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Prescribing practices of rural primary health care physicians in Uzbekistan

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Summary Doctors prescribe medications for therapeutic indications and to meet patient expectations. Understanding the pattern of prescribing is a necessary precursor for any intervention and for improving prescribing practices. Using the WHO standard methodology, we investigated the prescribing practices of doctors in rural primary health care (PHC) clinics in the Ferghana region of Uzbekistan. Doctors in these clinics may have over-prescribed, prescribing 2.9 drugs per patient per encounter. Fifty-seven per cent of these were for injectable drugs, and 57% for antibiotics. Most prescriptions were for name brand (62%) rather than generic drugs.

keywords prescribing, drugs, indicators, rational use, injections, pharmaceuticals

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Introduction

Pharmaceuticals often present problems in contemporary medical practices: lack of safety, lack of efficacy and lack of proper use. In many countries of the former Soviet Union reduced financing for health, in addition to the opening of economies and markets, has had a negative impact on the quality of pharmacotherapy (WHO 1998a). Therefore, we conducted an assessment of the pharmaceutical sector in Uzbekistan. This paper reports on the prescribing practices' portion of the assessment that was conducted in the Ferghana region.

Uzbekistan is considered a transitional country. Its population is approximately 25 million, with 70% living in rural areas. Uzbekistan has a birth rate of 22.2 per 1000, an infant mortality rate of 52 per 1000 (UNICEF 2000), and an average life expectancy of 70.2 years (Uzbekistan Ministry of Health & WHO/Euro 1998). As a legacy from the former Soviet Union, it has a strong health system infrastructure with abundant speciality health services and providers. In rural areas there are centrally located hospitals and speciality polyclinics (outpatient clinics) and smaller health care clinics in the villages. Until the current health reforms, primary health care (PHC), as non-specialized services, was almost non-existent, with the small village clinics functioning predominantly as screening and referral sites.

The USAID/ZdravPlus project provides technical assistance to the Ministry of Health of Uzbekistan to reform and restructure their health care system, with the initial focus on improving PHC in the rural districts. These health reforms are being piloted in Ferghana Region in conjunction with the Ferghana Region Health Department and the implementing unit of a $30 million World Bank health sector loan. Ferghana Region has a population of 2 708 299. There are 1219 health facilities in the region, including hospitals, speciality polyclinics and rural PHC clinics. The current pilot of health reforms focuses on strengthening PHC and integrating speciality health care services. The village-based clinics in the pilot districts (rayons) now provide outpatient PHC services. Doctors in the pilot rural PHC clinics now function as general practitioners, providing a wide range of routine health care services for community members of all ages. This health reform project focused initially on three pilot districts: Yazyavan, Quva and Beshariq. As part of the health reforms, most of the doctors in these three rayons attended a 10-month course to retrain them as general practitioners as well as short courses on a variety of PHC topics, such as nutrition, hypertension, reproductive health and diarrhoeal

diseases. Ferghana Region is the most densely populated region in Uzbekistan. The pilot rayons are very similar; all three are agriculturally based rural districts with predominantly Uzbek and Moslem populations.

Uzbekistan has a National Essential Drugs List (EDL) that was developed in 1997 by the Ministry of Health. The EDL was revised in 1998, 1999 and 2000. At the time of the study the list comprised 337 drugs, including vaccines, totalling 750 medicinal products, counting different doses and forms (Ministry of Health of the Republic of Uzbekistan 2000).

To assess the pharmaceutical sector, ZDRAVPLUS conducted a three-pronged study: (1) an evaluation of health policies related to pharmaceuticals; (2) an assessment of drug pricing and availability; (3) a review of the prescribing practices of rural primary health care physicians. Information from these studies is now being used to inform and revise policies related to the pharmaceutical sector, and to improve the quality of PHC services, particularly in the rural districts in Ferghana Region. This paper reports our findings on prescribing practices of rural PHC physicians within the three pilot districts in Ferghana Region.

Similar drug studies have been conducted in a number of developing and transitional countries (Quick *et al.* 1988; Hogerzeil *et al.* 1993; WHO 1993; Groom & Hedlund 1998; Andom *et al.* 1999; Chorliet 2000; Memon 2001). We reviewed drug studies from 17 countries and synthesized the results using mean values and ranges for prescribing indicators (Table 1). Although there are no standards for prescribing practices, the results from each study can be compared with the others, which can at least highlight the outlying values. Some measures, such as the percentage of generic drugs prescribed and percentage of drugs prescribed from an EDL should be as high as possible, while prescribing rates for other indicators, such as rate of antibiotics, are more dependent on the mix of cases seen.

Drug studies are important because of the serious consequences of non-rational prescribing practices. Every drug prescribed has its own potential side-effects, and if multiple drugs are prescribed there is an increased risk of adverse drug interactions. In Uzbekistan, patients are expected to purchase most of their own drugs. Whether the patient or the government is paying, if the drugs prescribed are inappropriate, in excess, not the most effective or not generic, they waste the patient's or the government's limited resources (WHO 1998a,b, 2001). Given the closed market economy of Uzbekistan, access to and availability of drugs can also be an issue. Patients in Uzbekistan, especially in rural areas, may have difficulty in getting to the better stocked pharmacies, which are usually located in the towns and cities. Other consequences of irrational prescribing practices are that overuse of antibiotics can lead to antimicrobial resistance (WHO 2000), and that overuse of injectables increases the risk of transmission of hepatitis B, AIDS, and other blood-borne diseases (Hutin & Chen 1999).

Methods

The indicators used to determine the prescribing practices of local PHC doctors were taken from *How to Investigate Drug Use in Health Facilities: Selected Drug Use Indicators* (WHO 1993), developed by WHO. This instrument was adapted for use in Ferghana, Uzbekistan, which included adding variables for drug name and diagnosis. Our study did not address drug use in hospitals or speciality polyclinics, or in urban settings, and patient care and health facility indicators were not collected. All diagnoses were coded according to International Classification of Disease (ICD-9) (WHO 1977) and drugs were coded using WHO's Anatomical Therapeutic Chemical (ATC) (WHO Collaborating Centre for Drug Statistics Methodology 1998) classification index. Data was entered and analysed using EPIINFO v 6.04b (Atlanta, USA) (Dean *et al.* 1994).

Site and sample selection

This drug study was conducted in three pilot districts. Each district has approximately 15 rural PHC clinics, depending on the size of the district. Ten rural PHC clinics were randomly selected from a list of all rural clinics in each district, giving us a total sample of 30 rural PHC clinics, of a total of 47 PHC clinics in all three districts.

Table 1 Review of prescribing indicators from other studies

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	Avg
Average no. of drugs prescribed	1.5	1.9	1.4	1.8	3.3	1.4	1.3	2.2	3.8	2.1	1.3	1.4	2.8	2.5	3.5	1.8	3.8	2.2
Per cent generic drugs prescribed			63		59	78	94	82	58	44	37	72			36	79		63.8
Per cent EDL drugs prescribed						85		88		86					70	94		84.6
Per cent patients prescribed injections	25	48	36	19	17		11	29	37	5	19	13		17.3	74	17	62.5	28.7
Per cent patients prescribed antibiotics	46	56	63	34	43	25	29	39	48	43	27	27	33.8	22	77	44	76.5	43.1

a, Yemen; b, Uganda; c, Sudan; d, Malawi; e, Indonesia (1991); f, Bangladesh; g, Zimbabwe; h, Tanzania; i, Nigeria; j, Nepal; k, Ecuador; l, Guatemala; m, Cameroon; n, Macedonia; o, Pakistan; p, Eritrea; q, Indonesia (1988).

To obtain information on the prescribing practices of the doctors in these rural PHC clinics, we abstracted information from 45 randomly selected ambulatory cards (individual patient records) within each of the 30 clinics, giving us a sample of 450 per district with a total of 1350 cases. These ambulatory cards were stored in three areas in each clinic: one for the general population, one for gynaecological services which included most women of reproductive age presenting for all complaints, and the third for paediatric records. Fifteen records from each of these areas were randomly collected. Information was abstracted from each ambulatory card on the patient's last curative visit that resulted in at least one prescription being written. If the last visit was a follow-up visit, then we went to the previous visit on the card. Patients also visit these clinics for preventive health care, such as immunizations and prenatal care, and to obtain health certificates that are required for some jobs and sports activities. These visits were omitted from this drug study and only data on curative visits were used. We also left out records that listed more than one diagnosis for the index visit, as it would have been difficult to determine which drugs were being prescribed for which diagnosis.

Data abstracted from individual patient ambulatory cards included: personal information, such as age, sex and year of birth (complete birthdates are not always available); diagnosis; and the prescription, such as drug name, form, dosage, times per day, and quantity. Investigators were given a copy of the most current EDL for Uzbekistan. For each drug prescribed they noted if it was a generic drug, an injectable drug, and if it was listed on the EDL. Data abstraction was carried out by experienced Uzbek doctors. Each doctor spent a day at each facility collecting the data.

Results

The age of the 1350 patients from whose records data were abstracted ranged from new-born to 90 years, and 60% were female. The number of prescribed drugs per outpatient encounter in a rural PHC clinic ranged from 1 to 9, with an average of 2.9 (Table 2). We found no significant difference in the average number of drugs prescribed between males and females, nor among different age groups; but there was a highly significant variation between districts ($P < 0.0001$). Yazyavan was the outlier district with 3.5 drugs per prescription.

Table 3 shows the frequencies of the number of drugs prescribed by district: 56% of the study population had three or more drugs prescribed. In Beshariq, 55% had three or more drugs prescribed, in Quva 40% were prescribed

Table 2 Rates of prescribing practices by district

	Total		Beshariq		Quva		Yazyavan		
	(%)	Clinic range	(%)	Clinic range	(%)	Clinic range	(%)	Clinic range	*P*-value
Average no. of drugs prescribed	2.9	1.9–4.2	2.8	2.2–3.3	2.5	1.9–3.1	3.5	2.7–4.2	<0.0001
Generic drugs prescribed	38.3	23–75	35.7	28–43	46.8	23–75	34.7	22.5–47	<0.0001
EDL drugs prescribed	79.4	26–100	99.9	89–100	53.4	26–78	80.6	58–91	<0.0001
Patients prescribed injections	57	29–82	61.1	38–82	51.3	40–58	58.7	29–80	<0.0001
Patients prescribed antibiotics	56.5	24–84	50.4	36–64	54.2	24–84	64.9	47–78	<0.0001

Table 3 Frequency and per cent of the total amount of drugs prescribed per patient by district

	All three districts No. of patients		Beshariq No. of patients		Quva No. of patients		Yazyavan No. of patients	
No. of drugs prescribed	($n = 1350$)	(%)	($n = 450$)	(%)	($n = 450$)	(%)	($n = 450$)	(%)
1	195	14.4	60	13.3	103	22.9	32	7.1
2	395	29.3	145	32.2	167	37.1	83	18.4
3	393	29.1	133	29.6	119	26.4	141	31.3
4	210	15.6	74	16.4	40	8.9	96	21.3
5	86	6.4	25	5.6	14	3.1	47	10.4
6	40	3.0	8	1.8	6	1.3	26	5.8
7	28	2.1	5	1.1	1	0.2	22	4.9
8–9	3	0.2	–	–	–	–	3	0.7
Total drugs prescribed	3896		1253		1067		1576	

Table 4 Most frequently prescribed drugs*

	Drug name	Drug type	Frequency	(%)	Cum. (%)
1	Vitamins (multivitamin; vitamin C, E and B group)	Vitamin	422	10.83	10.83
2	Benzathine benzylpenicillin	Antibiotic	376	9.65	20.48
3	Paracetamol (acetaminophen)	Analgesic	335	8.60	29.08
4	Ampicillin	Antibiotic	210	5.39	34.47
5	Metamizole sodium, and combinations	Analgesic	189	4.85	39.32
6	Sulphamethoxazole and trimethoprim	Antibiotic	189	4.85	44.17
7	Calcium chloride and gluconate	Calcium salts	174	4.47	48.64
8	Diphenhydramine	Antihistamine	156	4.00	52.64
9	Ferrous salts	Iron preparations	138	3.54	56.19
10	Clodantoin	Antibiotic	134	3.44	59.63
11	Procaine	Anaesthetic	133	3.41	63.04
12	Bromhexine	Mucolytic	125	3.21	66.25
13	Acetylsalicylic acid	Antipyretic, NSAID	74	1.90	68.15
14	Herbal remedies, miscellaneous	Patent medicine	63	1.62	69.76
15	Drotaverine	Anti-spasmodic	49	1.26	71.02
16	Glucose	Electrolyte	46	1.18	72.20
17	Indomethacin	NSAID	39	1.00	73.20
18	Streptomycin	Antibiotic	37	0.95	74.15
19	Ibuprofen-APAP ('Korflam')	NSAID/analgesic	36	0.92	75.08
20	Diclofenac	NSAID	35	0.90	75.98
21	Moxaverine	Anti-spasmodic	30	0.77	76.75
22	Clindamycin	Antibiotic	30	0.77	77.52
23	Mebhydrolin	Antihistamine	26	0.67	78.18
24	Enalapril	Antihypertensive	24	0.62	78.80
25	Sulphacamphorcaine	Respiratory aneleptic	23	0.59	79.39
26	Nitrofurantoin	Antibiotic	22	0.56	79.95
27	Pancrelipase	Enzyme	22	0.56	80.52

* Data for this table were abstracted from patients' records for the index visit at the same time and in the same manner as all other data in this study.

three or more drugs, and Yazyavan had 74% of cases with three or more prescriptions for one diagnosis at a single visit.

The most commonly prescribed drugs are listed in Table 4. Seven drugs accounted for about 50% of prescription items. The most commonly prescribed drugs were vitamins, accounting for 11% of all drugs prescribed. Nineteen drugs accounted for 75% of all prescriptions. In addition to the large quantity and variety of vitamins prescribed, this list shows seven antibiotics and six analgesic and NSAID drugs. On average, 38% of the prescribed drugs were generic. This indicator varied by district, ranging from 35% to 45%, with a range among PHC clinics of 23–75% (Table 2). The number of drugs prescribed from the National EDL comprised 78% of the total number of drugs prescribed, which varied across districts, with 51% in Quva, 80% in Yazyavan and 99.5% in Beshariq.

We found that 57% of the cases reviewed were prescribed injections, ranging from 29% to 82% (Table 2). Beshariq had the highest rate of injectables (61.1%) and Quva the lowest (51.3%). Eighteen per cent of all cases were prescribed three or more injectables (Table 5), ranging from 11% to 27%. If we consider only the 770 people who received a prescription for an injection, then 32% of them received three or more injections.

The most frequently prescribed injectable drug was benzathine benzylpenicillin, an antibiotic, accounting for 24% of all injectable prescriptions. The next most frequent injectable drug prescribed was vitamins (multivitamins, C, E and B groups) accounting for 21%, metamizole sodium accounting for 10%, diphenhydramine accounting for 10%, and procaine accounting for 8%. Altogether these five drugs accounted for 72% of all injectables prescribed.

The overall rate of antibiotic use was 56.5%, ranging from 24.4% to 84.4% (Table 2). Fifteen per cent of all cases were prescribed two or more antibiotics, with Yazyavan district's overall rate being the highest at 23% (Table 6).

Table 7 lists the diagnoses for which prescriptions were written. Almost half of all patients seen were diagnosed with a respiratory problem, of which 90% had acute

Table 5 Number of injectables prescribed per patient by district ($P < 0.0001$)

	All three districts No. of patients		Beshariq No. of patients		Quva No. of patients		Yazyavan No. of patients	
No. of injectables prescribed	($n = 1350$)	(%)	($n = 450$)	(%)	($n = 450$)	(%)	($n = 450$)	(%)
0	580	43	175	39	219	49	186	41
1	335	25	118	26	120	27	97	22
2	190	14	84	19	60	13	46	10
≥3	245	18	73	16	51	11	121	27

Table 6 Number of antibiotics prescribed per patient by district ($P < 0.0001$)

	All three districts No. of patients		Beshariq No. of patients		Quva No. of patients		Yazyavan No. of patients	
No. of antibiotics prescribed	($n = 1350$)	(%)	($n = 450$)	(%)	($n = 450$)	(%)	($n = 450$)	(%)
0	587	43.5	223	49.6	206	45.8	158	35.1
1	564	41.8	187	41.6	189	42.0	188	41.8
≥2	199	14.7	40	8.9	55	12.2	104	23.1

Table 7 Frequency and per cent of categories of diagnoses by district

	All three districts No. of patients		Beshariq No. of patients		Quva No. of patients		Yazyavan No. of patients	
Categories of diagnosis	($n = 1350$)	(%)	($n = 450$)	(%)	($n = 450$)	(%)	($n = 450$)	(%)
Respiratory	630	46.7	148	32.9	217	48.2	265	58.9
Urinary tract	124	9.2	22	4.9	62	13.8	40	8.9
Anaemia	115	8.5	48	10.7	51	11.3	16	3.6
Digestive system, including diarrhoea	86	6.4	45	10.0	19	4.2	20	4.5
Hypertension	45	3.3	19	4.2	7	1.6	19	4.2
Others	350	26.1	166	36.7	94	20.8	90	20.0

respiratory infections. Diagnoses related to the urinary tract occurred in 9% of the cases, with anaemia noted in 8.5%. Other diagnoses of concern to rural primary care physicians are digestive disorders, including diarrhoea, occurring in 6.4% of the cases, and hypertension, found in 3.3% of the study population.

We were interested in examining the variability of prescribing practices given specific diagnoses (Table 8). We found a high rate of patients being prescribed antibiotics for respiratory diseases (79%) and urinary tract disorders (94%). Injectable drugs were also prescribed at a high rate for urinary tract disorders (80%), hypertension (69%) and respiratory diseases (55%). Outpatients with anaemia were prescribed fewer drugs, averaging 2.2. Generic drugs were prescribed for respiratory diseases about 10% more often than for all diagnosed conditions overall, and were prescribed at a much lower rate for anaemia (18%), hypertension (17%) and digestive disorders (19%).

The specific drugs prescribed for the different diagnostic categories are listed in Table 9. Vitamins (C, B and multivitamins) are the most frequently prescribed drugs although they have no known therapeutic benefit for the listed conditions, except for vitamin C which may help increase iron absorption for treatment of anaemia. Metamizole is an analgesic with potential serious side-effects (Shuhov & Harper 2000). It is not clear why this was prescribed in more than 5% of the respiratory cases. Festal, a combination preparation of pancreatic extracts, is used nearly 10% of the time in digestive disorders and is not even on the EDL. Dibazol, a Soviet era injectable used to decrease high blood pressure, is being used in nearly 14% of the hypertension cases.

Table 8 Rates of prescribing practices by diagnosis

	Total ($n = 1350$)	Respiratory ($n = 630$)	Urinary tract ($n = 124$)	Anaemia ($n = 115$)	Digestive system including diarrhoea ($n = 86$)	Hypertension ($n = 45$)
Average no. of drugs prescribed	2.9	3.2	2.9	2.2	2.6	3.1
Per cent generic drugs prescribed (%)	37.8	47.3	38.3	17.9	18.8	16.7
Per cent EDL drugs prescribed (%)	78.3	83	78.5	60.6	79.4	79
Per cent patients prescribed injections (%)	57	54.8	79.8	32.2	47.7	68.9
Per cent patients prescribed antibiotics (%)	56.5	78.9	93.5	1.7	30.2	2.2

Table 9 Most frequently prescribed drugs (with frequency and per cent reported) per diagnostic category among all drugs prescribed

Respiratory ($n = 2002$ drugs)	Urinary ($n = 365$ drugs)	Anaemia ($n = 252$ drugs)	Digestive/diarrhoea ($n = 222$ drugs)	Hypertension ($n = 137$ drugs)
Paracetamol	Sulphamethoxazole and trimethoprim	Iron oxide, nanoparticles	Drotaverine	Enalapril
297 (14.8%)	71 (19.45%)	113 (44.8%)	33 (14.9%)	21 (15.3%)
Benzathine benzylpenicillin	Benzathine benzylpenicillin	Vitamin C, B group and multivitamin	Festal*	Dibazol†
227 (11.3%)	67 (18.4%)	105 (41.7%)	21 (9.5%)	19 (13.9%)
Ampicillin	Vitamin C, B group and multivitamin		Vitamin C, B group and multivitamin	Papaverine
167 (8.3%)	45 (12.3%)		19 (8.6%)	15 (10.9%)
Vitamin C, B group and multivitamin	Ampicillin		Aluminium hydroxide	Vitamin C, B group and multivitamin
126 (6.3%)	20 (5.5%)		15 (6.8%)	9 (6.6%)
Calcium salts and phosphate	Nitrofurantoin		Oral rehydration solution	Magnesium sulphate
120 (6.3%)	18 (4.9%)		13 (5.9%)	8 (5.8%)
Bromhexine	Calcium salts		Alcohol (Spirits)	Reserpine, combinations
123 (6.1%)	17 (4.7%)		11 (5.0%)	8 (5.8%)
Metamizole sodium and combinations			Metronidazole	
109 (5.4%)			10 (4.5%)	
Clodatoin				
106 (5.3%)				
Sulphamethoxazole and trimethoprim				
96 (4.8%)				
Diphenhydramine				
95 (4.7%)				

Refer to Table 4 for drug therapy uses of unfamiliar drugs.
* Festal is a pancreas extract; † Dibazole is an antispasmodic.

Discussion

The methods used in this survey followed WHO procedures (WHO 1993) that have been widely used in other countries and in a wide variety of studies. Within the existing record keeping system in rural PHC clinics in Uzbekistan it was relatively easy to abstract the needed data, and it also allowed us to collect additional information such as diagnosis and specific drug names. By converting the diagnoses to ICD codes and drug names to ATC codes, we were easily able to analyse the data to take a closer look at prescribing practices by diagnostic categories. Such data can be used not only for descriptive studies, as in this case, but also to evaluate the effect of interventions aimed at improving prescribing practices and quality of care.

Within individual patient records doctors note the diagnoses and the drugs prescribed related to each visit, but this

is not always performed in such a way to determine which drugs have been prescribed for what diagnosis. Therefore, we needed to limit our study to records with only one diagnosis per index visit. Given this omission of complicated cases with multidiagnoses it is likely that the results reported here underestimate the actual seriousness of the situation.

The average number of prescribed drugs per outpatient encounter in a rural PHC clinic, 2.9, is substantially higher than the international average of 2.2 drugs per person, as shown in Table 1. Some other countries, Nigeria, Indonesia and Pakistan, have higher rates than Uzbekistan, but most countries use fewer drugs per consultation. The variation between districts and between clinics is striking, with Yazyavan using 3.5 drugs per consultation compared with Quva with 2.5, and with a single clinic in Quva averaging 1.9 drugs and another clinic in Yazyavan averaging 4.2 drugs. Investigating the reasons for this significant difference may be useful for developing interventions to reduce polypharmacy.

Of particular concern was that 56% of patients overall were receiving three or more drugs. Other studies have shown an association between the number of drugs prescribed and reduced patient compliance (Holloway 1999). As patients are required to purchase most of the drugs themselves, this polypharmacy creates barriers to access, for patients. Given that it is unlikely that patients will comply with taking as many as three drugs or more (average is 2.9 drugs prescribed) and that there are barriers to access to drugs, including cost, we can assume that patients may not be taking their full prescriptions. We do not know which drugs or how many drugs the patients are actually taking. Antimicrobial resistance (56.5% of patients were prescribed antibiotics) may be increasing. Patients may take incomplete or insufficient treatments for their health problems. If patients are not purchasing the complete list of drugs prescribed, it is unlikely that they will know which is the most pertinent drug needed for treating their disease. Also, the more drugs prescribed, the more likely the occurrence of side-effects or drug interactions. It is important to note here that this study only looked at patients with a single diagnosis for the index visit, so we can assume that the occurrence of polypharmacy would become even more serious when patients are prescribed drugs for more than one diagnosis, which potentially would lead to a higher prevalence of adverse drug interactions, side-effects, and higher costs.

It is interesting to note that there was no significant difference in the average number of drugs prescribed to men and women, or to the different age groups. This lack of difference is contrary to what was found in the study conducted in Indonesia in 1988, where older age groups received more drugs for most conditions (Quick *et al.* 1988). This lack of difference in Uzbekistan suggests that gender and age differences are not significant factors in prescribing factors.

The rate of generic drug use, 38%, was low compared with other countries' experiences with a mean of 64% among the 17 countries listed in Table 1. The only country with a lower rate was Pakistan with 36% (Memon 2001). Increasing generic prescribing could substantially reduce the cost of purchasing drugs for the patient, and reduce cost for pharmacies as they need to carry fewer versions of the same product. Prescribers might need to learn to use generic names, which is how they generally appear in journals and textbooks. The reason for low prescribing of generics may also be related to the actual registration of various products. In Uzbekistan high registration fees for generic drugs may be an obstacle in registering generics. In other countries registration of generics is encouraged by having lower or no fees for registering these products (WHO 1998, 2001).

The rate of prescribing from the EDL was 79% which is very close to the average of the 17 countries of 85% (Table 1). This reflects that the EDL in Uzbekistan is a well selected list, which meets the needs of primary care patients. Of concern, however, is the use of drugs such as metamizole (Analgin, dipyrone), NoSpa, aminotriphosphate (ATF) and Visanevsky ointment, Festal, and multivitamins. None of these are on the current EDL, although metamizole was on the EDL at the time of the survey. Many of these drugs lack evidence of therapeutic efficacy or have well recognized significant side-effects. For example, metamizole (Analgin, no. 5 listed in Table 4) has been withdrawn by its parent company, Hoechst, from its original market in Germany, because it has been associated with agranulocytosis and aplastic anaemia (The International Agranulocytosis and Aplastic Anemia Study 1986; Shuhov & Haper 2000).

The rate of prescribing of injectable drugs is very high (57%), far higher than the average (29%) of the 17 countries listed in Table 1. Only Pakistan with the rate of 74% used more injections. One PHC clinic in Beshariq had a rate of over 82%. While there may be some indication for using injectable antibiotics in severely ill, usually these patients are hospitalized, whereas most patients seen in these rural PHC clinics are unlikely to be severely ill. Some of the prescribed injectable drugs could be given orally, which is not only safer, but often less expensive. Of particular concern in this study is the lack of variation and high use of injectables across the diagnostic categories, as shown in Table 8. The fact that nearly 80% of patients with urinary tract diagnoses, 48% of patients with gastrointestinal complaints and 69% of patients with hypertension received injections is truly alarming. For these diagnoses it is difficult to think of an injectable drug that

could be justifiably used, let alone for such a high proportion of cases. Although patients with anaemia had the lowest rate of injectable prescriptions (32%), even this was too high, as anaemia is a chronic condition requiring longer-term solutions, such as improved nutrition and iron supplements. The risk of transmission of HIV and hepatitis B through the use of needles is well recognized. A further danger for children is the possibility of nerve damage. Injections are also more costly and require repeated attendance at the health facility. The inappropriate use of injections (Reeler 1990) is of concern worldwide and recently WHO has established an international network to reduce the inappropriate use of injectable drugs (SIGN 2002).

The rate of antibiotic use was somewhat higher (57%) than in the 17 other countries reviewed (43%). The range between facilities was remarkable, varying from 24% to 84% among different PHC clinics. Such a great range is unlikely to reflect differing morbidity patterns, especially in a relatively small geographical area as Ferghana Region. Such changes are far more likely to be as a result of prescribing practice of the individual doctors. A further concern is the use of multiple antibiotics, especially in Yazyavan district with 23% of patients being prescribed two or more antibiotics. The inappropriate use of antibiotics can potentially lead to antimicrobial resistance and increase the necessity to use more expensive antibiotics to treat life threatening infections (WHO 2000).

Almost half the cases studied were diagnosed with a respiratory system problem, of which most were acute respiratory infections (ARI). Fifty-five per cent of these patients were prescribed injections and 79% were prescribed antibiotics. Further in-depth studies may be needed to determine if such prescriptions were justified. The rate of antibiotic use among patients diagnosed with urinary tract illness was even higher at 94%, with 80% of patients being prescribed injections. Sixty-nine per cent of patients with hypertension were prescribed injections. The use of injections such as dibazol for chronic conditions, such as hypertension, also must be questioned.

There was greater variability of use of antibiotics. Only 2% of cases with anaemia and hypertension were prescribed antibiotics. These few cases are not of great concern as it is just as likely that they may have been prescribed for secondary diagnoses not noted; whereas, as noted above, prescriptions for antibiotics was much too high for all other diagnostic categories.

Although one-third of the patient records abstracted were retrieved from the gynaecological files, only 2.4% of all cases were diagnosed with a gynaecological problem. As most records of women of childbearing age, regardless of diagnosis or health care services received are stored in the gynaecological department, and as we did not abstract prenatal visits, as they were considered preventive not curative, most women in this study were diagnosed with a variety of other health conditions. Forty per cent of all females in this study were diagnosed with a respiratory problem, 12% with anaemia, 11% had a urinary tract diagnosis, and 6% with a digestive problem.

Further in-depth studies will elucidate the reasons for irrational prescribing behaviours. Such studies should focus on high and low outlier clinics, as well as the knowledge and attitudes about injections among prescribers and differing patient groups. Further work on costing of differing prescribing practices may also be undertaken to clarify possible benefits of generic prescribing, and a shift from injectable to oral drugs for patients. Then interventions will be undertaken to improve prescribing practices in these three districts, and successful interventions will be recommended to the Ministry of Health for national implementation. Emphasis will be placed on improving the practices of the health care facilities that displayed the worst practices. These interventions will apply the lessons learned from an investigation of the positive practices of those facilities that are currently doing the best. The potential options for interventions have been reviewed recently in Laing *et al.* (2001). Among the most promising interventions that might be tested would be the development of district-specific standard treatment guidelines developed by the health workers themselves, or the establishment of drug and therapeutic committees, which would review clinical practices occurring in the facilities. A role for this committee would be to identify the best practices occurring and to encourage others to aspire to the same high standard. The use of targeted problem-based in-service education may also be undertaken, particularly related to the problems identified. In addition to looking at the best practices within the clinics studied, one activity that might be tested, would be to duplicate the Indonesian intervention study that dramatically reduced the injection use from 65% to 43% in 6 months (Hadiyono *et al.* 1996).

Conclusion

Other studies have shown that patients expect to receive a prescription as part of their medical treatment and as confirmation that they are ill; and that by giving a prescription doctors can show they are concerned, and that they can do something to solve their patients' problems (van der Geest *et al.* 1996). This study has documented serious problems in prescribing practices in Uzbekistan, particularly very high use of injections, a low rate of generic drugs prescribed, high use of antibiotics, and a relatively high rate of polypharmacy. Despite the overall

irrational use of drugs, some clinics demonstrated close to optimum practices. The challenge now is to identify the reasons for these practices, and to find ways to duplicate these better practices in all clinics. In this way the doctors can improve the quality of their response to their patients. We recommend that the drug study be duplicated in other regions throughout Uzbekistan, so that clinicians take ownership of their local results and accept the need to improve their prescribing practices.

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