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Management Information System In Promoting Rational Drug Use

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Abstract: Rational drug use cannot be identified without a method of measurement and a reference standard that are necessary to measure the impact of interventions. Over the past few years, the International Network for Rational Use of Drug (INRUD) and the WHO Action Program on Essential Drugs have closely collaborated in developing countries to test a set of 5 prescribing indicators to measure some key aspects of prescribing. Collecting the prescriptions data and analyzing them is one way for measuring the above indicators. In Iran, National Committee of Rational Use of Drug (NCRUD) and local committees affiliated to 42 universities of medical sciences were established by Food and Drug Organisation in 1996 throughout the country to implement and promote rational use of drugs. Here we aimed to examine all prescribing patterns in Iran in terms of irrational use of drugs. To look at the pattern of physicians' prescription, the subcommittee of computer and data analysis of NCRUD was set up to initiate and develop a data warehouse and application software. The intended outcome of such efforts was to gather and analyze prescription data for measuring RUD indicators and strategies to promote rational drug use. After development, data ware house, called "Noskhehpardaz (RX Analyzer)," was tested for its validity and reliability in a pilot study in Mashhad University of Medical Sciences in 1996. More than 200 million prescriptions, equaling about to 70% of all prescriptions in the country, were collected nationally and analyzed by RX Analyzer software. Mean items per prescription was 4. 25 in 1998 and with the downward trend were 3.22 in 2009. Mean cost of prescriptions increased from 0.56 US$ in 1998 to 4.19 US$ in 2009. Availability of information on prescriptions has facilitated audit and feedback suggesting that policy makers should have to consider these data in their decisions.

Key words: Rational use of drug, RUD indicators, management information system, prescriptions, indicators, Iran

INTRODUCTION

One of the most important duties of health authorities is to ensure the efficacy and cost effectiveness of health services (Soleymani *et al.*, 2009). Pharmaceuticals are important among essential components in many diagnostic and therapeutic measures (Abdollahiasl *et al.*, 2011a, b). Promoting rationality in drug use is a well-recognized and an important part of health policy. However, with no method of measurement and reference standard (Le Grand *et al.*, 1999) it is impossible to take the step. Therefore developing systems or methods for gathering valid and accurate data on prescribing behavior of physicians are very important. Moreover, it is critical in planning strategies and necessary in measuring the impact of interventions for promoting rational drug use. It is well accepted that all medications have adverse, possibly lethal effects, if prescribed inappropriately as shown in studies of pattern of antibiotic use (Abdollahiasl *et al.*, 2011c; Ahmadizar *et al.*, 2011) or in investigations of self-medication. Other important factors that might increase the risks of intervention include number of items per prescriptions and drug interactions as well as patients' sex, age and background disease. There are many examples for that notice but the best one is our experience with the use of tramadol (Soleymani *et al.*, 2011). Due to the above and also economic conditions and cultural believes of people in each society, it is an acceptable requirement to establish and organize a framework for official implementation of the concept of RUD in daily practice of medical professionals. Of course this has been

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already proved that there are some inconsistencies with decided strategies and those practically occurred (Nikfar *et al.*, 2005).

In Iran, for many years, the problem of irrational drug use have been investigated by academic members of several universities (Cheraghali *et al.*, 2006). Fortunately, in 1996 those sporadic activities became the basis for official establishment of National Committee of Rational Use of Drug (NCRUD) in the Food and Drug Organisation and in local committees of 42 universities of medical sciences throughout the country.

The national committee has three subcommittees named policy and legislation, computer and data analysis and consultants of medical sciences. These subcommittees, based on their responsibilities, consist of officials and experts from different sectors.

MATERIALS AND METHODS

For looking at the pattern of physicians' prescriptions, the subcommittee of computer and data analysis of NCRUD was formed and developed a data warehouse and application software in order to gather and analyze prescription data for measuring RUD indicators and to develop strategies for promoting rational drug use. The data warehouse called "Noskhehpardaz (RX Analyzer)" was tested for its validity and reliability in a pilot study in Mashhad University of Medical Sciences in 1996. Currently the software is in use by universities and health services all over the country. Steps in looking at the pattern of physicians' prescriptions by local committees are as follows:

• Receiving prescriptions from pharmacies or health insurance providers
• Data entry by computer operators under supervision of pharmacists
• Data analysis by pharmacists using the software provided by national committee
• Preparation of the report to be reviewed by medical advisors
• Decisions about physicians' practice regarding rational or irrational use of drugs
• Preparation of reports containing the results and the decision of advisory subcommittee
• Sending reports directly to physicians whose prescriptions have been analyzed

• Sending to local medical council and health insurance providers for appropriate legal actions, a copy of profiles of physicians' whose practice consistently, after being previously informed at least twice, had major problems in terms of RUD

After above stages, a geographic information system is used to draw a comprehensive picture and illustrate the spread of the problem at national level.

RESULTS

More than 200 million prescriptions, equal to 70% of all prescriptions in the country with an acceptable spread were collected and analyzed by RX Analyzer software. Table 1 is one of the possible outputs of the software that demonstrates national level and comparative information regarding the yearly number of prescriptions between 1998 to 2009. The software also allows calculation of other figures such as national mean items per prescription and mean cost of prescription in Iranian currency units (each US$ equating roughly to 10,000 Iranian Rials), the percentage of prescriptions contain antimicrobial drugs, parenteral drugs and corticosteroids as well as the other drug categories as shown in Table 1. To calculate the above and other indicators, all data included information of physicians, pharmacies and patients, drug's name, dosage form and number prescribed were all entered continuously into the software. In this way the system give report in many forms such as:

• Reporting system for each groups of physician, pharmacy, location
• Frequency in use of different drug items and frequently used drugs
• Price analysis
• Drug interaction according to reference database (Threlkeld and Hagemann, 1996)
• Drug group frequency usage based of USPDI (2005)
• Drug form analyzing

According to the above data, feedback forms for physicians were developed that is shown in Fig. 1.

Table 1: Trend of prescriptions' indicators in Iran evaluated between 1998 and 2009

Indicator	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of prescriptions (million)	1.15	1.56	1.86	6.27	1.57	6.72	1.48	1.24	53.00	52.28	72.88	55.00
Mean item per prescription	4.25	4.00	3.75	3.50	3.50	3.59	3.37	3.39	3.43	3.28	3.23	3.22
Mean cost of prescriptions (US $)	0.56	0.51	0.60	0.78	1.30	1.60	1.60	2.10	3.42	3.40	3.83	4.19
Percent of prescriptions contain antimicrobials	64.25	66.00	65.20	56.20	47.20	42.20	50.30	49.80	48.20	49.00	49.90	49.00
Percent of prescriptions contain parenteral drugs	49.25	48.70	47.50	46.00	36.00	41.00	33.90	39.60	40.70	42.00	41.90	43.50
Percent of prescriptions contain corticosteroids	12.68	13.00	14.00	14.70	16.50	16.90	18.50	176.00	21.00	23.00	23.30	25.20

Rational use of drug committee					
Doctor ID				No of prescription	
First name				Survey period	
Last name				Insurance type	
Specialty					
Address					

Important Indicators

Indicators	Selected physician	Comparison peer group	All physician in the region
Prescription number	6,409	198,970	416,926
Average items in prescription	5.74	3.97	3.57
Average price for prescription (Rials)	46,791	38,258	38.752
Prescription with one item (%)	0.92	5.05	7.55
Prescription with more than 4 items (%)	80.18	35.86	25.90
Maximum items in prescription	10	12	13
Injection ratio in all items (%)	35.99	27.19	22.31
Injection ratio in all prescription (%)	88.14	63.73	49.49

Research in drug groups (reference: USPDI, 2005)*

	Selected physician		Comparison peer group		All physician in the region	
Drug group	Prescription (%)	Items (%)	Prescription (%)	Items (%)	Prescription (%)	Items (%)
Antibiotics	73.40	25.16	62.76	23.88	55.93	22.56
NSAIDs	49.52	8.91	19.42	5.03	20.04	5.79
Anticonvulsants	0.90	0.17	1.46	0.40	2.30	0.72
Corticosteroids	65.38	12.60	33.53	9.08	25.90	7.73

Top 10 most frequent items in prescriptions

Comparison peer group		Selected physician	
Prescription	Dosage (%)	Prescription	Dosage (%)
Dexamethasone phosphate disodium 8 mg/2 ml ampule	16.57	Diclofenac sodium 50 mg tablet	31.56
Ceftriaxone 1 g vial	13.35	Betamethasone long acting ampule	29.18
Acetaminophen codeine (300+20) tablet	9.04	Betamethasone disodium phosphate 4 mg mL^{-1} ampule	23.40
Diphenhydramine compound 60 mL syrup	7.24	Ceftriaxone 1 g vial	21.86
Ceftriaxone 500 mg vial	7.06	Hyoscine-n-butyl bromide 20 mg ampule	17.96
Metronidazole 250 mg tablet	6.62	Ceftriaxone 500 mg vial	16.54
Betamethasone disodium phosphate 4 mg mL^{-1} ampule	6.09	Diphenhydramine HCl 12.5 mg 5/mL elixir	16.01
Omeprazole 20 mg capsule	6.02	Acetaminophen 120 mg 5 mL 60/mL solution	14.51
Diphenhydramine HCl 12.5 mg/5 mL elixir	5.76	Cetirizine HCl 10 mg tablet	13.56
Acetaminophen 120 mg 5 mL/60 mL solution	5.76	Penicillin G Procaine 800,000 U vial	13.36

Fig. 1: The main page of the feedback form, *Threlkeld and Hagemann (1996)

DISCUSSION

NCRUD has 14-year experience in collecting and data analyzing of physicians prescriptions at both national and local levels. In the early years it was important to inform policy makers about national and local drug use patterns and to indicate and highlight gravity of problems in key areas. In the next step, different types of interventions were implemented to improve irrationality in drug use. More recently it has been necessary to look at the impact of those interventions on drug use patterns.

Looking at the experiences of other countries shows such services to optimize drug-related health outcomes by identifying and promoting drug prescribing and use. For example National Prescribing Service in Australia has been established to implement a quality use of medicines service as part of the National Medicine Policy in mid 1998 as an independent public company that was funded almost exclusively by the Federal Government (Weekes *et al.*, 2005) and also the Canadian Optimal Medication Prescribing and Utilization Service (COMPUS) which was launched in March 2004, by the Canadian Coordinating Office for Health Technology Assessment (CCOHTA) to achieve the above goal.

Considering the mean of items per prescription as an important indicator among rational drug use indicators, the findings of this study indicate a descending trend for this indicator from 4.25 in 1998 to 3.22 in 2009. Given the large number of medicines that prescribed in each year, even the small reduction in prescribing would be worthwhile. For instance, a 5% reduction in prescribing would result in a saving of 235 million pound in the United Kingdom and $A1 40 m in Australia annually (O'Connell *et al.*, 1999).

Pattern of prescriptions is influenced by many factors and implementing interventions for improving and

promoting rational drug use is the need for corporation between different sectors involved in the health field. One of the most important items is cost-effectiveness studies that is rare in most of developing countries. To make a feasible national policy decision, information on burden of expenses to the insurance companies or the government should be also collected and paid enough attention. Such studies would clarify which class of drugs are misused and thus should be regulated properly. The examples are drugs like diphenoxylate tablet (Farshchi *et al.*, 2012) or nitroglycerine ampule (Nikfar *et al.*, 2011).

CONCLUSION

Availability of information on prescriptions can facilitate audit and feedback. It is therefore recommended that decision-makers place a greater emphasis on the use the database in evaluating the impact of corrective interventions.

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