



National Drug Information Center Services through Ministry of Health Hotline Calling Center (937) in Saudi Arabia

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Abstract

Objective: National drug information center (NDIC) has started providing services since January 2013, and answering public and professional inquiries through MOH-Hotline Calling Services (937) since December 2013. The objective of this study to explore the analysis of national drug information inquiries by the hotline services in Saudi Arabia.

Method: Simulation including all 12-month 2014 of receiving adults and pediatrics drug information inquiries; through MOH-hotline calling services (937). Ten on-call clinical pharmacists and expert trained pharmacists were receiving calls from public and professional asking about drug information, through manual documentation system of drug information inquiries by drug information data collecting form.

Results: The total number answered calls were 976 calls through the entire study period. Of them, 264 (27%) calls were documented. The question most asked was on dose standardization (27%) followed by drug Administration (15.3%). Medications were the most asked about (83.3%). Antibacterial was the most frequent question (19.80%) followed by Vitamins and supplements (11.68%) then antidiabetic by (4.87%).

Conclusion: National drug information center was providing new first-time hotline services by answering drug information inquiries from professional and public. Targeting to educate professional and public about drug therapy of common diseases will decrease drug related problems. Expanding drug information hotline services with electronic documentation, expansion of clinical pharmacist with advanced training will improve patient outcomes and avoid the unnecessary cost.

Keywords: National drug information; Hotline; Clinical pharmacist; Pharmacist; Saudi Arabia

Introduction

The first drug information center was founded in the world and located in United State of America (USA) at begging of the 1960s, and in the United Kingdom in 1977 [1,2], the services expanded over years in the USA and other countries [3-13]. In Saudi Arabia, the first drug information center was established at King Saud University college of pharmacy in early 1978 [14], then in late 1980s King Khalid University Hospital (KKUH) and King Faisal Specialist Hospital and Research Center (KFSHRC) had established drug information and poisoning information center [15,16]. The first drug and poisoning information center at MOH was founded in 1989 at very public 500 beds-hospital King Saud Medical City previously known as " Riyadh Central Hospital". It was operated by a pharmacist, and supervised by a clinical pharmacist who had a master degree in clinical pharmacy from the University of Pacific from United State of America. The center had started with a limited scope service of answering drug information inquiries, with available of an old version of references British National Formulary, and Micromedex Drugdex in Microfiche version, and provided eight hour's morning duty. In 1994, the number of pharmacists increased and expanded the scope of services by participating in the Pharmacy and Therapeutic committee and sharing in 4th Edition of MOH Drug Formulary. In 2008, the local drug and poisoning information center converted to be regional coverage and expanded the scope of services in Riyadh area, and headed by the

critical care clinical pharmacist certified board of pharmacotherapy. The number staff increased to 10 clinical pharmacists and new services had been started as clinical pharmacy programs including medication safety program, anticoagulation program, pain management program, and drug utilization evaluation program. An electronic documentation and workload analysis system had been started to measure pharmacist impact on patient outcome and cost avoidance. In 2013 the regional center converted to national drug information center (NDIC) at General Administration of Pharmaceutical Care at Ministry of Health (GAPC-MOH) to cover all 21 regions in the kingdom of Saudi Arabia with expanded scope of services based on American Society Health-Syst Pharmacist (ASHP) updating guidelines and recommendations, and International Pharmaceutical Federation (FIP) [17,18]. It was

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running with a network of more than ten drug information centers at MOH hospitals with hotline calling services started in late of 2013; and then expanded services to all more than 250 hospitals and 2500 primary care centers, with five years strategic plan of services [19].

Method

Ministry of Health started providing 937 hotline services in January 2013 through the general administration of emergency. These services were answering the call by a physician or may be the calls were transferred according to specialty (e.g. number of collaborative departments; Corona, Poisoning, Drug Information and Neonate and Pediatrics...etc.), the center can receive several calls at same time, it capable to get up to 20 calls at the same time. The call center is receiving 500 calls monthly. NDIC had started providing hotline services with collaboration with the general administration of emergency in December 2013. It's a 24/7 active service throughout the year covering holidays as well, receiving calls from the public and professional health care providers from all around the Kingdom. This service was operated with an eleven Clinical Pharmacist and trained Pharmacist who provided Drug Information to professional and public. All pharmacists either holding Pharm D degree or Master in clinical pharmacy or pharmacist trained in a short course in basic drug information and 5 weeks practical training at accredited drug information center and accredited by general administration of pharmaceutical care. We provided all pharmacists with a collection of online references as showed in Table 1. All pharmacists provided over all 21 regions at Saudi Arabia. All clinical pharmacists and trained pharmacists who work as a drug information pharmacist in the site were scheduled to cover calls from 937 at any time transferred to their phones. Schedules were divided into five shifts covers 24 hrs/day in each shift covered by a clinical Pharmacist as a supervisor, the updating monthly schedule sent to all participants and a follow-up report was sent daily to evaluate the process. The study period was from December 2013–November 2014, excluding all Poisoning calls and any calls, were not documented was also excluded in this study.

A drug information request form was used in a manual documentation consistent of four parts; fist part: questioner data (name, ID#, nationality, gender, profession, qualification, contacts information). Second part: patient data (name, ID#, nationality, gender, weight, height, diagnosis). Third part: question documentation (the type of question, the question, and its answer, reference of the answer). Fourth part: drug information inquiries cost avoidance based on American model [20]. By the end of the study, the authors found very poor documentation in the references section. To overcome this problem the authors present again as in Table 1, and asked the pharmacist arrange the references from 1 to 20 numbers based more frequent to least one, the pharmacists filled the table separately and return it back to the authors. Then references were rearranged based on their answers with average member. All the medications were asked it will be categorized grouping based on British National Formulary 64th edition. All data were later entered and analyzed by using excel sheet (Microsoft Office 2007).

Results

A total of 1479 calls were received during the period of 12 months. A number of drug information calls had been answered 976 (67.13%), poisoning calls had been answered 17 (1%), missed calls 421 (28.46%), and the number of calls was closed 65 (4.49%). Of answered calls only 264 (27%) calls were documented and including a total of 300 inquiries (each call contains more than one inquiry). Most inquiries were from

by public 180 (60%) and 120 (40%) were from by professionals. Of professional sector; the most inquiry was pharmacists 48 (48%), then 45 (37.5%) from by physicians, 7 (5.8%) made by Nurses, and 20 (16.6%) not specified. The most frequent inquiry was asked about dose standardization by (27), followed by drug administration (15.3%) and adverse drug reaction (11.66%) and the center helped in detecting 75 cases of ADRs throughout this period as showed in Table 2. Comparison between professional and public as a type of inquiries showed Table 3. The most inquiries were about drugs (81-83.8%) and food supplement (13.3-11.1%) from both professional and publics respectively. The medications most frequent was asked about Antibacterial by (19.80%) followed by vitamins (11.68%), anti-diabetic (4.87) antihypertensive with (4.54%), Analgesia and anticonvulsant both were (4.22%), rheumatic disease and gout and antihistamine both were asked by (3.89%), followed by contraceptives (3.57%), Antidepressant, immunosuppressant agent, and corticosteroid were least frequent by (2.92%). Comparison between professional and public as most medications were asked showed Table 4. The most frequent reference used was Lexi-comp, Up-to-date, and Micromedex to answer all type of inquiries both professional and public as showed in Table 5. The average costs avoidance per call was (415.78 USD), and total cost avoidance was (109,768 USD) with partial documentation, the estimated total cost with complete documentation was (405,801 USD) per year, cost avoidance of answering public inquiries were (80,806.5 USD) and Professional inquires were (28,961.5 USD) for more detail the reader can refer to published reference [21].

Discussion

GAPC-MOH started drug information centers program based on strategic planning of pharmaceutical care as part of national pharmacy practice program [22]. The program had started since December 2013 and coordinated by national drug information center located at MOH. The program should cover more 250 hospital and 2500 primary care centers over all Kingdom of Saudi Arabia. The program headed by 1st author Alomi YA as expert critical care clinical pharmacist with two boards; Board Certified of Pharmacotherapy Specialist (BCPS) and Board Certified of Nutrition Support Pharmacy (BCNSP). He had more 15 years experiences in clinical pharmacy and pharmacy practice. The program coordinated by 2nd author AL- Mudaiheem H with Pharm/MSc. Clin Pharm degree and more than 5 years' experience in pharmacy practice. The national drug information center established the scope of services based on ASHP and FIP recommendations. By the end of the 1st year of starting services, the center expanded their services and participated in MOH 937 call center.

National drug information center in Saudi Arabia resembled what had been done to USA, UK, and recently Germany as worldwide [1,2]. The center also resembles two countries in the Middle East including Iran and Palestine as providing services national wide to the entire public country [12-24]. However, our national drug information center more specialized on drug information with excluding poisoning information. In 2013 MOH established new general administration by the name of General Administration of Poison Control center and forensic chemical which specialized in all poisonous related issues. This reason made us exclude all poison questions from our analysis, this is not our scope of services but the pharmacist should answer the question if he received as part of ethical pharmacy practice.

In the study, the number missed call was high due to sometimes technical reason. Call center used equipment received several call at a time, sometimes the pharmacist during answering the inquiry another call was transferred to the same pharmacist. The computer

Resources	Resources
Tertiary Resources	
Medicine Complete	Lexi-Comp
Access Medicine	Up-to-date
Access Pharmacy	Pharmacy Online Library
Sanford Guide to Antimicrobial Therapy	Natural Medicine Comprehensive Database
Compounding Today	
Secondary Resources	
Micromedex	IDIS
AIDS Journals	
Primary Resources	
The Medical letter	Hospital pharmacy Journal
Annals of Pharmacotherapy	Pharmacist Letter
American Journal of Hospital System Pharmacist	Value in Health
Clinical Toxicology	Medical Teacher

Table 1: Collection of pharmacists.

Inquiry classification	%
Dose standardization	27
Drug Administration	15.33
ADR	11.66
Drug Identification	10.33
Drug availability/ formulary	9.66
Drug-drug interaction	7.66
Drug in pregnancy	7
Others	6
Drugs in breast feeding	2
Compounding	1.33
Compatibility	1
Drug- Nutrition interaction	0.66
pharmacokinetic	0.33
Total	100

Table 2: Percentage of inquiry classification.

Inquiry classification	Both	Public	Professional
		%	%
Dose standardization	27	27.77	25.83
Drug Administration	15.33	16.11	14.16
Drug in pregnancy	7.66	12.7	8.33
ADR	11.66	9.47	15
Drug availability/ formulary	9.66	9.4	5
Drug Identification	10	7.22	9.16
Drug-drug interaction	7.33	6.66	10.83
Others	6	5	5
Compatibility	1	1.66	1.66
Drugs in breast feeding	2	1.11	2.5
Compounding	1.33	0.55	2.5
Drug- Nutrition interaction	0.66	0.55	0
Pharmacokinetic	0.33	0.55	0
Total	100	100	100

Table 3: Percentage of inquiry classification public and professional.

will consider it as missed call. In addition, on-call pharmacist busy with his work during morning hours or the phone is silent or closed. All technical related issued will be corrected by general call center. National drug information during the period of study was using manual documentation system, this procedure is very bothersome and boring issue to all pharmacists, and it is not strange to find a very low percentage of drug information inquiries documentation. General Drawbacks of our services was the manual documentation system which has been overcome in our current phase II, all documentation process was converted into an online system. Today's we are using an electronic documentation system through monkey survey subscription on MOH website. The new system will help the pharmacist for quick documentation and make as a dashboard for any time of data analysis [23].

In similar data which involved receiving inquiries from public and professionals as explored in Table 6, looking into each class of question inquiry and compare it with our current study on dose standardization in arrange of (14-34%) with a similarity results of Entezari-Maleki T et al., Rosenberg JM et al., Pohjanoksa-Mäntylä, Schwarz UI et al., and Assiri YA et al. studies [1,6,11,13,14]. In drug Administration inquiries having a range of (7.5-16.11%) resemble results with Entezari-Maleki T et al., Schwarz UI et al., and Assiri YA et al. studies [1,13,14]. Moving to Adverse drug reaction ranges from (9.47-28%) also within range of previous studies Entezari-Maleki T et al, Rosenberg JM et al., Pohjanoksa-Mäntylä, Schwarz UI et al., and Assiri YA et al. studies [1,6,11,13,14]. The range of Drug Identification from previous studies (7.22-20.4%) our data fit with this range [1,13,14]. The drug availability/ formulary inquiries type similar with previous studies (4.2-26%) as in Pohjanoksa-Mäntylä, Schwarz UI et al., and Assiri YA et al. studies [11,13,14]. Drug in pregnancy with a range of (3.3-16%) also within range of previous data as showed in Rosenberg JM et al. and Assiri YA et al. studies [6,14].

Here, we discussed professional related type of questioner; only one study found a very old date by Leach FN in the United Kingdom [3]. Our study was the only updated one that's discussed this professional type. It is normal to find a lot of differences between our study and the old one. For instant; the authors found dose standardization the highest type of inquiries while adverse drug reaction was the highest type of inquiries. Previously most of the physician focused on drug-related problems while nowadays with a huge number of medications all health care professional cannot memorize all the doses and any pharmacokinetics related calculation, it is normal for find this results in our study due to this reason. The second in the list of professional related type was adverse drug reaction, drug administration, and drug-drug interaction while in the previous study was drug identification, drug in pregnancies, drug compounding the reason behind that the number of references were not existing in old age while today we a lot of references discussed and answer this type of inquiries like Micromedex and Lexi-comp, etc., in addition the internet resources was not available, and most of the drug available readymade and rarely needed for compounding, therefore, it is normal to find those results.

The public related type of questioner; it is only one study discussed this issue by Maywald U et al. [9] in Germany and another studies the majorities of questioners were public type Shadnia Sh et al. in Iran [12]. There are several differences in type of inquiries in our study the top in the list were dose standardization, and drug administration while in Germany and Iran study was adverse drug reaction this can be found due to our population had poor knowledge background of medication and patient education program did not exist in most of the hospitals,

Drug categories	Total Number of inquiries from Public and Professional	Number of inquiries from Public	Percentage of inquiries from Public	Number of inquiries from Professional	Percentage of inquiries from Professional
Antibacterial	61(19.8)	42	23.2	19	14.84
Antifungal	4 (1.29)	2	1.1	2	1.56
Antiviral	1 (0.32)	1	0.55	0	0
Anthelmintics	2 (0.64)	2	1,1	0	0
Antihypertensive	14 (4.54)	10	5.52	4	3.13
Antidiabetic	15 (4.87)	10	5.52	5	3.91
Immunosuppressant Agent and Corticosteroid	9 (2.92)	0	0	9	7.03
Anticonvulsants	13 (4.22)	5	2,76	8	6.25
Antipsychotics	3 (0.97)	0	0	3	2.34
Antidepressant	9 (2.92)	6	3.31	3	2.34
Anticoagulants	13 (4.22)	12	6.63	1	0.78
Antiplateletes	2 (0.64)	1	0.55	1	0.78
Antilipemic	3 (0.97)	1	0.55	2	1.56
Antihistamine	12 (3.89)	9	4.97	3	2.34
Anesthesia	3 (0.97)	0	0	3	2.34
Analgesia	13 (4.22)	5	2.76	8	6.25
Bronchodilators	5 (1.62)	1	0.55	4	3.13
Thyroid products	1 (0.32)	0	0	1	0.78
Rheumatic disease and gout	12 (3.89)	8	4.42	4	3.13
Parkinsonism and related disorder	2 (0.64)	2	1,1	0	0
Antisecretory drugs and mucosal protectant	8 (2.59)	7	3.87	1	0.78
Blood disorder	2 (0.64)	1	0.55	1	0.78
Genito-urinary disorder	1 (0.32)	0	0	1	0.78
Antifoaming agent	1 (0.32)	0	0	1	0.78
Neuromuscular disorder	1 (0.32)	1	0.55	0	0
Laxative	1 (0.32)	0	0	1	0.78
Dermatology	6 (1.94)	5	2.76	1	0.78
Contraceptives	11 (3.57)	2	1,1	9	7.03
Antiflatulents	1 (0.32)	0	0	1	0.78
fluids and electrolytes	6 (1.94)	5	2.76	1	0.78
Bone metabolism	3 (0.97)	2	1,1	1	0.78
drugs used in substance dependence	2 (0.64)	0	0	2	1.56
Baby formula	3 (0.97)	1	0.55	2	1.56
Diuretics	2 (0.64)	1	0.55	1	0.78
Treatment of obesity	4 (1.29)	3	1.66	1	0.78
CNS stimulants	1 (0.32)	1	0.55	0	0
Sex hormones	2 (0.64)	2	1,1	0	0
Cough preparation	6 (1.94)	3	1.66	3	2.34
Vitamins	36 (11.68)	20	11.05	16	12.5
Vaccines	3 (0.97)	2	1,1	1	0.78
Antispasmodics	9 (2.92)	6	3.31	3	2.34
Intestinal secretion	3 (0.97)	2	1,1	1	0.78
Total	309 (100%)	181	100%	128	100%

Table 4: Comparison between professional and public.

and this reflects the system in the country of obtaining medications without prescription from private pharmacies adding to this no patient counseling program active throughout the kingdom and finally, there are no label standards applied into MOH hospitals and PHC yet. Also; we can't negligent the fact of internal resources available to everyone that may send a wrong or biased information which leads to confusion by most of the callers. In addition the awareness by Saudi Food and Drug Authority of adverse drug reaction reporting system did not exist,

while in Germany and Iran the second one was drug-drug interaction and drug identification respectively, it could be the good background of medication in Germany and the dilution of professional involved Iran study. In our study the third type of inquiries from our public was drug in pregnancy, this reflects patient perception on his health care and drug related problem. This perception encourages the entire pharmacist to start patient medication education program as soon as possible overall health care institution in Saudi Arabia

Resources	Arrangement	Resources	Arrangement
Tertiary Resources			
Lexi-Comp	1.57	Natural Medicine Comprehensive Database	9.43
Up-to-date	2.71	Access Pharmacy	9.85
Medicine Complete	7	Access Medicine	10.85
Sanford Guide to Antimicrobial Therapy	7.43	Compounding Today	12.43
Pharmacy Online Library	8.71		
Secondary Resources			
Micromedex	2.29	AIDS Journals	15.86
IDIS	14.43		
Primary Resources			
The Medical letter	10.14	American Journal of Hospital System Pharmacist	13.29
Annals of Pharmacotherapy	11.43	Hospital pharmacy Journal	14.43
Clinical Toxicology	11.57	Value in Health	16.857
Pharmacist Letter	12.43	Medical Teacher	17.29

Table 5: Frequent reference used was Lexi-comp, Up-to-date, and Micromedex.

Inquiry classification	Present study. Rosenberg JM, et al. 2015 Saudi Arabia			Shadnia Sh et al. Assiri YA, et al. 2011 Iran [12]		Entezari-Maleki T et al. Pohjanoksa-Mäntylä MK, 2014 Iran [13]		Leach FN Schwarz UI et al. 1978 UK [3]		Maywald U et al. 2004 2004 Germany [9]		Rosenberg JM, et al. 2004 2004 USA [1]		Assiri YA, et al. 2007 2007 Saudi Arabia [15]		Pohjanoksa-Mäntylä MK, 2008 2008 Finland. [11]		Schwarz UI et al. 1999 1999 Germany [6]	
	Drug Information Center	Drug and Poisoning Information Center		Drug and Poisoning Information Center		Regional Drug information		Public Health Saxony in Germany		Most of DIC in the US		University DIC		Helsinki University DIC		DI Regional center in Germany			
	60% Public	40% Professional	total	97.14% Public	2.86% Professional	57.63% Public	42.37% Professional	3.62% Public	96.37% Professional	100% Public	15% Public	85% Professional	% 17.50% Public	82.50% Professional	Not Written	Others 33%	Professional 67%		
Dose standardization	27.77	25.83	27	6.06		19.32				5	17		21.7		14	34			
Drug Administration	16.11	14.16	15.33	13.21		7.58		8.4			10.1		7.5						
Drug in pregnancy	12.7	8.33	7.66	4.44				11.2					3.3			16			
ADR	9.47	15	11.66	20.14		15.05		19.3		23.9	16.2		13.3		11	28			
Drug availability/formulary	9.4	5	9.66	0		15.87							4.2		26				
Drug Identification	7.22	9.16	10	17.64		18.74		17.4			14.3		20.4						
Drug-drug interaction	6.66	10.83	7.33	5.23				6		7.1	9.1		7.3						
Drug-Nutrition interaction	0.55	0	0.66	0															
Compatibility	1.66	1.66	1	0.68				7.9			4.2		1.8						
Drugs in breast feeding	1.11	2.5	2	2.31															
Compounding	0.55	2.5	1.33	0				8.6											
Pharmacokinetic	0.55	0	0.33	0				5.7			4					15			
Others	5	5	6																
Total	100	100	100																

Table 6: Percentage of Inquiry Classification public and professional.

This is the first study found discussed the national drug information center at MOH in Saudi Arabia, this is piloting epidemiologic prospective analysis of drug information inquiries. Although of poor documentation from pharmacist answered the inquiries especially the references used, lack of skills of answering drug information inquiries, and time lack of answering the question the pharmacists are not full-time staff, in addition to the technical system of 937.

Currently, we changed drug information documentation from manual to online through our website at MOH portal, all technical related issued well be corrected by 937 general administration. We are planning to increase drug information education courses to all pharmacist, and increase the number of pharmacists who answering the questions, and repeat the study again on a yearly basis.

In similar data which involved receiving inquiries from public and professionals together, looking into drug category and compare it with our current study with the consideration that's our classification based on BNF database, more detail and specific information which was found in any previous studies. The 1st class of inquiries was about antibacterial. It is was out of range results for Entezari-Maleki T et al., Pohjanoksa-Mäntylä and Schwarz UI et al., studies [6,11,13] in the range of (7.58-19%), most of our community pharmacies break pharmacy law by dispensing antibiotics without prescriptions. CNS medications fit within results in a range of (15-20%) by Schwarz UI et al and Pohjanoksa-Mantyla studies [6,13]. Coming to the cardiovascular medications also it was out of range of previous studies ranges (8-20%) by Schwarz UI et al., Pohjanoksa-Mäntylä et al., and Entezari-Maleki T et al. studies [6,11,13]. The 2nd public disease in Saudi Arabia is cardiovascular diseases, it is normal to find it as more percentages of inquiries than previous studies. In analgesia which was the fourth class of inquiries was almost the same as only one study by Shadnia Sh et al. [12] and had no comparative data found in any of others studies. The results of Antidiabetic was within the range of previous studies (1.73-18.74%) by Shadnia Sh et al. [12] and Entezari-Maleki T et al. [13].

The public inquiries related to drug category; the 1st class of inquiries was Antibacterial compared in just only one study Maywald U et al. [9], our result was lower reasoning that to poor documentation of drug information inquiries, in Gastrointestinal drugs a mostly resemble while in Cardiovascular range our result lower than Maywald U et al. study [9] due to poor drug information inquiries documentation. The CNS medications related inquiries was lower that Maywald U et al. [9], because very restricted law, policy and procedures for narcotics and controlled medications, in addition to our traditional behavior of rejection CNS diseases from the public. In regards to references of answering of drug information inquiries, there were four studies [1,12,13,14] had a documentation of drug information inquiry documentation process ending with the reference in answering each question. All those studies discussed inquiries from both professional and public, and no existing studies discussed either professional or nor public even our study. Our center used frequently Lexi-Comp as it was with Shadnia Sh et al. [12]. The reason of that's being inquiries were higher in public asking about dose standardization, drug administration in our study, and adverse drug reaction Shadnia Sh study; so the search supposed to be direct, with no details. In addition, Lexi-Comp came as an application makes it more convenient to use even without internet connection. The 2nd resource used Up-to-date, this normal to find that being understanding the question were derived from professionals and more than 40% of total inquiries asking about dose standardization. Moreover, the new version of Up-to-date has an application which is friendlier in use; this resembles what found in Entezari-Maleki T et al. [13]. The 3rd reference was in our study the Micromedex, while the

previous studies by Rosenberg JM, et.al. [1], Assiri YA et al. [14] And Entezari-Maleki T et al. [13] were being 1st and 2nd common reference respectively. More than 80% of inquiries derived from professionals Rosenberg JM et al. [1], Assiri YA et al. [14] And more than 40% of inquiries in regards to dose standardization and more in depth detail of information. Our study been 3rd reference due to most of our consumers were public with different demands. Meanwhile, in general, all five data shows that the most frequent resource been used are Lexi-Comp, Micromedex and up-to-date.

Limitations

Although this is the first study founded about national drug information center at MOH in Saudi Arabia, with more detail comparisons of professional and public inquiries, there are some limitations in the study including poor documentation of drug information inquiries, using manual documentation, and founding of new services at MOH with little experiences toward public answering inquiries.

Conclusion

Despite that the national drug information center provided 1st new services to the huge population of professional and public. The study should be repeated gain with an electronic documentation system in order to get all data clearly, using hand application of entering data, expansion of clinical pharmacist answering inquiries with comprehensive advanced training in drug information skills. Moreover, get international accreditation of the center and services, make this service as part of accreditation for local drug information center at MOH, involve Pharm D student and residents at their clinical rotation, and an incentive payment to all participants to encourage our staff for excellent performances.

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