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TECHNICAL REPORT:

Drug Prescription Practices in Primary Health Care Facilities in Central Kazakhstan

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Almaty, Kazakhstan



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II. Abstract

This report contains the results of two surveys of routine prescribing practices in Family Group Practices (FGPs) in three cities in Karaganda Oblast, Kazakhstan, in 2000-2002, using reviews of patient charts/medical records. The surveys compared the medications prescribed over two time periods of one year each (Year 1 and Year 2). The study reviewed charts from general adult visits to the FGPs; visits of children under age 14; cases of hypertension in adults; and acute respiratory infections in children under five. A total of 1,406 charts were reviewed for Year 1 and 1,386 for Year 2.

In adults, respiratory, digestive, and circulatory diseases accounted for 64.8 percent of visits in Year 1 and 62.3 percent of visits in Year 2. In children, respiratory and digestive diseases accounted for 78.0 percent of visits in Year 1 and 78.1 percent of visits in Year 2. Over 66 percent of medications prescribed in both years to adults were circulatory, anti-inflammatory, vitamin and antimicrobial medications. In children vitamins, cough and expectorant medications and antibiotics accounted for 58.5 percent of medications in Year 1 and 54.0 percent of medications in Year 2. The use of antibiotics for respiratory diseases in adults declined from 59.3 prescriptions per 100 visits in Year 1 to 48.3/100 in Year 2; in children the rate decreased from 26.4/100 to 19.2/100. In treatment of anemia in adults, the use of products containing iron, usually by brand name, decreased from 53.3 percent to 47.8 percent of prescriptions written, while in children the rate increased from 47.8 percent to 57.1 percent. Vitamins accounted for most other prescriptions in both adults and children. The predominant treatments for digestive disease in children were: vitamins, antibiotics, and pancreatic enzymes, accounting for 45.2 percent of prescriptions in Year 1 and 44.2 percent in Year 2. The prescription of oral rehydration solution dropped from 4.8 percent of prescriptions to none at all.

The number of prescriptions per visit declined from 3.3 to 3.0 in adults and from 3.2 to 2.7 in children, primarily due to somewhat reduced numbers of vitamin prescriptions. The percentage of prescriptions that were generics dropped from 26.1 percent to 24.1 percent in adults and from 34.6 percent to 30.5 percent in children. The percentage of prescriptions from the essential drug list declined from 53.7 percent to 45.0 percent in adults and from 47.9 percent to 39.6 percent in children. The number of injections changed very little from 22.2 percent to 21.4 percent in adults and from 11.9 percent to 12.9 percent in children. The number of patients to whom antibiotics were prescribed declined from 27.1 percent to 19.8 percent in adults and from 45.8 percent to 27.1 percent in children.

III. Executive Summary

The ZdravPlus project, supported by the United States Agency for International Development (USAID), seeks to improve the quality and efficiency of health services in Central Asia, particularly at the primary health care level. Some of its key pilot sites are in Karaganda Oblast in central Kazakhstan, where doctors working in Family Group Practices (FGPs) have received a number of short training courses to bring their practices into line with international evidence-based approaches. Among the courses provided, several have addressed improved prescription practices for adults, particularly in cases of hypertension, and for young children, especially for acute respiratory infections (ARIs). ZdravPlus also worked with the Karaganda Oblast Health Department to set up a Drug Information Center (DIC) to promote evidence-based pharmaceutical decision-making by oblast authorities, health care providers, and the population.

This report contains the results of two surveys of routine prescribing practices of family physicians working in FGPs in three cities in Karaganda Oblast in 2000-2002, using reviews of patient charts/medical records. The surveys compared the medications prescribed over two time periods of one year each (Year 1 and Year 2) and provided data to assess the impact of ZdravPlus' programs on FGP physicians' drug prescribing practices and to plan future activities.

ZdravPlus sponsored short courses in hypertension and various primary care topics beginning in 1998. Trainings in Integrated Management of Childhood Illnesses (IMCI) were held from May, 2001 to August, 2002.

The study reviewed charts in two major categories: general adult visits to the FGPs and visits of children under 14 years old. Two supplementary categories were also surveyed: hypertension in adults and ARIs in children under age five. A total of 1,406 charts were selected for data extraction in Year 1 and 1,386 in Year 2. Diseases treated and drugs used for treatment were compared across sites and between the two years. The following key drug indicators were also collected and analyzed: 1) the number of medications per visit; 2) the use of generic medications; 3) the use of medications included in the Kazakhstan Essential Drug List (EDL); 4) the rate of injectable medication use; and 5) the rate of antibiotic use.

A. Findings

The results from the general adult category showed that circulatory and respiratory diseases followed by digestive disorders, hypertension, and genito-urinary disorders were the most frequent conditions treated. Visits for hypertension increased from 7.1 percent to 9.7 percent of visits and diabetes increased from 2.9 percent to 6.2 percent of visits between the two study periods. The most frequently prescribed medications were in these categories: cardiovascular (33.5 percent of all prescriptions, Year 1; 37.3 percent, Year 2), non-steroidal anti-inflammatory (9.6 percent, Year 1; 10.7 percent, Year 2), vitamins (9.0 percent, Year 1; 7.8 percent, Year 2), antimicrobial (8.4 percent, Year 1; 7.8 percent, Year 2), and expectorant/cough (5.7 percent, Year 1; 2.6 percent, Year 2).

For hypertension there was an improvement in the choice of medications, with more medications chosen that are recommended by evidence-based data for the treatment of hypertension (30.4 percent and 46.8 percent of prescriptions written for hypertension in Year 1 and Year 2). For respiratory disease, there was frequent use of expectorant/cough medications and vitamins (34.9 percent and 22.9 percent of prescriptions for respiratory disease in Year 1 and Year 2). The use of antibiotics for respiratory disease declined from 59.3 prescriptions per hundred visits in Year 1 to 48.3 in Year 2. Favorably, the use of injectable Gentamicin decreased, but there was also a decline in the use of first-line antibiotics from 12.5 percent to 10.2 percent of prescriptions written, while use of broad-spectrum antibiotics, generally recommended as second choice in primary care, remained stable at 6.9 percent of prescriptions written. In digestive diseases there was frequent use of the antibiotic Metronidazole (14.3 percent and 10.8 percent of

prescriptions in Year 1 and Year 2), as well as vitamins, pancreatic and gastric enzymes, and antispasmodics. Anti-ulcer medications showed a trend to the use of more Omeprazole (4.0 percent to 7.7 percent of prescriptions) and less H2-antagonists (7.9 percent to less than 3 percent of prescriptions). In genito-urinary diseases, non-preferred quinolone antibiotics rose from 3.2 percent to 5.4 percent of prescriptions written, while the preferred antibiotic, Co-trimoxazole, fell from 7.4 percent to 4.5 percent of prescriptions. In treatment of anemia, prescriptions containing iron decreased from 53.3 percent to 47.8 percent of prescriptions written. Vitamins accounted for most of the other prescriptions. Simple, inexpensive, generic ferrous sulfate accounted for no prescriptions in Year 1, but 8.7 percent of prescriptions in Year 2.

The data from the separate Adults with Hypertension group showed a trend towards increased use of thiazide diuretics, ACE inhibitors, and beta-blockers (38.3 percent to 39.8 percent of prescriptions written) compared to the use of less effective or ineffective agents, such as centrally acting agents, sedatives, and short acting calcium-channel blockers (32.7 percent to 21.6 percent of prescriptions written). This has been a major goal of antihypertensive education provided to the Family Group Practice (FGP) physicians.

In children under 14, the most common conditions treated were respiratory, digestive, genito-urinary, and anemia. There was an increase in the percentage of charts from Year 1 to Year 2 in the digestive (3.8 percent to 8.3 percent) and genito-urinary (3.6 percent to 11.3 percent) diagnostic groups. Vitamins, cough and expectorant preparations, and antibiotics were the most frequently prescribed medications. For digestive conditions, vitamins, antibiotics, pancreatic enzymes and digestive enzymes were the most frequently prescribed medications. The use of oral rehydration solution decreased from two of 1,326 prescriptions written in Year 1 to none at all in Year 2. Vitamins and multivitamins were frequently prescribed for anemia accounting for 52.2 percent of medications in Year 1 and 42.9 percent in Year 2. From Year 1 to Year 2, there was some increase in the use of iron or iron/Vitamin C combinations from 47.8 percent to 57.1 percent of prescriptions, but mostly in the form of brand name products, rather than generics.

The data for children under age five with ARIs showed a substantial reduction in use of antibiotics from 42.1 percent to 25.6 percent of visits, as taught in the FGP trainings. Multivitamin prescriptions also decreased from 20.0 percent to 14.0 percent of all prescriptions. Yet the use of injections actually increased from 5.8 percent to 8.2 percent of visits. The data also showed excellent use of the parameters of medical examination taught through Integrated Management of Childhood Illness (IMCI).

In Year 1, the data regarding the number of prescriptions per patient showed a rate of 3.3 prescriptions per visit for adults and 3.2 prescriptions per visit for children (compared to an international average of 2.2). In Year 2, the general adult rate had dropped to 3.0, while the pediatric rate had dropped to 2.7. The reduction in the number of prescriptions per visit is probably attributable at least in part to educational efforts. The extensive use of vitamins and multivitamins accounts for a large portion of the polypharmacy.

Generics were prescribed at a low level compared to international averages, meaning that patients are often paying a higher price than necessary for drugs. The rate of generic prescribing actually dropped between the first and second years from 26.1 percent to 24.1 percent in adults and from 34.6 percent to 30.5 percent of medications for children.

Between the two data collection periods, the percentage of prescribed drugs that were on the EDL fell from 53.7 percent to 45.0 percent in adults and from 47.9 percent to 39.6 percent in children, a low indicator.

The percentage of patients who were prescribed injections changed very little from Year 1 to Year 2 (from 22.2 percent to 21.4 percent in adults and from 11.9 percent to 12.9 percent in children). There was a wide range of site-to-site variation.

Results regarding antibiotic prescribing were more favorable, with a drop from 27.1 to 19.8 prescriptions per hundred visits in adults and from 45.8 to 27.1 in children in Year 1 and Year 2 respectively.

B. Conclusions

ARI in adults and children and cardiovascular disease and hypertension in adults are frequent reasons for visits to FGP physicians. There was a substantial decrease in the percentage of patients given antibiotics, which may be related to training provided by ZdravPlus. The rational use of drugs in treating hypertension increased, which may also reflect training and the educational efforts of the Karaganda Drug Information Center (DIC.)

There remain a large number of medications prescribed per patient and use of drugs with no proven effectiveness and low safety. Examples include vitamins, pancreatic enzymes, expectorants, Cinnarizine and Riboxin. Regarding the frequent use of vitamins, though generally benign, there is some risk from side effects, suppression of other essential nutrients, and displacement of other indicated therapies, such as vitamins in place of adequate iron dosing for anemia and vitamins in place of acid controlling medications in stomach disorders. Inappropriate use of vitamins also wastes precious health resources that could be put to more valuable use.

Educational efforts alone have not been effective in increasing generic drug use. There is a problematical trend towards the prescription of expensive, widely advertised, brand name medications, and reduction in the use of generic first line medications. This raises a concern that pharmaceutical advertising may be influencing prescribing habits, overriding educational efforts encouraging use of low cost generics, and decreasing the magnitude of rational pharmacotherapy. Attention will thus be needed to make it more practical to prescribe generics.

The Kazakhstan Essential Drug List does not perform optimally its function to promote the rational use of effective and safe drugs.

Regarding the frequent and increasing use of injections, educational efforts have not overcome the widespread preference among many adults for injections rather than pills and the belief on the part of many practitioners that injections are more effective.

While improvements were seen in the prescribing for cardiovascular disease and hypertension, there remains lots of room for improvement. Other highly prevalent diseases, including respiratory, digestive, and infectious diseases, also need much further effort to improve prescribing practices.

C. Recommendations

The findings of this research point to a number of recommendations which are directed to three potential audiences: the government; doctors and pharmacists; and the population.

The government and the Ministry of Health should encourage the use of generics and the EDL with policies which remove or decrease registration fees for generic products. Policy should support the production or importation of generics and of drugs from the EDL. Procurement should be limited to drugs on the EDL. Government and the Ministry of Health should support a review and revision of the EDL in order to make it consistent with evidence-based medicine as well as sensitive to the cost and local availability of medication. The work of the EDL committees must be coordinated with the writing of national treatment guidelines.

The government should subsidize certain medications that are strongly evidence-based but underutilized because of cost, including preparations with appropriate amounts of iron for anemia and inhaled corticosteroids for asthma. The reduction in later diseases and morbidity would produce long term savings.

Doctors' prescribing practices can be addressed with stepped-up education efforts directed towards reduction of the prescription of non-evidence-based vitamins, expectorants, cough medications and other non-effective ARI preparations, as well as the use of ineffective or less than optimal blood pressure medications. Because hypertension, ARI, and anemia are so prevalent, efforts to improve management of these conditions merit special attention because of their frequency and importance. In addition to educational efforts, managerial and regulatory strategies should be implemented in order to influence prescribing habits.

Efforts to reduce the number of medications prescribed and use evidence-based treatment guidelines need to be extended to specialists and academic medicine. It is difficult for primary care physicians who have received rational pharmaceutical management training to apply their knowledge in practice, when other—more prestigious—sectors of the health care system enforce other protocols and behaviors. The medical academies should teach and practice these same evidence-based principles.

Physicians should be encouraged to seek rational sources of information about medications to be prescribed, such as the DIC in Karaganda, rather than pharmaceutical advertising. Health workers at all levels of the system should be involved in the development of standard treatment guidelines, so they learn about evidence-based practices.

Pharmacy-therapeutic committees that would monitor clinical practices should be established in health facilities. Excellent practices could be identified, highlighted, and promoted to all. This would likely be more effective than the punitive approach so often practiced in systems inherited from the former Soviet Union.

Patients, too, have an important role to play in improving prescribing practices through educational efforts to avoid multiple prescriptions, unnecessary multivitamins, injections, and antibiotics, and to ask if a generic can be prescribed. Patient education materials with such messages can be distributed through health facilities, pharmacies, patient advocacy groups, and community health promoters. Mass media also should be utilized to disseminate these messages.

IV. Introduction

The ZdravPlus project, supported by the United States Agency for International Development (USAID), seeks to improve the quality and efficiency of health services in Central Asia, particularly at the primary health care level. Primary health care was under-developed in Soviet times, with most services provided in specialized facilities and heavy reliance on hospital care. In Kazakhstan, ZdravPlus has focused many of its efforts to strengthen primary health care in Karaganda Oblast in the central part of the country. In Karaganda, Satpaev, and Zhezkazgan cities, the project helped establish Family Group Practices (FGPs) which provide a range of primary health care services.

To improve the quality of care provided in FGPs, doctors there have received a number of short training courses to bring their practices into line with international evidence-based approaches. Among the courses provided were five-day courses on hypertension, covering diagnosis, treatment and formulary at the primary health care level; and two-week courses on Integrated Management of Childhood Illness (IMCI). IMCI is a program designed by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) to reduce the five key causes of death in children under age five worldwide: pneumonia, diarrhea, malaria, measles, and malnutrition. The five-day courses in hypertension have occurred over a period of several years. The IMCI trainings took place from May 2001 to May 2002 for the Karaganda physicians and in June and August, 2002 for the Zhezkazgan and Satpaev physicians.

In addition, ZdravPlus has worked in various ways to strengthen pharmaceutical activities in Kazakhstan, including assisting with the development of Essential Drug Lists (EDL) and formularies based on evidence, promoting generic drugs, training on procurement, and other topics. It has also conducted Rational Pharmaceutical Management training for primary health care doctors, including how to select drugs for a primary health care formulary and how to prescribe. ZdravPlus worked with the Karaganda Oblast Health Department to set up a Drug Information Center (DIC) to promote evidence-based decision-making by oblast authorities, health care providers, and the population. The DIC researches evidence-based information about pharmaceuticals, prepares and disseminates newsletters, helps develop pharmaceutical policy, trains health care providers, and educates the population, among other functions. One of the aims of the DIC is to reduce the inappropriate prescription of antibiotics for children, particularly in cases of acute respiratory infections (ARI). Another aim is to encourage health workers to reduce inappropriate use of injections for hypertensive outpatients and encourage treatment of hypertension as a chronic disease. Injections are commonly prescribed in the outpatient setting to control hypertension in adults, acute respiratory infections in children, and numerous other conditions.

Achieving rational drug prescription by physicians is an elusive goal in many countries of the world. In the USA, it is estimated that prescribing errors are responsible for 7,000 deaths annually¹. The US Food and Drug Administration has been charged with developing new schemes of drug prescription, reducing the confusion caused by similar names and packaging, and improving documentation. At the same time, more financing is to be made available for research to determine the mechanisms underlying medical mistakes. Experts hope that the measures taken by the government will reduce medical mistakes by 50 percent over five years². In Britain, investigation has shown errors in prescribing by general practice physicians. Mistakes were found in the selection of medications, dosages prescribed and over-use of brand names, rather than available generic medications³. This results in excessive cost as well as morbidity and mortality.

In Kazakhstan, as in most countries, trends in the drug prescription practices of family physicians reflect the way the healthcare system functions. Study of these patterns can help identify interventions to improve

¹ Clinton seeks to reduce medical errors, promote patient safety, CNN, February 22, 2000

² Physicians divided: Report of medical-error deaths on target or exaggerated? CNN, July 5, 2000

³ Buetow SA, Sibbald B, Cantrill JA, et al. Prevalence of potentially inappropriate long term prescribing in general practice in the United Kingdom, 1980-95: systematic literature review. *BMJ*, 1996, Vol. 313, pp.1371-1374.

the situation. It is known from previous research that the measurement of pharmacological indicators gives useful information about the level and status of the primary health care system.

There are other factors that also influence prescribing habits by primary care physicians. The foreign pharmaceutical industry has become very active in marketing medications to physicians and the population. Their recommendations often are not consistent with clinical guidelines for care, EDLs, or other indicators of rational prescribing practice. However, pharmaceutical advertising in the former Soviet countries is relatively new and it is not easy for physicians to develop a habit of questioning materials so persuasively presented.

Primary care physicians who have received training on international approaches to patient care also find that specialists and academic medical communities, who have not received such training, sometimes undermine them. Patients are sometimes told that the primary care physician's new prescribing methods demonstrate that she/he does not know how to prescribe properly.

The economy of providing generics compared to brand name medications is also not yet clear in Kazakhstan. When the registration process for pharmaceuticals does not offer an advantage to generic products, there are little or no savings to be passed on to the patient or the health system through their use. Abroad, the registration of generics is encouraged by either lower registration fees or free registration⁴. Often, generic products are not available at the local pharmacy, so a brand named product is the only practical choice under the circumstances. In addition, there are such a wide variety of medications, as well as multiple names for medications, making it difficult to determine what is generic and what is not.

During Soviet times and just after the collapse of the USSR, many useful drugs were not available in Kazakhstan. In more recent years the situation has changed. Now there is an abundance of drugs on the market, but not everybody can afford to buy the drugs they need. In this situation, rational drug use becomes more and more important.

It is generally accepted that reduction in the number of medications prescribed per visit, reduction of injections, and reduction in the use of antibiotics directly contribute to improved quality of care in the region by reducing problems with compliance, side effects, interactions, complications and cost.

This report contains the results of two surveys of routine prescribing practices of family physicians working in FGPs in three cities of Central Kazakhstan in 2000-2002, using reviews of medical records. The surveys sought to identify the most vulnerable points in the routine clinical practices of drug prescribing and to offer possible solutions on the PHC level to healthcare managers and health workers. They compared the medications prescribed over two time periods of one year each and provided data to assess the impact of ZdravPlus's programs on FGP physicians' drug prescribing practices. Based on the results, programs can be modified, or new interventions developed, to promote more rational pharmaceutical practices.

V. Methodology

Data collection for these surveys was undertaken in line with World Health Organization (WHO) and Management Sciences for Health guidelines. The indicators used to assess the FGP physicians' drug prescribing practices were taken from "How to Investigate Drug Use in Health Facilities"⁵ and from

⁴ Essential Drugs Monitor, No. 25-26 (WHO/DAP - WHO/EDM, 1988, p. 36), Managing Drug Supply: How to Develop and Implement a National Drug Policy (Second Edition) (WHO, 2001, p. 96)

⁵ How to Investigate Drug Use in Health Facilities, Selected Drug Use Indicators, WHO/DAP/93.1

“Rapid Pharmaceutical Management Assessment: An Indicator-Based Approach.”⁶ This material was adapted for use in Karaganda Oblast and some variables as to the names of pharmaceuticals and diagnoses were included (see Appendix 1).

The surveys looked exclusively at primary health care practices in FGPs and did not examine drug use in hospitals, specialized polyclinics, or other health facilities. They also did not collect data concerning the patients or the health facilities. All diagnoses were coded in accordance with the International Classification of Diseases⁷ and pharmaceuticals were coded using the WHO Anatomical Therapeutic Chemical⁸ index. For the purpose of analysis and data input, EpiInfo version 6.04b9 and EpiInfo 2002 were used.

The surveys collected data for two one-year periods: January to December 2000 (Year 1) and October 2001 to September 2002 (Year 2). The surveys were conducted in the cities of Karaganda, Zhezkazgan, and Satpaev and in two suburban pilot rayons (districts) of Karaganda city, Maikuduk and Yugo-Vostok. In each of these cities and rayons there are approximately 7-9 FGPs and, in each geographic area, four to seven FGPs were chosen at random. A total of 29 out of 36 PHC facilities were selected:

- Karaganda City—four FGPs
- Maikuduk—seven FGPs
- Yugo-Vostok—seven FGPs
- Satpaev—four FGPs
- Zhezkazgan—seven FGPs

In each FGP, 45 patient charts were chosen at random to review physicians’ prescribing practices. Data was collected for four groups of charts:

- Fifteen charts of adults with any diagnosis
- Five charts of adults with arterial hypertension
- Fifteen charts of children under age 14
- Ten charts of children under age five with ARI (none of the charts for children under 14 were included in this group.)

1,406 charts were reviewed in the first time period and 1,386 in the second time period. The numbers of charts reviewed, by group, were:

⁶ “Rapid Pharmaceutical Management Assessment: An Indicator-Based Approach,” Rational Pharmaceutical Management, Management Sciences for Health, Washington, DC, 1995.

⁷ International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, WHO, Geneva – 1992.

⁸ Anatomical Therapeutic Chemical (ATC) Classification Index with Defined Daily Doses (DDDs), WHO Collaborating Center for Drug Statistics Methodology, 1998.

⁹ Dean AG, Dean JA, Coulombier D, *et al.* (1994) *Epi Info*, Version 6.04. Centers for Disease Control and Prevention, Atlanta. van der Geest S, Whyte SR & Haradon A (1996) The Anthropology of Pharmaceuticals: a Biographical Approach. *Annual Review of Anthropology* 25, 153-178.

- For 2000, 451 adult charts with any diagnosis and, for 2001/2002, 435 adult charts
- For 2000, 177 charts for adults with hypertension and, for 2001/2002, 188 charts
- For 2000, 419 charts for children under age 14 with any diagnosis and, for 2001/2002, 435 charts
- For 2000, 359 charts for children under age five with ARI and, for 2001/2002, 328 charts.

In each chart, data collectors looked for information about the last visit to the doctor for treatment that ended with a prescription. If the last visit was a second or repeat visit, the data collectors used the notes made at the previous visit. Visits for preventive care, such as immunization or prenatal care, or for health “certificates” needed for employment or sports activities were not included. Charts with more than one diagnosis per visit were also excluded, since it was difficult to determine which medications were prescribed for which diagnosis.

The information from patient charts included: the patient’s age, gender, diagnosis, and the medications prescribed (drug name, its form, dosage, administration/how many times a day and quantity). The surveyors were given the current EDL of the Republic of Kazakhstan, a reference book of “Synonyms of Pharmaceuticals” by G.V. Shashkova et al.,¹⁰ and a copy of the International Classification of Diseases (ICD-10). In each case, the data collectors noted whether or not the prescribed medication was a brand name, an injectable, and on the EDL. In the charts of children with ARIs, data collectors recorded on the survey form not only any medications prescribed, but also the patient’s temperature and respiratory rate, since these are practices promoted in IMCI. In charts of adults with arterial hypertension, data collectors looked not only at medications but also at the notes of blood pressure readings, since this is a key practice taught in ZdravPlus’s hypertension training.

The data collectors were independent, experienced local physicians and pharmacists, instructed and supervised by ZdravPlus’s pharmaceutical specialist.

It is important to note that the prescription practices reported here do not necessarily accurately reflect doctors’ recommendations to their patients, since record-keeping is not always very precise. And of course, there is no assurance that patients will have followed the doctor’s recommendations and obtained the recommended medications.

VI. Findings and Discussion

The findings of the chart audits are presented as follows: first, the most frequent conditions found among adults, followed by the medications prescribed for adults. There is a particular focus on hypertension because of its association with cardiovascular disease, which is the leading cause of death in Kazakhstan. Then the most frequent conditions found among children under age 14 are discussed, along with the medications prescribed for that group. In Kazakhstan, management of respiratory infections in children under age five is a focus area, since they are a leading cause of death, so special attention was paid to management of these conditions. Afterwards, various indicators of rational pharmaceutical use are analyzed, specifically the number of medications prescribed, use of generic drugs and drugs from the Kazakhstan EDL, and use of injections and antibiotics.

¹⁰ Shashkova G, Lepakhin V, Kolesnikova G. Synonyms of Pharmaceuticals. Russian Center “Pharmedinfo,” Moscow, 2001.

A. Management of Common Conditions in Adults

The ten most frequent conditions treated among adults in the two time periods are shown in Table 1. Circulatory and respiratory diseases accounted for more than 50 percent of visits in both periods of study, followed by digestive disorders, hypertension, genito-urinary disorders and musculo-skeletal disorders. From the first to the second time period, hypertension and diabetes accounted for larger shares of all visits, while musculo-skeletal disorders accounted for a smaller share. There were large site-to-site variations in the frequency of hypertension, genito-urinary, and other circulatory diseases, but the causes of these variations are not apparent. In Year 2, the percentage of patients seen for diabetes doubled. It is not clear whether this reflects an actual increase in prevalence of diabetes, more visits per patient or other factors. No diabetes was identified in either year in charts selected for review in the city of Satpaev.

Table 1: Most Common Diagnoses in Adults (Percent of all Diagnoses in Adults)

Year 1		Year 2	
Category of Diagnosis	Percent N = 451	Category of Diagnosis	Percent N = 435
Circulatory except hypertension	28.4	Circulatory except hypertension	32.0
Respiratory	27.3	Respiratory	20.0
Digestive	9.1	Digestive	10.3
Musculo-skeletal & Connective Tissue	9.1	Hypertension	9.7
Genito-urinary	7.3	Genito-urinary	9.4
Hypertension	7.1	Diabetes	6.2
Anemia	3.3	Musculo-skeletal & Connective Tissue	5.1
Nervous system	3.3	Nervous system	3.9
Diabetes	2.9	Anemia	1.6
Skin and Subcutaneous	0.7	Skin and Subcutaneous	0.5

The types of medication most frequently prescribed to adults were cardiovascular, followed by non-steroidal anti-inflammatory, vitamins, antimicrobials, and expectorants, as can be seen in Table 2. There was little change in these categories from Year 1 to Year 2. Together they accounted for over 66 percent of the medications prescribed in both years.

Regarding cardiovascular medications, Enalapril has become the most often prescribed medication as it is useful for the common conditions of hypertension and congestive heart failure. Riboksin and Cinnarizine are cardiac and cerebrovascular medications with a theoretical basis, but not yet proven to be clinically effective for commonly seen cardiovascular conditions. They are also widely recommended by local cardiologists. Furosemide is used routinely in Kazakhstan for hypertension, even in the absence of congestive heart failure, although Hydrochlorothiazide or another thiazide diuretic would be better

evidence-based choices in most situations. Dipyridamole has very limited efficacy, but it is widely recommended by local cardiologists. Acetylsalicylic acid (Aspirin) is appropriately and frequently prescribed to reduce cardiovascular risk and as an anti-inflammatory and analgesic. However, cholesterol-lowering drugs, which have been clearly shown to reduce mortality and morbidity, were rarely used. Regarding antibiotics, the decreased prescription of Co-trimoxazole is of concern as it is an inexpensive and efficacious anti-bacterial for many common conditions seen in primary care. Vitamin C and other vitamin products were heavily used for many conditions, even though there is no scientific evidence for such widespread use.

Table 2: Drugs Most Frequently Prescribed for Adults (Percent of All Prescriptions)

Year 1		Year 2	
Drug	Percent N = 1,476	Drug	Percent N = 1,310
Acetylsalicylic acid	5.6	Enalapril	9.1
Isosorbide dinitrate	4.6	Acetylsalicylic acid	6.4
Enalapril	4.3	Isosorbide dinitrate	6.2
Riboksin	3.9	Cinnarizine	3.4
Vitamin C	3.5	Vitamin C	3.3
Multivitamins	3.5	Riboksin	3.2
Cinnarizine	3.3	Dipyridamole	2.9
Broncholitini	3.0	Atenolol	2.4
Co-trimoxazole	2.7	Paracetamol	2.2
Bromhexine	2.7	Furosemide	2.1

To investigate appropriate management of common adult conditions, the chart audits looked at management of respiratory infections, digestive and genito-urinary diseases, hypertension, and anemia. The results appear in Table 3.

For respiratory diseases, antibiotics were the most frequently prescribed medications (19.4 percent and 17.2 percent of prescriptions in Year 1 and Year 2), followed by expectorants and cough suppressants (21.3 percent and 13.9 percent), and vitamins (13.6 percent and 9.0 percent). Yet, according to the British National Formulary, “there is no evidence that any medicine can considerably ease expectoration.”¹¹ Because of that, expectoration medications were called “an expensive myth”¹² and their use is not rationally approved¹³. As in most medical systems, it will likely take diligent continuing education for physicians and the population to reduce the use of expectorants. These results suggest some progress is being made. It is encouraging that Paracetamol, an appropriate medication for symptom relief, has increased in use from 7.7 percent to 9.8 percent of prescriptions. Antibiotics are not appropriate for most

¹¹ BMA and the Royal Pharmaceutical Society of Great Britain, op cit, p 129

¹² Parish P. Medicines: A Guide for Everybody, (6th end, revised), London, Penguin, 1989, op cit, p104

¹³ Lowenstein, SR, and Parrino, TA. op. cit., p 221

respiratory infections and overall prescription fell somewhat. Notably, there were declines in the use of Gentamicin, an injectable antibiotic, seldom an evidence-based choice for primary care respiratory infections. However, the choice of antibiotic used over time is of concern because it shows that much of the decrease is from the recommended inexpensive first-line antibiotics Co-trimoxazole and Ampicillin (fell from 12.5 percent to 10.2 percent). Meanwhile the percentage receiving more expensive Ciprofloxacin remained unchanged. There is worldwide concern regarding resistance patterns to Ciprofloxacin, engendered by its overuse in situations where a first-line antibiotic, or no antibiotic, would be more appropriate. Ciprofloxacin would never be appropriate for this indication, regardless of cost or concerns for resistance.

For digestive and intestinal diseases, the antibiotic Metronidazole was the most frequently prescribed medication in both years. Famotidine, a histamine₂ receptor blocker (H₂-blocker) that reduces gastric acidity and is considered a drug of choice for peptic ulcer disease, was the second most prescribed medication in Year 1—but it dropped off the list in Year 2. Meanwhile, Omeprazole, an effective and powerful but more costly acid inhibitor of the proton pump inhibitor class, doubled in frequency of prescription to become the second most widely used medication during Year 2. This has significant cost implications. Multivitamins, which have no definite efficacy in intestinal disease, were also prescribed frequently. Meanwhile, prescriptions of antacids were very infrequent. It is also of concern that Metronidazole was the most prescribed medication in both years. It has three primary indications in digestive disease: diverticulitis, antibiotic-associated diarrhea, and peptic ulcer disease associated with *Helicobacter pylori*. However, when used alone for *Helicobacter*, it has a very low cure rate and promotes development of antibiotic resistance. It is unlikely that these three conditions together represented enough patient visits to support such frequent prescription of Metronidazole. Yet it is often recommended by local gastroenterologists for a wide range of digestive disorders. Domperidone, a relatively expensive anti-emetic, doubled in frequency of prescription. While this is a valuable medication, the level of use found in these surveys seems inappropriately high. A pancreatic enzyme combination (Festal) was commonly used both years. This category of medication is very widely used beyond its evidence base. Antispasmodics (Drotaverine and others) were also used, though there is scant evidence of their effectiveness.

For genito-urinary diseases, prescription of Ciprofloxacin, an expensive wide spectrum antibiotic, increased from Year 1 to Year 2, while use of Co-trimoxazole (Trimethoprim/Sulfamethoxazole), an inexpensive first line medication for treating urinary infections, decreased between the two time periods¹⁴. Nitroxoline, Nitrofurantoin, Furazidine, and Pipemidic acid are reasonable antibacterial selections. The increasing use of Ciprofloxacin and declining use of Trimethoprim/Sulfamethoxazole for genito-urinary problems is disturbing, because of the increasing resistance of organisms to Ciprofloxacin worldwide, as a result, in part, of frequent and inappropriate use. Enalapril became the most frequently used medication for genito-urinary disorders in Year 2. It is an evidence-based medication for treatment of hypertension and congestive heart failure possibly explaining its appearance at the top of the list of medications for genito-urinary disease which can occur as a complication of hypertension or congestive heart failure.

¹⁴ http://www.guideline.gov/summary/summary.aspx?ss=15&doc_id=2284&nbr=1510#s23 (Accessed 1 July 2004)

Table 3: Most Frequently Prescribed Drugs for Common Adult Conditions (Percent of all Prescriptions)

Respiratory		Digestive		Hypertension		Genito-urinary		Anemia	
Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
N=376	N=245	N=126	N=130	N=112	N=124	N=94	N=111	N=30	N=23
Broncholitini 11.2	Paracetamol 9.8	Metronidazole 14.3	Metronidazole 10.8	Enalapril 21.4	Enalapril 25.0	Nitroxoline 14.9	Enalapril 9.0	Multivitamins 20.0	Ranferon 17.4
Bromhexine 10.1	Bromhexine 8.6	Famotidine 7.9	Omeprazole 7.7	Furosemide 6.3	Hydrochloro- thiazide 12.1	Cyctenal 9.6	Nephritic composite 8.1	Ranferon 16.7	Vitamin C 13.0
Co- trimoxazole 8.8	Vitamin C 5.7	Festal 6.3	Domperidone 6.9	Cinnarizine 5.4	Acetylsalicylic acid 10.5	Nitrofurantoin 7.4	Furazidine 6.3	Ferroplex 13.3	Ferrum Gradument 8.7
Vitamin C 8.0	Co- trimoxazole 5.3	Vitamin C 5.7	Festal 6.9	Captopril 5.4	Atenolol 9.7	Multivitamins 7.4	Ciprofloxacin 5.4	Vitamin C 13.3	Sorbifer 8.7
Paracetamol 7.7	Broncholitini 5.3	Mesym forte 5.7	Drotaverine 6.9	Asparkam 4.5	Furosemide 4.0	Co- trimoxazole 7.4	Pipemidic acid 4.5	Gemsinerol 10.0	Ferrous Sulfate 8.7

For anemia, multivitamins were the most frequently prescribed medication in Year 1, with three iron-containing products and Vitamin C making up the rest of the five most frequent prescriptions. In Year 2, iron-containing products and Vitamin C represented the five most frequent prescriptions written. Vitamin C (Ascorbic acid) accounted for 13 percent of prescriptions written each year. Vitamin C increases the absorption of iron and is an appropriate medication to use for anemia, provided that iron is given simultaneously.

There is much reluctance to prescribe the simplest iron preparations, generic ferrous sulfate or ferrous sulfate plus Vitamin C, due to previous teaching and the allure of more expensive products, which sometimes contain smaller amounts of iron. This study shows that some progress is being made to reduce vitamin prescribing but there is still much room for improvement. The number one drug for Year 2 is Ranferon, a brand name combination iron/Vitamin C product. This must be very costly to the system and to consumers.

Management of Adults with Hypertension

Cardiovascular disease is the leading cause of mortality in Kazakhstan and is rising in frequency. As hypertension is a major contributing factor to cardiovascular morbidity and mortality and its proper treatment is known to reduce these adverse events, it is important that hypertension be recognized and properly treated. Therefore, ZdravPlus has sponsored trainings on hypertension for FGP physicians in Karaganda Oblast and made information on internationally recommended treatments available through the Karaganda DIC.

The chart reviews showed that prescription of first line medications (thiazide diuretics, beta-blockers, and ACE-inhibitors) increased slightly from 38.3 to 39.8 percent of prescriptions written. Use of Vinpocetine, Cinnarizine, Asparkam, and Riboksin (medications widely used in the Soviet era, with no well-established evidence basis) decreased from 14.7 percent to 12.6 percent of prescriptions written.

It is notable that use of Hydrochlorothiazide, a recommended first choice medication, has increased substantially, while use of Furosemide, which is not recommended for simple hypertension, has decreased. For a long time in Kazakhstan, Furosemide, a diuretic useful for heart failure and edema, has been widely used for hypertension, even in the absence of congestive heart failure or edema. This study shows a shift away from this practice and toward use of the recommended medication, Hydrochlorothiazide.

Beta-blockers are another category of first-line medication for hypertension. In Year 1, Propranolol was the most frequently prescribed, at 5.4 percent. In Year 2, Propranolol was less frequently prescribed (2.9 percent) but Atenolol increased from 4.1 percent to 5.9 percent. Atenolol is easier to use since it is effective when given once daily, while Propranolol requires 2-4 times daily dosing, so it is not as likely to result in good patient compliance.

Angiotensin Converting Enzyme (ACE) inhibitors are also effective medications for hypertension. From this category, Enalapril ranked as the most frequently used medication for hypertension in both Year 1 and Year 2. This popularity probably reflects habits of use, teaching, and advertising, as well as its appropriate use in certain subsets of hypertensive patients. Use of Nifedipine, another medication no longer recommended for general hypertension treatment, also decreased substantially. Nifedipine, a short-acting calcium channel blocker, effectively lowers blood pressure, but is not as safe as first line medications and does not have an evidence base proving its effectiveness in reducing mortality and morbidity. ZdravPlus training programs and the DIC advise against using Nifedipine as a primary choice medication. Cinnarizine is also a calcium channel blocker, popular in the past, but it lacks evidence-based studies to confirm its effectiveness.

The use of centrally-acting agents, Clonidine and Reserpine, decreased from 5.7 percent to 1.6 percent of prescriptions written. Clonidine and Reserpine, both widely used in the past, are also effective at lowering blood pressure, but their side effects' profile and lack of proof of mortality and morbidity reduction make them inappropriate for frequent use. These agents should be used only when there is a specific reason not to use a first line medication. The DIC provides information and advice on better choices.

Hypertensive patients also may benefit from aspirin¹ and from cholesterol-lowering statin medications² if their cholesterol is elevated. Aspirin was frequently prescribed in both years, but cholesterol-lowering medications were not used.

The shift toward medications included in international guidelines for treatment of hypertension is positive. This has been a specific focus of educational efforts by ZdravPlus for FGP physicians in the region over the past several years. It appears these physicians are making improved choices in use of medications for hypertension.

When measurement of the number of prescriptions per encounter is used to evaluate the quality of

prescribing in hypertension, it must be recognized that prescription of more than one antihypertensive medication is often appropriate and necessary in order to provide adequate control of hypertension. The number of prescriptions per visit for hypertension in this study remained steady at 3.3 in both years, which, while high, may be appropriate, as long as the medications were evidence-based. In this study, the use of appropriately selected medications increased between Year 1 and Year 2.

Another focus of training by ZdravPlus has been to reduce the use of injections and increase the use of generics and medications from the EDL. Yet use of injections increased somewhat, from 14 to 17 percent of cases, in the two years. And site by site analysis showed great variation and no effect that could be attributed to training or the DIC. Prescription of generics actually fell from 24 to 21 percent and medications from the EDL fell from 68 to 48 percent. These factors are discussed in the body of the report.

Table 4: The Most Frequently Prescribed Drugs for Adults with Hypertension (Percent of All Prescriptions for Adults with Hypertension)

Year 1		Year 2	
Drug	Percent N=592	Drug	Percent N=626
Enalapril	18.9	Enalapril	21.4
Cinnarizine	6.6	Acetylsalicylic acid	9.1
Acetylsalicylic acid	6.6	Hydrochlorothiazide	7.7
Nifedipine	6.4	Cinnarizine	7.3
Captopril	6.4	Atenolol	5.9
Furosemide	6.1	Isosorbide dinitrate	4.5
Propranolol	5.4	Nifedipine	3.5
Atenolol	4.1	Furosemide	3.2
Riboksin	3.7	Dipiridamole	3.0
Hydrochlorothiazide	3.5	Propranolol	2.9

1. European Society of Hypertension–European Society of Cardiology Guidelines Committee, Guidelines for the Management of Arterial Hypertension, J Hypertension 2003; 21: 1011–1053

2. The Seventh Report of the Joint National Committee on Identifying, Estimating, and Managing High Blood Pressure (USA), JNC – 7, General Description, Cardiology 2003; №8

B. Management of Common Conditions in Children Under Age 14

The conditions treated most frequently among children under age 14 in both time periods were respiratory disease, gastrointestinal disease, genito-urinary disease and anemia, as can be seen in Table 5. Together these conditions accounted for 84 percent of conditions treated in the first year and 89 percent the second year. The increased proportion of cases related to digestive and genito-urinary diseases is interesting, but has no explanation based on this study. It may reflect traditional diagnosis and treatment practices for children for which there is no support in evidence-based medicine.

Table 5: Most Common Diagnoses in Children Under Age 14 (Percentage of all Diagnoses in Children)

Year 1		Year 2	
Category of Diagnosis	Percent N = 419	Category of Diagnosis	Percent N = 435
Respiratory	74.2	Respiratory	66.9
Digestive	3.8	Genito-urinary	11.3
Genito-urinary	3.6	Digestive	8.3
Anemia	2.9	Anemia	2.5
Skin	2.9	Chicken pox	2.5
Musculo-skeletal	2.1	Nervous system	2.3
Ear	1.7	Skin	2.1
Hypertension	1.0	Rubella	1.1
Mumps	1.0	Eye	0.7
Other circulatory	1.0	Adverse birth outcome	0.5

Four groups of medications accounted for 72.2 percent of prescriptions in Year 1, as can be seen in Table 6: vitamins (multivitamins, Vitamin C, and others) accounted for 23.8 percent of prescriptions. (Note that the percentages in Table 6 may not add up to the percentages in the text because the table includes only the top 10 medications.) Expectorants, cough suppressants and bronchodilators (Travisill, Broncholitini, Bromhexine, Mucaltin and others) make up 17.4 percent of prescriptions. Antibiotics (Co-trimoxazole, Ampicillin, Furacillin and others) were also widely used, accounting for 17.3 percent of prescriptions. Analgesics and non-steroidal anti-inflammatory medications (Paracetamol and others) amounted to 13.7 percent. In Year 2 there was little change. Sixty-eight point three percent of prescriptions were in the same four groups: vitamins (20.6 percent); expectorants, cough suppressants, and bronchodilators (17.2 percent); antibiotics (16.2 percent); analgesics and non-steroidal anti-inflammatory medications (14.3 percent).

Table 6: Most Frequently Prescribed Medications for Children Under Age 14 (Percentage of all Prescriptions)

Year 1		Year 2	
Drug Name	Percent of Total Medications	Drug Name	Percent of Total Medications
	N = 1,326		N = 1,189
Multivitamins	13.3	Paracetamol	12.4
Paracetamol	12.1	Multivitamins	11.3
Vitamin C	10.1	Vitamin C	8.9
Co-trimoxazole	7.0	Angisept	6.1
Lincas	6.1	Bromhexine	4.1
Travisill	5.3	Co-trimoxazole	3.4
Broncholitini	4.2	Travisill	3.2
Bromhexine	3.5	Mucaltin	2.4
Ampicillin	2.8	Furacillin	2.4
Calcium gluconate	2.7	Ampicillin	2.1

As was the case for adults, prescribing practices for common conditions in children were also analyzed—in this case, respiratory infections, digestive/intestinal infections and anemia. These are shown in Table 7. For respiratory infections, vitamins made up 21 percent of prescriptions in Year 1 and just 16 percent in Year 2. Expectorants, cough suppressants, and antibiotics ranked after vitamins. The percentages of expectorants and cough suppressants prescribed during the first and the second year were 19.6 percent and 24.4 percent respectively. Out of the 10 most frequently prescribed medications, antibiotics made up only 7.9 percent in Year 1 and 6.8 percent in Year 2.

Vitamins are widely prescribed for respiratory infections, but are probably of little value in most cases. According to the British Medical Association, “Vitamin medications should not be used as a general stimulator to make a patient feel better as they do not do that.”¹⁵ The British guide for consumers of drugs and medicines points out that multivitamin pills have value mostly for their manufacturers¹⁶. Patients and the health system could save money by using resources spent for vitamins for more proven therapies. There are no medications with good evidence of effectiveness, compared to simple symptomatic advice: drink fluids, high humidity, use Paracetamol or Ibuprofen for pain or high fever. Even cough medications and expectorants have little support from evidence-based medicine. It is encouraging that the total number of prescriptions declined and the number of prescriptions for vitamins declined.

¹⁵ Henry, J (ed). The British Medical Association Guide to Medical and Drugs. London Dorling Kindersley, (2nd ed) 1991, p. 145

¹⁶ Cawson, R and Spector R. Drugs and Medicines: a Consumers’ Guide. Oxford, Oxford University Press, 1990, p. 105

Table 7: Most Frequently Prescribed Medications for Common Conditions in Children under 14, (Percent of all Medications for Children with these Conditions)

Respiratory		Digestive/Intestinal Infections		Anemia	
Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
(N=1,032)	(N=814)	(N=42)	(N=95)	(N=23)	(N=21)
Paracetamol 13.9	Paracetamol 17.0	Multivitamins 11.9	Multivitamins 21.0	Vitamin C 30.3	Multivitamins 28.6
Multivitamins 12.3	Angisept 8.9	Festal 11.9	Festal 12.6	Ranferon 21.7	Ranferon 19.0
Vitamin C 8.7	Vitamin C 8.5	Allohol 9.5	Cholagogue composite 6.3	Gemofer 21.7	Iron Sulfate 14.2
Co-trimoxazole 7.9	Multivitamins 7.9	Metronidazole 7.1	Aluminum Hydrate 4.2	Multivitamins 21.7	Vitamin C 14.2
Angisept 7.5	Bromhexine 6.0	Drotaverine 7.1	Allohol 4.2	Gemsineral 4.3	Sorbifer 9.6
Travisill 6.8	Travisill 4.6	Famotidine 7.1	Metronidazole 4.2		Feroplex 4.8
Broncholitini 5.3	Co-trimoxazole 4.0	Mesym-Forte 4.8	Cholosas 4.2		Totema 4.8
Bromhexine 4.4	Mucaltin 3.4	Rehydron 4.8	Omeprazole 3.2		Fenuls 4.8
Mucaltin 3.4	Furacillin 3.4	Paracetamol 4.8	Pyrenzepin 3.2		
Pinosol 3.2	Ampicillin 2.8	Aluminum/magnesium Hydroxide (Maalox) 2.4	Bismuth Salicylate Basic 3.2		

For treatment of digestive diseases, there was extensive use of vitamins and antibiotics. Oral rehydration salts, or no medication at all, is the indicated treatment for most intestinal infections. From Year 1 to Year 2, the use of oral rehydration salts (Rehydron) dropped from a low percentage to none at all. This may be due to the requirement by Sanitary Epidemiologic Service (SES) and other authorities and hospitals for hospitalization and treatment with antibiotics in cases diagnosed with diarrhea. It is encouraging, however, to see a drop in the use of Metronidazole, which should have a very restricted use. Pancreatic enzymes (Festal and Mesym Forte), digestive enzymes (Allohol), biliary expectorants (Cholosas and Cholagogue composite), and promotility agents (Domperidine) account for a significant percentage of pediatric prescribing. This level of use is not supported by evidence-based medicine, but these enzyme preparations are widely recommended by gastroenterologists.

For anemia, only five medications were prescribed in Year 1, while eight were used in Year 2. Out of all prescriptions in Year 1, 52.2 percent were vitamins (Vitamin C and multivitamins) and 47.8 percent were combined medications containing iron, vitamins and other minerals. During Year 2, the percentage shifted to 42.8 and 57.1 percent respectively. Since ferrous (iron) sulfate alone, or combined with Vitamin C, should be the product most used for anemia, it is encouraging to see increased use over the two time periods of pharmaceuticals that contain at least some iron. This may be attributed to educational efforts undertaken.

Management of Children under Age Five with Respiratory Infections

Integrated Management of Childhood Illness (IMCI) is a WHO and UNICEF program designed to reduce the five key causes of death in children under age five worldwide: pneumonia, diarrhea, malaria, measles, and malnutrition. ZdravPlus conducted IMCI trainings for 40 physicians in Karaganda Oblast between May 2001 and August 2002—a small number relative to the number of physicians whose charts were reviewed. The trainings in Zhezkazgan and Satpaev did not occur until near the end of the Year 2 chart review period, so their impact would probably not be seen in the Year 2 chart review.

The chart reviews showed several favorable changes occurring following training. One of the key results that ZdravPlus seeks to achieve through IMCI training is to reduce the use of antibiotics for young children with respiratory infections. Prescription of antibiotics decreased quite substantially, from 42.1 to 25.6 percent of cases between the two time periods, although there was a lot of unexplained variability between sites. Prescriptions for vitamin products fell from 20.0 to 14.0 percent of prescriptions for respiratory infections, while prescriptions for antipyretics rose from 17.5 to 23.0 percent of prescriptions, consistent with IMCI recommendations.

The number of prescriptions per visit decreased, most evidently in the sites with earlier IMCI training. The percentage of patients for whom five or more medications were prescribed dropped from 8.6 to 3.4 percent overall. In Year 1, all children received at least one prescription to treat ARI, but in Year 2, 4.3 percent of the patients were not prescribed any medications. This is a very favorable indicator and consistent with the advice given by the DIC and in training courses. The percentage of generics prescribed increased and the use of injections, while low, also grew, while there was no change in the frequency of selecting EDL drugs. Since IMCI does not address generics, injections versus oral medications, and EDL drugs, this is hardly surprising. The training is being modified to cover these topics.

IMCI also teaches basic medical examination techniques for sick children and the chart reviews looked at evidence of selected indicators from medical exams. Overall frequency of measurement of a sick child's respiratory rate increased from 81 to 94 percent and measurement of temperature increased from 81 to 96 percent of the young patients. Satpaev had 100 percent compliance with both parameters in the latter study period. This excellent compliance with medical examination parameters in Satpaev and Zhezkazgan may be due to prior ARI training supported by ZdravPlus, as well as chart audits conducted there in June, 2001, which checked these parameters in ARI cases. One of the purposes of the audit was to demonstrate to FGP physicians and medical authorities that well-designed chart audits often actually contribute to improved quality of care.

Table 8: Indicators of Appropriate Management of Children under Age Five with Respiratory Infections

	Year 1	Year 2
Prescriptions per Visit	3.3	2.7
Percent of Prescriptions for Generic Medications	35.6	40.0
Percent of Prescriptions from EDL	44.7	44.8
Percent of Prescriptions for Injections	5.8	8.2
Percent of Prescriptions for Antibiotics	42.1	25.6

C. Key Indicators of Rational Prescription Practice

The chart audits looked at a number of measures widely regarded as indicators of rational prescription practices. This analysis was undertaken using the general adult charts and the general children's charts. The results are summarized in Table 9 and discussed below.

Over-medication has long been a problem in Kazakhstan, so it is good news that the average number of prescriptions per visit fell from 3.3 to 3.0 for adults and from 3.2 to 2.7 for children between the two years. In Year 1, there were considerably fewer medications prescribed for both adults and children in Zhezkazgan and Satpaev, compared to the Karaganda City sites. Prescription of five or more medications per visit was also much lower in the cities of Zhezkazgan and Satpaev, possibly due to training in management of respiratory infections provided in those cities by ZdravReform, ZdravPlus's predecessor project, in the late 1990s. There was a sharper decline in the number of medications prescribed, however, at the Karaganda sites than in Zhezkazgan and Satpaev. There was a marked decline in the prescription of five or more medications per visit at the Karaganda sites, while there was little change in Zhezkazgan and Satpaev, which already had lower levels of prescribing. This could be the result of IMCI training for physicians at the Karaganda sites, along with the information and support provided by the DIC to physicians at those sites.

Table 9: Key Indicators of Rational Prescription Practice

	Adults		Children Under 14	
	Year 1	Year 2	Year 1	Year 2
Average Number of Prescriptions per Visit	3.3	3.0	3.2	2.7
Percent of Prescriptions for Generic Medications	26.1	24.1	34.6	30.5
Percent of Drugs from EDL	53.7	45.0	47.9	39.6
Percent Prescribed Injections	22.2	21.4	11.9	12.9
Percent Prescribed Antibiotics	27.1	19.8	45.8	27.1

Generic drugs accounted for 26 percent of prescriptions written for adults in Year 1 and this fell slightly to 24 percent in Year 2. Among prescriptions for children, the percentage getting generics also dropped, from 35 to 30 percent. However, overall prescription of generics in this study was very low compared with the international average of 64 percent (in the total population—all ages) in 17 countries.¹⁷ This is not surprising, since generics are new to the countries of the former Soviet Union. However, the specific reasons are not clear. It could be because of the low number of physicians trained in generic concepts. Or it could be due to outside factors that may make it difficult to change prescribing habits, for example, poor understanding of the advantages of generics, pricing structures that do not favor generics due to national pharmaceutical regulations, or promotion of brand name drugs.

Prescription of drugs included on the Kazakhstan EDL fell from 54 to 45 percent between Year 1 and Year 2 in the adult portion of the study and from 48 to 40 percent in the pediatric component. Again, the reasons for this are unclear, in light of efforts to educate physicians about the importance of using drugs on the EDL. Some possible explanations are that the EDL itself is not widely available, the medications on the list may not always be readily available or affordable, and/or specialists may recommend non-EDL

¹⁷ Pavin M., Nurgozhin T., Hafner G., Yusufy F., Laing R. Prescribing Practices of Rural Primary Health Care Physicians in Uzbekistan. *Tropical Medicine and International Health*, Vol. 8, No 2, pp 182–190, February 2003

medications, contradicting evidence-based information from sources such as the DIC and international guidelines. Prescription of EDL drugs was higher in Zhezkazgan and Satpaev cities than in most of Karaganda City in both years. This is probably because Zhezkazgan and Satpaev have had training courses on rational pharmaceutical use since 1995, while Karaganda physicians have had much less exposure to such training.

The rate of antibiotic prescription for adults fell from 27 to 20 percent in the two periods observed and, at all sites except Zhezkazgan, use of two or more antibiotics per visit decreased substantially. Maikuduk had the lowest level in the first study, at 17.2 percent, and reduced this further to 9.5 percent in Year 2, for reasons that are not clear.

Antibiotic prescription for children fell from 46 to 27 percent of patient visits between the two years and the proportion of children recommended two or more antibiotics decreased from 4.8 percent to 0.7 percent. Antibiotic use in children declined markedly for treatment of respiratory infections and gastrointestinal diseases, which were important focus areas in IMCI training.

The reduction in antibiotic prescriptions, both for adults and children, as well as the decrease in use of multiple antibiotics is encouraging. Multi-pronged efforts by ZdravPlus to educate primary care doctors and pharmacists on more rational antibiotic use may have contributed to these trends.

The percentage of patients given injections hardly changed in the two-year period of the study. Among adults, it went from 22 to 21 percent and, among children, from 12 to 13 percent. There was considerable variation across sites, however. Satpaev and Zhezkazgan had the highest rate of injection use, but it is not clear why. At two of the three Karaganda sites, the rate of injections dropped over the two years, but at the other site it increased. This could be due to patients asking for injections; the common belief among physicians that injections are better; or other reasons.

VII. Conclusions and Recommendations

This study reviewed prescribing practices of primary health care physicians over two one-year periods between 2000 and 2002.

A. Prescription Practices for Adults

In adults circulatory and respiratory diseases were the most common conditions seen during both years. The most frequent medications were those in the cardiovascular category.

For respiratory infections, many expectorants, bronchodilators, cough suppressants, and vitamin preparations were prescribed both years, though the number did drop in the second year of the study. Very favorably, antibiotic use fell slightly, and there was a specific drop in the use of injectable Gentamicin. It will take many years of repeated efforts to overcome habits of prescription of non-evidence-based products and to further improve the use and choice of antibiotics.

For digestive disease, Metronidazole remained the most used medication both years, but it is encouraging that the percentage of prescriptions fell somewhat. Although it is appropriate for some digestive conditions, its pattern of use generally has not fit evidence-based guidelines, so the reduction in use may be in part due to the information received from the DIC. The use of inexpensive H2 antihistamine acid blockers such as Famotidine fell, while the use of effective but more expensive medications, Omeprazole and Domperidone, increased. This could reflect proprietary drug promotion to primary care physicians and narrow-specialists. With a limited health care budget, a cost/benefit analysis would be useful to determine whether the use of the more expensive medications is justified. For anemia the prescribing pattern improved somewhat, but there is still a great need for continued emphasis on simple iron preparations and Vitamin C.

The hypertensive component of the study revealed a definite trend to improved prescribing habits with an increase in the use of thiazide diuretics. Beta-blocker and ACE-inhibitor usage remained stable. These three categories are most supported by evidence-based medicine and promoted by the DIC. Use of Furosemide, short-acting calcium channel blockers, and centrally acting agents fell, as encouraged by the DIC.

B. Prescription Practices for Children

In children, there was an increase in the number of charts with digestive and genito-urinary diagnoses between the two years. The explanation is not clear. Primary categories of medication did not change substantially. There was a slight decrease in the percentage of patients prescribed vitamins and antibiotics.

In respiratory infections, Paracetamol was appropriately the most used medication and its use increased somewhat between Year 1 and Year 2.

In the treatment of digestive diseases, there was still very heavy use of multivitamins, pancreatic and digestive enzymes, biliary expectorants, and antibiotics. It is difficult to change the pattern in primary care prescribing, when specialists and hospitals promote non-evidence-based patterns of care.

For anemia, there was an increase in the prescription of preparations that contain some iron. The effort by the DIC and training programs to promote the most efficacious products for treatment of anemia must continue in order to overcome longstanding habits of prescribing ineffective products. Multivitamins remain widely prescribed. The small numbers of charts identified for diagnosis of anemia, compared with the known high prevalence of disease suggests under-recognition of this disorder in clinical practice.

In the management of respiratory diseases in children under age five, the study revealed a decrease in antibiotic prescriptions from 42 to 25 percent, consistent with the teaching in training courses and support from the DIC. There was also an encouraging drop in the numbers of children prescribed five or more medications for ARIs. In Year 2, 4.3 percent of patients received no prescriptions at all.

Regarding key indicators in the overall study, the reductions in medications per visit and in the use of antibiotics are encouraging. They coincide with educational efforts to decrease the number of medications prescribed. Except in certain groups (see box on ARIs), increasing the prescription of generics remains an elusive goal in Kazakhstan. Use of medications from the EDL actually fell from Year 1 to Year 2, while use of injections increased.

C. Recommendations

The findings of this research point to a number of recommendations. These are presented in terms of three potential audiences: the government; doctors and pharmacists; and the population.

The government and the Ministry of Health should encourage the use of generics and the EDL, by developing and implementing policies promoting these drugs. Registration fees should be removed or decreased for generic products and the production or importation of generics and EDL products should be encouraged, rather than discouraged. The EDL should be reviewed for consistency with evidence-based medicine and for the cost and local availability of medications. It would also be useful to calculate the costs of various prescription practices to clarify the possible benefits of using generics. The EDL committee should work together with those groups creating national treatment guidelines. Procurement should be limited to drugs on the EDL.

Certain medications that are strongly evidence-based should be subsidized by the government in order to promote their use. Examples are preparations containing adequate iron for anemia and inhaled corticosteroids for asthma. This could produce long term savings by preventing disease. On the other hand, medications which are unsafe and ineffective should be withdrawn from the market. Irrational medications, such as certain vitamin combinations and combination bronchodilator drugs, should have any government subsidy or support removed, except for use in specific situations where efficacy is

proven. Managerial interventions to control prescribing or community campaigns to discourage use could also be implemented.

To help promote improved prescribing practices among doctors, it would be valuable to better understand current prescribing practices. One approach would be to benchmark and replicate excellent practices. For example, the physicians of Maikuduk appear to have better antibiotic prescribing patterns than other communities. Maikuduk could be investigated more closely to see if antibiotics are really being prescribed appropriately and if the prescriptions are being filled and used. If so, benchmarking could be applied to Maikuduk, which had low initial antibiotic usage in Year 1 and reduced that still further—and quite substantially—in Year 2. The aim would be to investigate how it came to be that Maikuduk has this favorable pattern and see if similar results can be produced elsewhere. Another approach would be to examine irrational prescription practices, by studying the reasons for these practices.

In terms of improving doctors' prescribing practices, stepped-up educational efforts are needed to reduce prescription of medications such as non-evidence-based vitamins, expectorants, and other non-effective ARI preparations, as well as the use of ineffective or less than optimal blood pressure medications. Proper management of hypertension, ARI, and anemia merit special attention because of their frequency and importance. Managerial and regulatory programs must also be implemented to promote evidence-based prescribing practices. The finding of extensive use of vitamins alone in treatment of anemia provides a potential focus for future educational efforts, as ferrous sulfate by itself, or with Vitamin C, should be the product most used for anemia. Moreover, widespread use of vitamin products contributes to the overall large number of medications prescribed. Although it is widely believed that vitamins are harmless there is, in fact, some risk of harm. Vitamin overuse can cause deficiency of other essential nutrients, and large doses of minerals, fat-soluble vitamins and some water-soluble vitamins are toxic¹⁸. In addition, valuable health resources are wasted.

Efforts to reduce the number of medications prescribed need to be extended to specialists. Educating primary health care physicians is not sufficient to change their practices. It is difficult for primary care physicians who have received rational pharmaceutical management training to apply their knowledge in practice, when other sectors of the health care system enforce other protocols and behaviors. Examples are: the hospitalization and use of antibiotics for children with diarrhea, the extensive use of medications such as pancreatic enzymes, vitamins, and antibiotics to treat simple self-limited gastrointestinal infections in children, and the use of injections to treat hypertension. Specialists and hospital staff need to learn about the use of generics, the EDL, injections, and antibiotics.

Physicians should be encouraged to seek rational sources of information about medications to be prescribed, such as the DIC in Karaganda, rather than pharmaceutical advertising. It would be helpful, too, to involve health workers at all levels of the system in the development of standard treatment guidelines, so they learn about evidence-based practices. The DIC needs to adopt more pro-active strategies for reaching doctors, by adopting some of the marketing strategies of the pharmaceutical industry. This strategy involves taking a popular advertisement and teaching doctors and pharmacists how to evaluate it with a critical eye.

It would be valuable also to establish pharmacy-therapeutic committees that would monitor clinical practices in health facilities. Proper training, and then monitoring, of such an effort would be necessary in order to assist them to become effective and sustainable. Such a committee should find the best examples of prescribing practices and encourage others to meet these high standards, rather than adopting a punitive approach, as is so often practiced in the system inherited from the former Soviet Union.

Patients, too, have an important role to play in improving prescribing practices. They need to be educated to avoid multiple prescriptions, unnecessary injections and antibiotics and to ask for generic drugs when they are available. Patient education materials with such messages can be distributed through health

¹⁸ Chemical Market Review, 8 Oct 1984

facilities, pharmacies, and a host of other channels, as well as information disseminated through mass media. A program of trained community health promoters and community health educators could also help in this effort. This could perhaps be done in cooperation with the Community Healthy Lifestyle Centers.

Appendix 1

PRESCRIBING INDICATOR FORM

Date (m/d/y) ___/___/___ Investigator : _____ Group [Pediatric] [ARJ] [Diarrhea] [Hypertension] [[Adult]

FGP _____ District [Karaganda] [Maikuduk] [Yugo-Vostok] [Satpaev] [Zhezkazgan]

Last name: _____ Name: _____ DOB: (m/d/y) ___/___/___

Gender [male] [female]

Date of visit. (m/d/y) ___/___/___ Diagnosis: _____ ICD: ___-___-___

	Drugs	ATC	Injection	Generics	Antibiotics	EDL
1						
2						
3						
4						
5						
6						
8						
9						
10						
TOTAL						

Temperature checked

[yes]
[no]

Respiratory rate checked

[yes]
[no]

Dehydration checked

[yes]
[no]

Blood pressure checked.

[yes]
[no]