hydroxyzine Hydrochloride 10mg	Ucerax tablet 10mg	20	7	1T qd	140 T
	Methylprednisolone 4mg	Metyhlon tablet 4mg	20	7	1T qd	140 T