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# PROJECT REPORT: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

January 2010



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## TABLE OF CONTENTS

<a href="#">List of Acronyms</a> .....	iii
<a href="#">Executive Summary</a> .....	1
<a href="#">Background</a> .....	5
<a href="#">Objectives</a> .....	6
<a href="#">Methods/Intervention</a> .....	6
<a href="#">Figure 1</a> .....	7
<a href="#">Results</a> .....	9
<a href="#">Summary Table 1</a> .....	10
<a href="#">Discussion</a> .....	11
<a href="#">Figure 2</a> .....	12
<a href="#">Summary Table 2</a> .....	13
<a href="#">Figures 3, 4</a> .....	14
<a href="#">Figures 5, 6</a> .....	15
<a href="#">Conclusions</a> .....	16
<a href="#">References</a> .....	17
<a href="#">Annex 1 – Data Tables</a> .....	19
<a href="#">Annex 2 – Study Protocol</a> .....	69
<a href="#">Annex 3 – Database Information</a> .....	78

## LIST OF ACRONYMS

AM	Antimicrobial
CIS	Commonwealth of Independent States
CRF	Case report form
DE	Distance Education Program on Antimicrobial Therapy
DQI	Drug Quality and Information Program implemented by U. S. Pharmacopeia
<i>Guide</i>	<i>Practical Guide on Anti-infection Chemotherapy</i>
IAC	Institute of Antimicrobial Chemotherapy
USAID	United States Agency for International Development
USP	United States Pharmacopeia
USP-NF	United States Pharmacopeia-National Formulary
WHO	World Health Organization

**PROJECT REPORT**  
**IMPACT OF EDUCATIONAL PROGRAMS ON PRESCRIBING PATTERNS OF**  
**ANTIMICROBIAL MEDICINES IN MULTIDISCIPLINARY HOSPITALS**  
**IN DIFFERENT REGIONS OF RUSSIA**

**EXECUTIVE SUMMARY**

The United States Pharmacopeia Drug Quality and Information (DQI) Program, supported by the U.S. Agency for International Development (USAID), since 2000 has assisted Russia develop approaches to reduce antimicrobial resistance. Projects included development of the *Practical Guide on Anti-infection Chemotherapy* and development and implementation of the Distance Education Program on Antimicrobial Therapy (DE). The *Practical Guide on Anti-infection Chemotherapy (Guide)* provides useful information on different groups of antimicrobial agents as well as the rational treatment of major infectious diseases, such as tuberculosis, HIV/AIDS, sexually transmitted diseases, and others. It also provides data on antimicrobial resistance and patterns of antimicrobial prescribing in healthcare facilities in Russia. Over the past 10 years, three editions of the *Guide*—a total of 95,000 copies—have been developed, published, and disseminated to healthcare professionals in Russia and in the Commonwealth of Independent States (CIS).

In 2002 DQI began implementing the Distance Education Program on Antimicrobial Therapy. Approximately 400 healthcare professionals from Russia and CIS have successfully completed the course thus far.

The objective of this study was to determine what impact the use of the *Practical Guide on Anti-infection Chemotherapy (Guide)* and implementation of the Distance Education (DE) Program have had on antimicrobial (AM) prescribing practices of physicians in in-patient healthcare facilities in Russia.

To learn more about how these two tools were used, the authors conducted a multicenter prospective-retrospective study. Sixteen Russian clinics (Centers) situated in twelve different regions participated in the project. The Centers were divided into four categories:

1. Both the *Practical Guide on Anti-Infection Chemotherapy* and the Distance Education Program were implemented;
2. Only the Distance Education Program was implemented;
3. Only the *Practical Guide on Anti-Infection Chemotherapy* was implemented; and,
4. Control group, where neither the *Practical Guide on Anti-Infection Chemotherapy* nor the Distance Education Program was implemented.

A two-part pharmacoepidemiologic<sup>1</sup> study conducted in participating Centers reviewed prescribing patterns during a two-week period in 2003 and again in 2009. The first part, the retrospective, focused on prescribing trends before the implementation of the DE and the *Guide* (2003); the second part, the prospective, examined prescribing patterns after the interventions, e.g., DE and/or *Guide* or control group with no interventions (2009). We selected the departments at each Center whose in-patients consumed the most AM medicines; we then trained each Center's staff on how to retrieve case histories containing AM-prescribing and record the data for the inquiry period. During the evaluation, we considered the following questions:

1. Was antimicrobial therapy/prophylaxis necessary?
2. Was the choice of antimicrobials appropriate to the recommended standard treatment protocols/guidelines?
3. Were the dosage regimen and antimicrobial route of administration appropriate?

The total number of Case Report Forms (CRFs) collected for 2003 and 2009 was 1,910 and 1,917, respectively; after data processing, the number of CRFs totaled 3,204—1,521 for 2003, and 1,683 for 2009.

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<sup>1</sup> **Pharmacoepidemiology** can be defined as the study of the utilization and effects of drugs in large numbers of people. For detailed information, visit the International Society for Pharmacoepidemiology: <https://www.pharmacoepi.org/index.cfm>.

A rationality assessment for the most frequent indications showed AM prescription improvement in each of the three groups of Centers where educational programs were implemented, as opposed to the control group where no educational interventions were conducted.

Thus, in **Group #1** (*Guide* and DE Program)—Vladivostok Center #1, Vladivostok Center #2, Tyumen, and Moscow Center #4)—adequate prescriptions increased 42.0%, 22.0%, 11.1%, and 25.0%, respectively. At the same time, non-adequate prescriptions decreased 46.7% for inappropriate use of metronidazole, ciprofloxacin, and amikacin for community-acquired pneumonia; and 57.0% for incorrect administration of ampicillin and amikacin for infected burns.

For **Group #2** (DE program only), the increase in rational AM administrations was 14.1% in Krasnoyarsk, 32.3% in Komsomolsky, 29.0% in Moscow Center #7, and 73.3% in Samara Center #8. Irrational AM administrations decreased 32.3% for use of gentamicin and ciprofloxacin for community-acquired pneumonia, and 73.3% for cefazolin, nitrofurantoin, and nitrofurantoin for pyelonephritis.

**Group #3** (*Guide* only) showed a rise in adequate prescriptions of 53.5% in Bryansk, 75.0% in Perm, 42.9% in Smolensk, and 73.1% in Ufa. There was a concurrent decrease in non-adequate AM administrations of 75.0% for irrelevant prescription of cefazolin, metronidazole, ciprofloxacin, amikacin for community-acquired pneumonia; 42.9% of ciprofloxacin and streptomycin for community-acquired pneumonia; and, 76.9% of cefazolin, ampicillin/oxacillin, and gentamicin for urolithiasis.

In the **control group**, a reduction in the percentage of adequate prescriptions was marked in Nizhniy Novgorod (6.0%), Samara (3.9%), and Yaroslavl (2.1%). At the same time, the weight of non-adequate AM administrations of ciprofloxacin and metronidazole for community-acquired pneumonia increased in Nizhniy Novgorod, as did ampicillin for infected burns in Samara, and cefazolin and clindamycin for sinusitis in Yaroslavl. The percentage of irrational prescriptions in Chelyabinsk was 50.0% in 2009.

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

Based on study results, in general, antimicrobial prescribing patterns shifted to a more rational model in 2009 as compared to 2003.

In every Center where educational interventions were conducted, an increase in rational AM prescriptions and a decrease of non-adequate antimicrobials prescriptions was observed in 2009 as compared with 2003. At the same time, in three Centers of the control group, adequate antimicrobial prescriptions decreased in 2009 from 2003, and in two Centers non-adequate AM prescriptions increased in 2009 from 2003.

Both the *Practical Guide on Anti-infection Chemotherapy* and the Distance Education Program on Antimicrobial Therapy are effective tools to improve antimicrobial prescribing patterns in hospitals. Wider application of these interventions would further improve rational antimicrobial prescribing in Russia.

## PROJECT REPORT

### Background

Since the introduction of penicillin in the 1940s, antimicrobial medicines have played a major role in the efficient control of infectious diseases, especially those caused by bacteria.

Antimicrobials are a unique class of medications, as their activity decreases with time due to the emergence of resistance in bacterial and other microbial pathogens (fungi, viruses and protozoa).

The current growth and spread of antimicrobial resistance presents a major problem to health authorities globally [1-3]. Trends now indicate that antimicrobial resistance is developing at 10 times the rate of antimicrobial development; consequently, morbidity, mortality and economic costs [4-5] are also increasing. Recent studies reveal a high frequency of irrational antimicrobial use characterized by unnecessary prescribing of and inappropriate selection, dosing, and/or treatment duration with antimicrobial medicines. Imprudent and inappropriate use of antimicrobials is a primary cause of antimicrobial resistance [7-10]. Educational interventions—with interactive educational programs apparently more effective than didactic lectures [11-12]—may successfully change prescribing patterns.

The United States Pharmacopeia Drug Quality and Information (DQI) Program, supported by the U.S. Agency for International Development (USAID), since 2000 has assisted Russia in developing approaches to reduce antimicrobial resistance. Projects include development of the *Practical Guide on Anti-infection Chemotherapy* and development and implementation of the Distance Education Program on Antimicrobial Therapy (DE). The *Practical Guide on Anti-infection Chemotherapy* provides useful information on different groups of antimicrobial agents as well as the rational treatment of major infectious diseases, such as tuberculosis, HIV/AIDS, sexually transmitted diseases, and others. It also provides data on antimicrobial resistance and patterns of antimicrobial prescribing in healthcare facilities in Russia. Over the past 10 years, three editions of the *Guide*—a total of 95,000 copies—have been developed, published, and disseminated among Russian and CIS healthcare professionals.



In 2002 DQI, together with Smolensk State Medical Academy, Vladivostok Drug Information Center, and other partners, began implementing the Distance Education Program on Antimicrobial Therapy. Approximately 400 healthcare professionals from Russia and CIS have successfully completed the course thus far.

The Institute of Antimicrobial Chemotherapy (IAC) within Smolensk Medical Academy has been the lead organization on this project. The IAC was a coordinating site for creation of all three editions of the *Practical Guide on Anti-infection Chemotherapy*, and IAC employees developed more than 50% of the materials for the *Guide*. IAC has also been a leader in the Distance Education project, having coordinated establishment of the regional education centers and supervising their operation.

## **Objectives**

The objective of this study was to determine what impact the use of the *Practical Guide on Anti-infection Chemotherapy (Guide)* and implementation of the Distance Education (DE) Program have had on antimicrobial (AM) prescribing practices of physicians in selected in-patient healthcare facilities in Russia.

## **Methods/Intervention**

To learn more about how these two tools were used, the authors conducted a multicenter prospective-retrospective study. Sixteen Russian clinics (Centers) situated in twelve different regions of the country participated in the project ([Figure 1](#)). The sites were selected according to the following criteria:

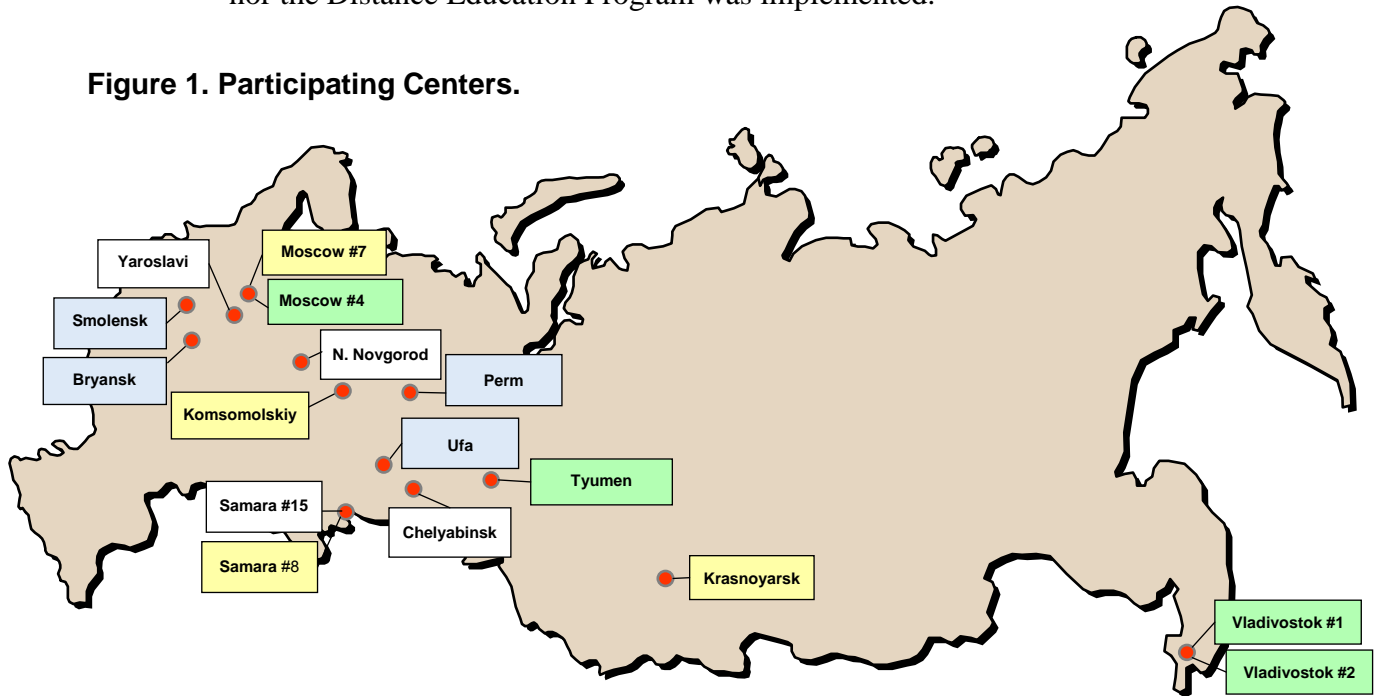
1. Intensive antimicrobial use in the healthcare facility;
2. Healthcare facility staff available to conduct the study at any given site;
3. Ability to enter data from case history directly to on-line database; and,
4. For study groups only, distribution of *Practical Guide on Anti-infection Chemotherapy* and/or implementation of Distance Education Program.

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

The Centers were divided into four categories:

1. Both the *Practical Guide on Anti-Infection Chemotherapy* and the Distance Education Program were implemented;
2. Only the Distance Education Program was implemented;
3. Only the *Practical Guide on Anti-Infection Chemotherapy* was implemented; and,
4. Control group, where neither the *Practical Guide on Anti-Infection Chemotherapy* nor the Distance Education Program was implemented.

Figure 1. Participating Centers.



Centers by category			
Group #1 Received Guide and participated in Distance Education Program	Group #2 Participated in Distance Education Program <i>only</i>	Group #3 Received Guide <i>only</i>	Control Group #4 Did not receive <i>Guide</i> or participate in Distance Education Program
Moscow #4	Komsomolskiy	Bryansk	Chelyabinsk
Tyumen	Krasnoyarsk	Perm	N. Novgorod
Vladivostok #1	Moscow #7	Smolensk	Samara #15
Vladivostok #2	Samara #8	Ufa	Yaroslavl

A two-part pharmacoepidemiological study was conducted in participating Centers. In Part I of the study, coordinators reviewed prescribing patterns in each hospital department included in the study for a two-week period during the first quarter of the year 2003 (Jan. 1–Mar. 31, 2003). This review focused on prescribing trends before the implementation of the DE Program and the *Guide* (2003, retrospective).

The second part reviewed prescribing patterns after the interventions, e.g., DE Program and/or *Guide* or control group with no interventions (2009, prospective). In Part II, we reviewed prescribing patterns in those same departments during the corresponding time period in 2009. (See Sections 4.1.2 and 4.2.2., Study Scheme, of the Study Protocol ([Annex 2](#)) for details.)

The Study Protocol and Case Report Form (CRF) were developed and ethical clearance was obtained (Annex 2-English version). We selected the departments at each Center whose in-patients consumed the most AM medicines, and then trained each Center's staff on how to retrieve all case histories containing AM-prescribing and how to record the data for the inquiry period. We collected each patient's demographic data (gender, age), specialty of the doctor who prescribed the AM, date of patient's admission to the hospital, diagnosis<sup>1</sup>, pre-existing and co-morbid conditions, date of discharge, reasons for AM administration (prophylaxis or therapy) and AM discontinuation, AM regimen, AM trade and INN names, dosing regimen, route of administration, duration of therapy, and outcome.

The data were analyzed using a specially-designed database developed through Microsoft Windows, ASP.NET 2.0, Microsoft SQL, and Microsoft Visual Studio; the statistical report was generated by an SAS Institute Program Package. (Details are provided [Annex 3](#).)

In evaluating the data, we considered the following questions:

1. Was antimicrobial therapy/prophylaxis necessary?

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All the diagnoses were covered by *Practical Guide on Anti-Infection Chemotherapy* and the Distance Education Program.

2. Was the choice of antimicrobials appropriate to the recommended standard treatment protocols/guidelines?
3. Was the dosage regimen and antimicrobial route of administration appropriate?

## Results

The total number of CRFs sent to IAC for 2003 and 2009 was 1,910 and 1,917 respectively; after processing the data, the total number of CRFs included was 3,204: 1,521 for 2003 and 1,683 for 2009 ([Table 3](#)).

Most patients were from surgical units, with the exception of those from Komsomolsky and Ufa Centers; their patients were from the therapy unit and the intensive care unit (ICU), respectively. In 2009, 51% of patients from the Samara Veteran's Center were from the therapy unit. A unit profile, patient demographic data, data on hospitalization type and duration, and information about previous antimicrobial chemotherapy are represented in [Table 4](#), [Table 5](#), [Table 6](#), [Table 7](#), [Table 8](#), and [Table 9](#).

We analyzed CRFs with the following disease conditions:

1. Respiratory tract bacterial infections (community-acquired pneumonia): patients from Vladivostok Center #1, Krasnoyarsk, Komsomolskiy, Bryansk, Perm, Smolensk and Nizhniy Novgorod.
2. Burns: patients from Tyumen and Samara Center #15.
3. Surgery on female upper genital tract (perioperative prophylaxis): patients from Moscow Centers.
4. Infections from abdominal surgery and perioperative prophylaxis: patients from Vladivostok Center #2 and Chelyabinsk.
5. Urinary tract infections (pyelonephritis bacterial, complicated or uncomplicated): patients from Samara Center #8 and Ufa.

These disorders were selected because they are the conditions for which AMs are most frequently prescribed and because their treatment regimens are included in both the *Guide* and Distance Education Program ([Table 15](#)).

The most commonly used antimicrobials varied by hospital Center and, often, by year. For example, in Vladivostok Center #1, the most popular AM used in 2003 was cefotaxime (18%); in 2009, it was levofloxacin (18.1%). The data on the most commonly used AMs by Center, by year, is outlined in [Summary Table 1](#) (below). Data on in-patient antimicrobial chemotherapy for each of the four groups of Centers are shown in [Table 10](#), [Table 11](#), [Table 12](#) and [Table 13](#).

**Summary Table 1. Most used antimicrobial medicines by Center, 2003 and 2009**

Center	Most used AM in 2003 (n/%)	Most used AM in 2009 (n/%)
Vladivostok Center #1	cefotaxime (31/18.0%)	levofloxacin (22/18.1%)
Vladivostok Center #2	cefazolin (64/29.8%)	cefazolin (20/21.7%)
Tyumen	cefotaxime (75/33.4%)	cefotaxime (53/29.1%)
Moscow Center #4	cefazolin (58/45.0%)	ampicillin/sulbactam (29/36.7%)
Krasnoyarsk	cefotaxime (37/17.1%)	ceftriaxone (72/35.6%)
Komsomolsky	ampicillin (53/60.9%)	ampicillin (27/26.7%)
Moscow #7	cefazolin (27/27.6%)	ceftriaxone (71/36.6%)
Samara #8	ampicillin (57/28.6%)	amoxicillin/clavulanate (20/26.0%)
Bryansk	benzylpenicillin (24/27.6%) gentamicin (24/27.6%)	ampicillin (41/21.9%)
Perm	cefazolin (72/25.8%)	cefazolin (78/29.3%)
Smolensk	ampicillin (45/25.3%)	cefazolin (44/24.4%)
Ufa	gentamicin (61/21.8%)	cefotaxime (89/17.1%)
Chelyabinsk	ampicillin (42/25.6%)	cefotaxime (49/23.7%)
Nizhniy Novgorod	cefotaxime (26/30.6%)	ceftriaxone (64/58.2%)
Samara #15	ampicillin (69/34.0%)	cefazolin (61/35.0%)
Yaroslavl	ampicillin (33/25.0%)	ceftriaxone (42/26.4%)

Parenteral (intravenous, intramuscular) route of administration for AMs predominated in all Centers with the exception of Samara, where the oral/parenteral ratio was 2.5/1 ([Table 14](#)).

The most common mistakes made in AM therapy were administration of gentamicin, metronidazole, ciprofloxacin, amikacin, and cefazolin for community-acquired pneumonia; use

of an old and non-effective combination of ampicillin and oxacillin, which should not be used at all for any infectious disease; cefazolin and kanamycin use for cholelithiasis (gallstones in the biliary tract); ampicillin and amikacin use for infected burns; cefazolin use for surgery on the upper female genital tract (adnexitis); cefazolin, nitrofurantoin, and nitrofurantoin use for pyelonephritis (urinary tract infections). Evaluation of antimicrobial therapy/prophylaxis for the most frequent diagnoses, distribution of specialties of prescriber-administered AM, distribution of reasons for AM discontinuation, and distribution of clinical outcomes are shown in [Table 17](#), [Table 18](#), [Table 19](#), and [Table 20](#).

## Discussion

We found positive progress in prescribing practices in 2009 compared to 2003. There was an obvious decrease in gentamicin use for community-acquired pneumonia in all Centers except Komsomolsky, where a 3% increase was registered ([Table 10](#), [Table 11](#), [Table 12](#) and [Table 13](#)). According to previous Russian pharmacoepidemiologic studies, gentamicin was one of the favorite medicines for community-acquired pneumonia, even though its prescription for community-acquired pneumonia is inappropriate due to lack of efficacy and questionable safety.

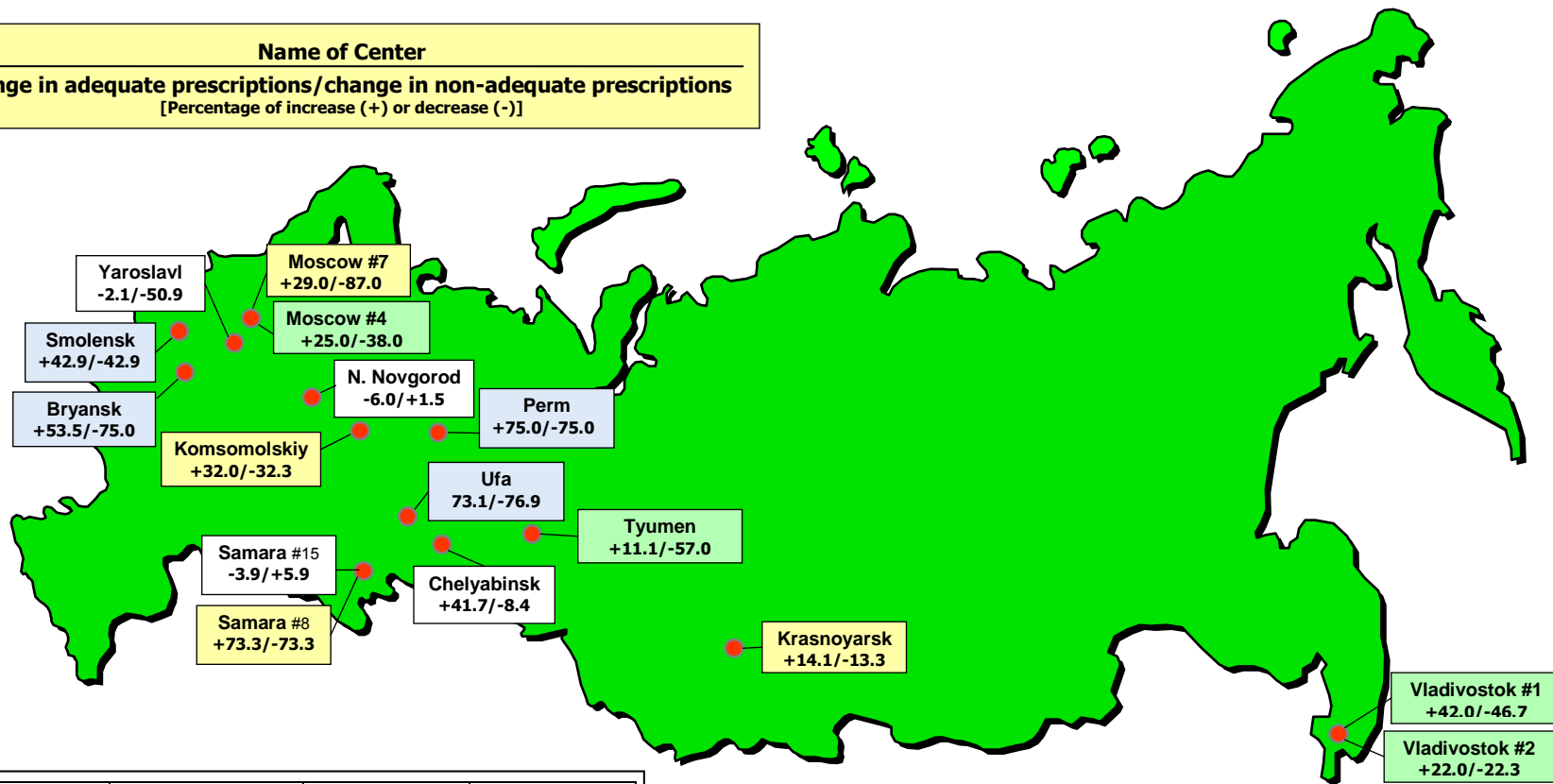
The data revealed nearly all Centers had reduced ampicillin use, though use of ampicillin in combination with an inhibitor of bacterial enzymes and analogs (e.g., ampicillin/sulbactam, amoxicillin/clavulanate, and cefoperazone/sulbactam) had increased. We also noted that use of the old, ineffective combination of ampicillin and oxacillin had also decreased in all Centers during the study period ([Table 10](#), [Table 11](#), [Table 12](#), and [Table 13](#)).

In some Centers, use of the erythromycin group of AMs had shifted to “modern” macrolides, which have better pharmacokinetics and safety profiles ([Table 10](#), [Table 11](#), [Table 12](#), and [Table 13](#)).

As for quinolones, in 13 Centers, use of ciprofloxacin increased. Also, a negligible rise in use of “respiratory” fluoroquinolones was registered in some Centers, with the exception of Vladivostok Center #1 where levofloxacin use increased significantly: from 1.7% in 2003 to 18.1% in 2009 ([Table 10](#), [Table 11](#), [Table 12](#) and [Table 13](#)).

**Name of Center**

**Change in adequate prescriptions/change in non-adequate prescriptions**  
 [Percentage of increase (+) or decrease (-)]



		Adequate Rx (%)	Non-adequate Rx (%)
Group 1 (Guide and DE)	Vladivostok Ctr #1	+ 42.0	-46.7
	Vlad #2	+ 22.0	- 22.3
	Tyumen	+ 11.1	- 57
	Moscow #4	+ 25.0	- 38
Group 2 (DE only)	Krasnoyarsk	+14.1	- 13.3
	Komsomolsky	+32.0	- 32.3
	Moscow #7	+29.0	- 87
	Samara	+73.3	- 73.3
Group 3 (Guide only)	Byransk	+53.5	- 75
	Perm	+75.0	- 75
	Smolensk	+42.9	- 42.9
	Ufa	+73.1	- 76.9
Control Group	Nizhniy Novgorod	-6.0	+ 1.5
	Samara	-3.9	+ 5.9
	Yaroslavl	-2.1	- 50.9
	Chelyabinsk	+ 41.7	- 8.4

**Figure 2. Results from Participating Centers**

The numbers represent changes in the prescribing habits of practicing physicians in 16 healthcare facilities in Russia between 2003 and 2009—an increase or decrease in adequate prescription vs. an increase or decrease in non-adequate prescriptions—after exposure to educational interventions about the rational use of antimicrobial medicines. One group had access to only the *Practical Guide on Anti-infection Chemotherapy* (Guide); one group participated in only a Distance Education (DE) Program; one group was exposed to both the *Guide* and DE; and, one group (control group) neither took part in the DE program nor used the *Guide* prior to or during that time period.

Rationality assessment for the most frequent indications showed AM prescription improvement in the three groups of Centers where educational programs were implemented, as opposed to the control group where no educational interventions were conducted ([Summary Table 2](#) and [Figure 2](#)).

In 2003, in answer to the question “Was this prescription adequate?” data was collected from each Center consistent with the following choices:

1. **Yes** = AM, course of treatment/prophylaxis, and route of administration were chosen correctly according to the Guide on Antimicrobial Chemotherapy;
2. **No** = AM, course of treatment/prophylaxis, and route of administration were not chosen correctly according to the Guide on Antimicrobial Chemotherapy; or,
3. **Not evaluable** = Frequent change of AM therapy and short periods of different AMs usage, due to developing of AM resistance, not full diagnosis.

**Summary Table 2: Results of adequacy assessment, 2003 and 2009**

	Yes (Adequate) n/%		No (Non-adequate) n/%		Not evaluable n/%	
	2003	2009	2003	2009	2003	2009
Group 1 (Guide and DE)	100/35.1	144/61.1	150/52.6	30/8.3	35/12.3	78/30.6
Group 2 (DE only)	100/36.7	238/75.6	155/59.2	35/11.1	20/4.1	42/13.3
Group 3 (Guide only)	72/21.4	350/77	264/78.6	98/21.5	0/0	7/1.5
Control Group	75/26.8	126/33.3	175/56.5	126/28.6	30/16.7	144/38.1



The same question was considered again in 2009 to determine what, if any, change took place in each Center’s prescribing patterns following implementation of the educational interventions, for the study groups, or without interventions for the control group.

Thus, in Group #1 (Guide and DE Program)—Vladivostok Center #1, Vladivostok Center #2, Tyumen, and Moscow Center #4—adequate prescriptions increased 42.0%, 22.0%, 11.1%, and 25.0%, respectively. At the same time, non-adequate prescriptions decreased 46.7% for inappropriate use of metronidazole, ciprofloxacin, and amikacin for community-acquired pneumonia; 22.3% for incorrect administration of cefazolin, ampicillin/oxacillin, and kanamycin for cholelithiasis; 57.0% for incorrect administration of ampicillin and amikacin for infected burns); and, 38.0% use of cefazolin for adnexitis) (Figure 3, Table 15, Table 16).

For Group #2 (DE program only), the increase in rational AM

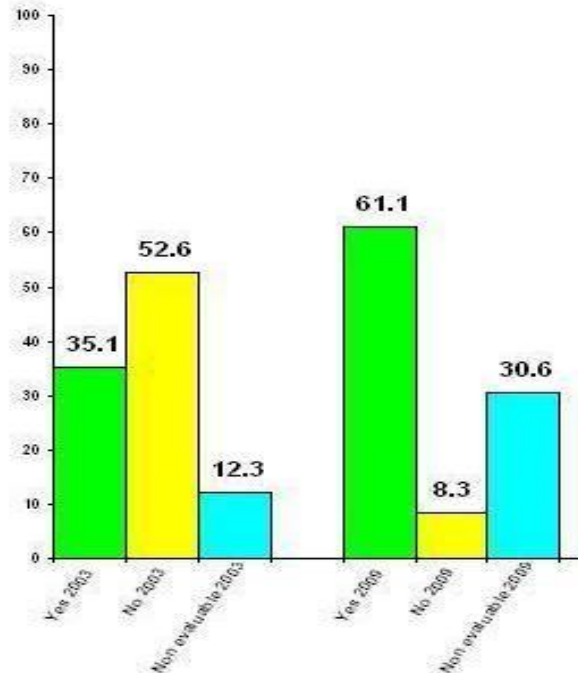


Fig. 3. Group #1 Guide & DE

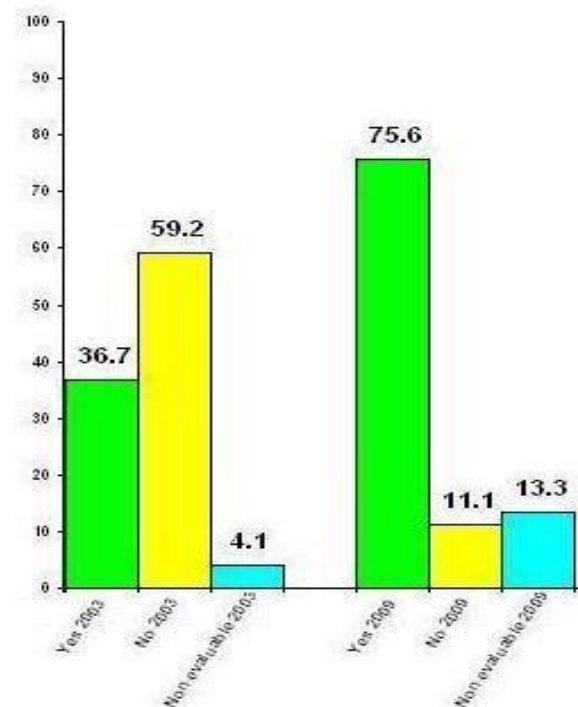
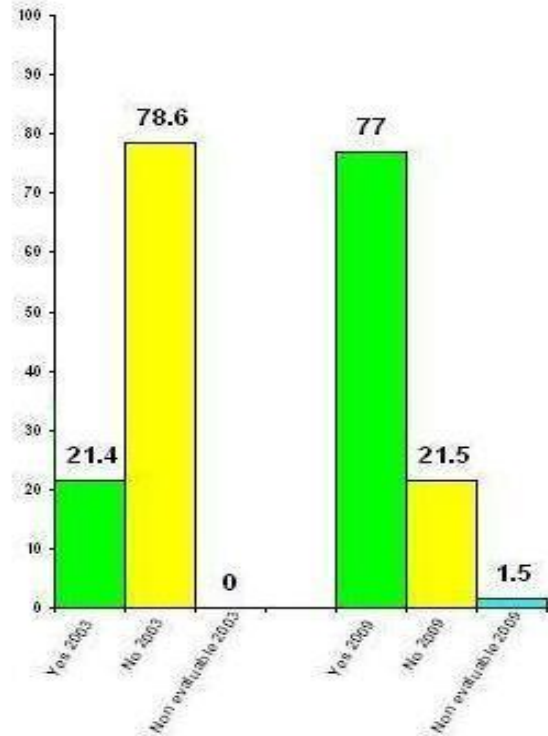


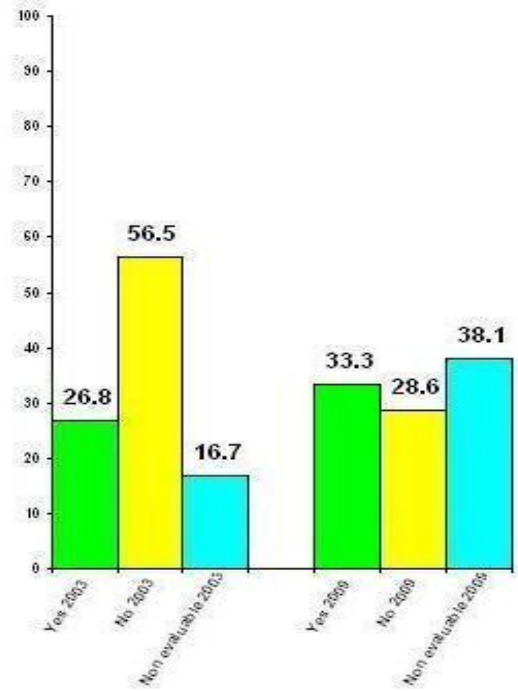
Fig. 4. Group #2 DE only

administrations was 14.1% in Krasnoyarsk, 32.3% in Komsomolsky, 29.0% in Moscow Center #7, and 73.3% in Samara Center #8. Irrational AM administrations decreased 13.3% for irrelevant use of gentamicin, cefazolin, and ciprofloxacin for community-acquired pneumonia; 32.3% for irrelevant use of gentamicin and ciprofloxacin for community-acquired pneumonia; 87.0% for cefazolin or metronidazole for adnexitis; and 73.3% for cefazolin, nitroxoline, and nitofurantoïn for pyelonephritis) as illustrated in [Figure 4](#), [Table 15](#), and [Table 16](#).

Group #3 (*Guide* only) showed a rise in adequate prescriptions of 53.5% in Bryansk, 75.0% in Perm, 42.9% in Smolensk, and 73.1% in Ufa. There was a concurrent decrease in non-adequate AM administrations of 75.0% for irrelevant prescription of cefazolin, metronidazole, ciprofloxacin, amikacin for community-acquired pneumonia; 42.9% of ciprofloxacin and streptomycin for community-acquired pneumonia; and, 76.9% of cefazolin, ampicillin/oxacillin, and gentamicin for urolithiasis ([Figure 5](#), [Table 15](#), and [Table 16](#)).



**Fig. 5. Group #3 *Guide* only**



**Fig 6. Group #4 No *Guide* or DE**

In the control group, a reduction in the percentage of adequate prescriptions was marked in Nizhniy Novgorod (6.0%), Samara (3.9%), and Yaroslavl (2.1%). At the same time, the weight of non-adequate AM administrations of ciprofloxacin and metronidazole for community-acquired pneumonia increased in Nizhniy Novgorod, as did ampicillin for infected burns in Samara, and cefazolin and clyndamycin for sinusitis in Yaroslavl. The percentage of irrational prescriptions in Chelyabinsk was 50.0% in 2009 ([Figure 6](#), [Table 15](#), and [Table 16](#)).

## Conclusions

1. In general antimicrobial prescribing patterns for most frequently treated diseases<sup>2</sup> shifted to a more rational model in 2009 as compared to 2003.
2. The most noticeable improvement was demonstrated in Centers that had received educational interventions (either the *Guide* or DE individually, or the combination of both the *Guide* and DE) compared to the control group.
3. In all Centers where educational interventions were conducted, an increase in rational AM prescriptions and a decrease of non-adequate antimicrobial prescriptions were observed between 2009 and 2003. At the same time, in three Centers of the control group, adequate antimicrobial prescriptions for the most frequently treated diseases decreased between 2009 and 2003 and, in two Centers, non-adequate AM prescriptions increased in 2009 from 2003.
4. Both the *Practical Guide on Anti-infection Chemotherapy* and the Distance Education Program on Antimicrobial Therapy are effective tools to improve antimicrobial prescribing patterns in hospitals. Wider application of these interventions would further improve rational antimicrobial prescribing in Russia.

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<sup>2</sup> **Most frequently treated diseases** include community-acquired pneumonia, burns, surgery on female upper genital tract (perioperative prophylaxis), intra-abdominal infections, perioperative prophylaxis in intra-abdominal surgery, and urinary tract infections (pyelonephritis bacterial, complicated or uncomplicated)

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## Data Tables

**Table 1. Participating centers divided into categories**

№	City
<b><i>Centers where both Practical Guide on Anti-Infection Chemotherapy was distributed and Distance Education Program was conducted</i></b>	
1	Vladivostok
2	Vladivostok
3	Tyumen
4	Moscow
<b><i>Centers where only Distance Education Program was conducted</i></b>	
5	Krasnoyarsk
6	Komsomolskiy (Republic Mordovia)
7	Moscow
8	Samara
<b><i>Centers where only Practical Guide on Anti-Infection Chemotherapy was distributed</i></b>	
9	Bryansk
10	Perm
11	Smolensk
12	Ufa
<b><i>Centers where neither Practical Guide on Anti-Infection Chemotherapy was distributed and the Distance Education Program was conducted</i></b>	
13	Chelyabinsk
14	Nizhniy Novgorod
15	Samara
16	Yaroslavl

**Table 2. Centers' contact information**

<b>№</b>	<b>City</b>	<b>Local coordinator</b>	<b>Hospital name</b>	<b>Contact Address</b>	<b>Phone</b>
1	Vladivostok	Irina A. Bekker	Primorsk Regional Clinical Hospital	57, Aleutskaya st, b. 4, r. 304 690950	+7 (4232) 400725
2	Vladivostok	Ekaterina V. Eliseeva	City Clinical Hospital No. 2	2, Ostryakova st, 690002	+7 (4232) 346165
3	Tyumen	Eduard A. Ortenberg	Tyumen State Medical Academy	54, Odesskaya st, 625000	+7 (912) 9227214
4	Moscow	Boris V. Berejansky	N.A. Semashko Railway Clinical Hospital, Lublino st.	3, Sportivnyi proezd 109386	+7 (495) 3595191
5	Krasnoyarsk	Elena N. Bochanova	Regional Clinical Hospital	123, Sudostroitelnaya st, 33, 660012	+7 (3912) 200282
6	Komsomolsky (Republic Mordovia)	Valentina P. Sergeeva	Central Regional Hospital	Chamzinskiy City Region	+7 (83437) 33803
7	Moscow	Evgenyi K. Samuilo	RAS Central Clinical Hospital	1a, Litovskii bld 117593	+7 (495) 4274808
8	Samara	Elena A. Oskina	Hospital for Veteran Affairs	43, 22 partsiezda st, 443063	+7 (8462) 9517581
9	Bryansk	Irina A. Kapylova	City Hospital No. 1	11, Kamozina st 241035	+7 (4832) 570877
10	Perm	Nadejda A. Zubareva	City Clinical Hospital No. 6	12, Gracheva st 614107	+7 (3422) 657544
11	Smolensk	Elena V. Korneva	Smolensk Regional Hospital	27, Gagarina st 214019	+7 (4812) 611301
12	Ufa	Alfia I. Abubakirova	G.G. Kuvatov Republic Clinical Hospital	6/8, 50 let Oktyabrya st 450005	+7 (3472) 289915
13	Chelyabinsk	Olga V. Pribitkova	Clinical Hospital No. 3	34, Lenina pr 454090	+7 (351) 7417736
14	Nizhniy Novgorod	Vladimir B. Kuzin	City Hospital No. 1	10/1, Minina pl 603005	+7 (831) 4390943
15	Samara	Natalia P. Sergacheva	N.I Pirogov City Clinical Hospital No. 1	122, K. Marks st, 7 443013	+7 (846) 3370701
16	Yaroslavl	Shamil H. Palutin	Regional Clinical Hospital	24, Popova st 150010	+7 (4852) 732587

**Table 3. Distribution of collected and processed CRFs by center**

<b>№</b>	<b>City</b>	<b>Sent CRFs on R* part (n)</b>	<b>Processed CRFs on R* part (n)</b>	<b>Sent CRFs on P* part (n)</b>	<b>Processed CRFs on P* part (n)</b>
<b>Centers where both Practical Guide on Anti-Infection Chemotherapy was distributed and Distance Education Program was conducted</b>					
1	Vladivostok	92	74	65	58
2	Vladivostok	155	118	131	65
3	Tyumen	98	92	90	81
4	Moscow	98	87	82	66
<b>Total</b>		<b>443</b>	<b>371</b>	<b>368</b>	<b>270</b>
<b>Centers where only Distance Education Program was conducted</b>					
5	Krasnoyarsk	130	111	133	123
6	Komsomolskiy	82	73	83	79
7	Moscow	123	53	136	123
8	Samara	134	110	58	43
<b>Total</b>		<b>469</b>	<b>347</b>	<b>410</b>	<b>368</b>
<b>Centers where only Practical Guide on Anti-Infection Chemotherapy was distributed</b>					
9	Bryansk	108	57	129	108
10	Perm	175	161	197	175
11	Smolensk	95	91	112	104
12	Ufa	162	119	223	211
<b>Total</b>		<b>540</b>	<b>428</b>	<b>661</b>	<b>598</b>
<b>Centers where neither Practical Guide on Anti-Infection Chemotherapy was distributed and the Distance Education Program was conducted</b>					
13	Chelyabinsk	95	95	124	124
14	N. Novgorod	76	57	82	73
15	Samara	167	122	152	138
16	Yaroslavl	120	101	120	112
<b>Total</b>		<b>458</b>	<b>375</b>	<b>478</b>	<b>447</b>
<b>Total</b>		<b>1910</b>	<b>1521</b>	<b>1917</b>	<b>1683</b>

\*P part – prospective part; R part – retrospective part



**Table 4. Distribution of patients by unit profile**

<b>№</b>	<b>City/Unit profile</b>	<b>2003 (n/%)</b>	<b>2009 (n/%)</b>
<b>1</b>	<b><i>Vladivostok</i></b>	<b><i>74/100.0</i></b>	<b><i>58/100.0</i></b>
	Surgery	57/77.0	44/75.9
	Therapy	9/12.2	2/3.4
	ICU	8/10.8	12/20.7
<b>2</b>	<b><i>Vladivostok</i></b>	<b><i>118/100.0</i></b>	<b><i>65/100.0</i></b>
	Surgery	113/95.8	55/84.6
	Therapy	0/0	0/0
	ICU	5/4.2	10/15.4
<b>3</b>	<b><i>Tyumen</i></b>	<b><i>92/100.0</i></b>	<b><i>81/100.0</i></b>
	Surgery	82/89.1	73/90.1
	Therapy	10/10.9	8/9.9
	ICU	0/0	0/0
<b>4</b>	<b><i>Moscow</i></b>	<b><i>87/100.0</i></b>	<b><i>66/100.0</i></b>
	Surgery	81/93.1	61/92.4
	Therapy	0/0	0/0
	ICU	6/6.9	5/7.6
<b>5</b>	<b><i>Krasnoyarsk</i></b>	<b><i>111/100.0</i></b>	<b><i>123/100.0</i></b>
	Surgery	71/64.0	85/69.1
	Therapy	33/29.7	24/19.5
	ICU	7/6.3	14/11.4
<b>6</b>	<b><i>Komsomolskiy</i></b>	<b><i>73/100.0</i></b>	<b><i>79/100.0</i></b>
	Surgery	28/38.4	28/35.4
	Therapy	45/61.6	51/64.6
	ICU	0/0	0/0
<b>7</b>	<b><i>Moscow</i></b>	<b><i>53/100.0</i></b>	<b><i>123/100.0</i></b>
	Surgery	53/100.0	74/60.2
	Therapy	0/0	0/0
	ICU	0/0	49/39.8
<b>8</b>	<b><i>Samara</i></b>	<b><i>110/100.0</i></b>	<b><i>43/100.0</i></b>
	Surgery	64/58.2	21/48.8
	Therapy	34/30.9	22/51.2
	ICU	12/10.9	0/0
<b>9</b>	<b><i>Bryansk</i></b>	<b><i>57/100.0</i></b>	<b><i>108/100.0</i></b>

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	Surgery	27/47.4	70/64.8
	Therapy	18/31.6	38/35.2
	ICU	12/21.0	0/0
<b>10</b>	<b>Perm</b>	<b>161/100.0</b>	<b>175/100.0</b>
	Surgery	128/79.5	140/80.0
	Therapy	17/10.6	18/10.3
	ICU	16/9.9	17/9.7
<b>11</b>	<b>Smolensk</b>	<b>91/100.0</b>	<b>104/100.0</b>
	Surgery	73/80.2	71/68.3
	Therapy	18/19.8	25/24.0
	ICU	0/0	8/7.7
<b>12</b>	<b>Ufa</b>	<b>119/100.0</b>	<b>211/</b>
	Surgery	48/40.3	79/37.4
	Therapy	1/0.9	13/6.2
	ICU	70/58.8	119/56.4
<b>13</b>	<b>Chelyabinsk</b>	<b>95/100.0</b>	<b>124/100.0</b>
	Surgery	59/62.1	53/42.7
	Therapy	14/14.7	25/20.2
	ICU	22/23.2	46/37.1
<b>14</b>	<b>N. Novgorod</b>	<b>57/100.0</b>	<b>73/100.0</b>
	Surgery	38/66.7	43/58.9
	Therapy	14/24.6	18/24.7
	ICU	5/8.7	12/16.4
<b>15</b>	<b>Samara</b>	<b>122/100.0</b>	<b>138/100.0</b>
	Surgery	103/84.4	127/92.0
	Therapy	0/0	0/0
	ICU	19/15.6	11/8.0
<b>16</b>	<b>Yaroslavl</b>	<b>101/100.0</b>	<b>112/100.0</b>
	Surgery	101/100.0	109/97.3
	Therapy	0/0	0/0
	ICU	0/0	3/2.7
<b>TOTAL</b>		<b>1521/100.0</b>	<b>1683/100.0</b>

**Table 5. Distribution by patient age**

<b>№</b>	<b>City/Year/Age</b>	<b>n</b>	<b>Mean</b>	<b>Std</b>	<b>Min</b>	<b>25%</b>	<b>Median</b>	<b>75%</b>	<b>Max</b>
<b>1</b>	<b>Vladivostok</b>								
	<b>2003</b>	<b>74</b>	<b>47.7</b>	<b>16.2</b>	<b>14.8</b>	<b>38.6</b>	<b>47.4</b>	<b>59.1</b>	<b>82.9</b>
	< 18 years old	2	15.0	0.3	14.8	14.8	15.0	15.3	15.3
	≥ 18 years old	72	48.7	15.5	19.0	38.7	47.7	60.1	82.9
	<b>2009</b>	<b>58</b>	<b>50.4</b>	<b>16.6</b>	<b>17.6</b>	<b>38.3</b>	<b>52.4</b>	<b>61.0</b>	<b>82.5</b>
	< 18 years old	1	17.6	-	17.6	17.6	17.6	17.6	17.6
	≥ 18 years old	57	50.8	16.4	18.0	39.0	53.0	61.0	83.0
<b>2</b>	<b>Vladivostok</b>								
	<b>2003</b>	<b>118</b>	<b>43.7</b>	<b>18.4</b>	<b>3.9</b>	<b>26.3</b>	<b>43.2</b>	<b>56.3</b>	<b>88.0</b>
	< 18 years old	5	12.1	5.7	3.9	8.6	15.1	15.4	17.5
	≥ 18 years old	113	45.1	17.5	18.2	28.9	43.8	56.5	88.0
	<b>2009</b>	<b>65</b>	<b>45.8</b>	<b>15.9</b>	<b>19.2</b>	<b>29.8</b>	<b>43.9</b>	<b>59.6</b>	<b>79.7</b>
	< 18 years old	-	-	-	-	-	-	-	-
	≥ 18 years old	65	45.8	15.9	19.2	29.8	43.9	59.6	79.7
<b>3</b>	<b>Tyumen</b>								
	<b>2003</b>	<b>92</b>	<b>40.8</b>	<b>17.6</b>	<b>3.1</b>	<b>26.6</b>	<b>43.0</b>	<b>52.5</b>	<b>88.5</b>
	< 18 years old	9	10.4	4.6	3.1	8.4	9.8	14.1	16.2
	≥ 18 years old	83	44.1	15.1	18.5	32.4	45.2	54.6	88.5
	<b>2009</b>	<b>81</b>	<b>43.6</b>	<b>18.3</b>	<b>1.1</b>	<b>28.3</b>	<b>46.5</b>	<b>56.7</b>	<b>83.0</b>
	< 18 years old	5	7.9	8.9	1.1	1.3	1.8	17.5	17.7
	≥ 18 years old	76	45.9	16.2	19.8	29.7	47.4	57.2	83.0
<b>4</b>	<b>Moscow</b>								
	<b>2003</b>	<b>87</b>	<b>49.5</b>	<b>16.0</b>	<b>18.3</b>	<b>40.1</b>	<b>47.6</b>	<b>62.9</b>	<b>82.4</b>
	< 18 years old	-	-	-	-	-	-	-	-
	≥ 18 years old	87	49.5	16.0	18.3	40.1	47.6	62.9	82.4
	<b>2009</b>	<b>66</b>	<b>47.2</b>	<b>13.8</b>	<b>17.0</b>	<b>38.0</b>	<b>48.0</b>	<b>55.0</b>	<b>75.0</b>
	< 18 years old	1	16.7	-	16.7	16.7	16.7	16.7	16.7
	≥ 18 years old	65	47.3	13.4	18.3	37.9	47.6	55.0	74.4
<b>5</b>	<b>Krasnoyarsk</b>								
	<b>2003</b>	<b>111</b>	<b>44.8</b>	<b>17.3</b>	<b>13.2</b>	<b>31.1</b>	<b>44.6</b>	<b>59.4</b>	<b>84.9</b>
	< 18 years old	7	15.2	1.2	13.2	14.5	15.4	16.0	17.0

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	≥ 18 years old	104	46.7	16.0	18.0	35.1	45.6	61.3	84.9
	<b>2009</b>	<b>123</b>	<b>43.7</b>	<b>20.2</b>	<b>1.0</b>	<b>28.9</b>	<b>45.8</b>	<b>57.2</b>	<b>86.9</b>
	< 18 years old	11	3.2	2.9	1.0	1.5	2.1	3.9	10.8
	≥ 18 years old	112	47.7	16.4	20.2	33.2	49.1	59.3	86.9
<b>6</b>	<b><i>Komsomolskiy</i></b>								
	<b>2003</b>	<b>73</b>	<b>29.1</b>	<b>19.9</b>	<b>0.6</b>	<b>11.7</b>	<b>28.1</b>	<b>42.3</b>	<b>73.2</b>
	< 18 years old	27	8.3	5.2	0.6	2.2	9.4	12.5	17.0
	≥ 18 years old	46	41.4	14.2	18.7	30.2	40.4	45.9	73.2
	<b>2009</b>	<b>79</b>	<b>33.2</b>	<b>25.3</b>	<b>0.1</b>	<b>6.0</b>	<b>30.9</b>	<b>55.9</b>	<b>79.8</b>
	< 18 years old	29	5.9	5.9	0.1	1.2	2.8	10.1	17.9
	≥ 18 years old	50	49.0	17.3	19.3	37.0	47.5	60.2	79.8
<b>7</b>	<b><i>Moscow</i></b>								
	<b>2003</b>	<b>53</b>	<b>55.0</b>	<b>14.0</b>	<b>17.2</b>	<b>47.1</b>	<b>55.1</b>	<b>64.2</b>	<b>83.1</b>
	< 18 years old	1	17.2	-	17.2	17.2	17.2	17.2	17.2
	≥ 18 years old	52	55.7	13.0	21.1	47.6	55.1	65.1	83.1
	<b>2009</b>	<b>123</b>	<b>48.8</b>	<b>16.6</b>	<b>20.9</b>	<b>30.7</b>	<b>49.3</b>	<b>63.2</b>	<b>86.5</b>
	< 18 years old	-	-	-	-	-	-	-	-
	≥ 18 years old	123	48.8	16.6	20.9	30.7	49.3	63.2	86.5
<b>8</b>	<b><i>Samara</i></b>								
	<b>2003</b>	<b>110</b>	<b>77.6</b>	<b>6.7</b>	<b>44.8</b>	<b>76.4</b>	<b>77.9</b>	<b>80.8</b>	<b>95.4</b>
	< 18 years old	-	-	-	-	-	-	-	-
	≥ 18 years old	110	77.6	6.7	44.8	76.4	77.9	80.8	95.4
	<b>2009</b>	<b>43</b>	<b>79.5</b>	<b>11.2</b>	<b>43.6</b>	<b>79.4</b>	<b>83.2</b>	<b>84.8</b>	<b>94.7</b>
	< 18 years old	-	-	-	-	-	-	-	-
	≥ 18 years old	43	79.5	11.2	43.6	79.4	83.2	84.8	94.7
<b>9</b>	<b><i>Bryansk</i></b>								
	<b>2003</b>	<b>57</b>	<b>48.2</b>	<b>17.8</b>	<b>15.5</b>	<b>31.7</b>	<b>49.1</b>	<b>63.3</b>	<b>84.7</b>
	< 18 years old	1	15.5	-	15.5	15.5	15.5	15.5	15.5
	≥ 18 years old	56	48.8	17.4	19.0	33.0	49.1	63.7	84.7
	<b>2009</b>	<b>108</b>	<b>45.7</b>	<b>19.4</b>	<b>0.0</b>	<b>30.8</b>	<b>46.5</b>	<b>58.5</b>	<b>82.0</b>
	< 18 years old	6	4.3	6.1	0.01	0.0	1.4	7.9	15.2
	≥ 18 years old	102	48.1	17.0	18.0	33.3	47.3	59.9	82.0
<b>10</b>	<b><i>Perm</i></b>								

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	<b>2003</b>	<b>161</b>	<b>46.3</b>	<b>18.0</b>	<b>15.8</b>	<b>31.2</b>	<b>46.8</b>	<b>57.2</b>	<b>93.8</b>
	< 18 years old	2	16.1	0.4	15.8	15.8	16.1	16.3	16.3
	≥ 18 years old	159	46.7	17.8	18.2	31.3	46.9	57.4	93.8
	<b>2009</b>	<b>175</b>	<b>46.5</b>	<b>18.7</b>	<b>16.1</b>	<b>30.4</b>	<b>43.3</b>	<b>61.8</b>	<b>94.5</b>
	< 18 years old	2	16.6	0.6	16.1	16.1	16.6	17.0	17.0
	≥ 18 years old	173	46.8	18.5	18.1	31.0	43.5	61.8	94.5
<b>11</b>	<b>Smolensk</b>								
	<b>2003</b>	<b>91</b>	<b>47.1</b>	<b>18.7</b>	<b>1.5</b>	<b>31.5</b>	<b>49.6</b>	<b>61.7</b>	<b>83.1</b>
	< 18 years old	3	9.6	7.2	1.5	1.5	11.9	15.4	15.4
	≥ 18 years old	88	48.4	17.6	18.9	33.3	50.4	62.5	83.1
	<b>2009</b>	<b>104</b>	<b>47.5</b>	<b>18.3</b>	<b>2.1</b>	<b>32.5</b>	<b>48.8</b>	<b>62.3</b>	<b>82.6</b>
	< 18 years old	3	12.5	9.1	2.1	2.1	17.8	17.8	17.8
	≥ 18 years old	101	48.6	17.5	18.3	34.9	49.3	62.4	82.6
<b>12</b>	<b>Ufa</b>								
	<b>2003</b>	<b>119</b>	<b>51.9</b>	<b>16.5</b>	<b>17.2</b>	<b>42.0</b>	<b>51.1</b>	<b>66.3</b>	<b>80.1</b>
	< 18 years old	2	17.5	0.4	17.2	17.2	17.5	17.9	17.9
	≥ 18 years old	117	52.5	16.0	18.3	42.7	52.4	66.3	80.1
	<b>2009</b>	<b>211</b>	<b>52.9</b>	<b>16.7</b>	<b>14.8</b>	<b>42.4</b>	<b>54.9</b>	<b>66.9</b>	<b>82.8</b>
	< 18 years old	6	16.3	1.0	14.8	15.9	16.4	16.5	17.9
	≥ 18 years old	205	54.0	15.7	18.3	46.1	55.6	67.1	82.8
<b>13</b>	<b>Chelyabinsk</b>								
	<b>2003</b>	<b>95</b>	<b>38.5</b>	<b>19.4</b>	<b>0.8</b>	<b>20.9</b>	<b>33.6</b>	<b>52.9</b>	<b>81.8</b>
	< 18 years old	14	14.8	4.6	0.8	15.3	16.4	16.9	17.9
	≥ 18 years old	81	42.6	18.0	18.1	28.9	38.9	53.6	81.8
	<b>2009</b>	<b>124</b>	<b>48.1</b>	<b>20.6</b>	<b>2.7</b>	<b>28.5</b>	<b>49.2</b>	<b>64.1</b>	<b>90.0</b>
	< 18 years old	6	11.9	7.1	2.7	2.8	15.9	17.0	17.1
	≥ 18 years old	118	49.9	19.3	18.1	32.4	50.8	65.6	90.0
<b>14</b>	<b>N. Novgorod</b>								
	<b>2003</b>	<b>57</b>	<b>48.1</b>	<b>16.7</b>	<b>15.8</b>	<b>37.5</b>	<b>53.0</b>	<b>62.0</b>	<b>77.0</b>
	< 18 years old	4	16.5	0.6	15.8	16.1	16.7	17.0	17.0
	≥ 18 years old	53	50.5	14.8	19.2	41.3	54.0	63.3	77.0
	<b>2009</b>	<b>73</b>	<b>52.1</b>	<b>17.7</b>	<b>16.4</b>	<b>38.9</b>	<b>51.1</b>	<b>67.6</b>	<b>86.1</b>
	< 18 years old	1	16.4	-	16.4	16.4	16.4	16.4	16.4

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	≥ 18 years old	72	52.5	17.3	18.8	39.0	52.4	67.8	86.1
<b>15</b>	<b><i>Samara</i></b>								
	<b>2003</b>	<b>122</b>	<b>41.8</b>	<b>20.7</b>	<b>2.8</b>	<b>22.6</b>	<b>42.6</b>	<b>56.8</b>	<b>87.9</b>
	< 18 years old	11	10.6	5.7	2.8	5.4	10.1	16.9	17.9
	≥ 18 years old	111	44.9	19.1	18.1	25.2	43.9	61.0	87.9
	<b>2009</b>	<b>138</b>	<b>41.1</b>	<b>18.9</b>	<b>3.4</b>	<b>24.9</b>	<b>37.6</b>	<b>55.3</b>	<b>84.0</b>
	< 18 years old	11	16.0	4.2	3.4	16.8	17.5	17.7	18.0
	≥ 18 years old	127	43.3	18.0	18.1	27.4	39.8	58.6	84.0
<b>16</b>	<b><i>Yaroslavl</i></b>								
	<b>2003</b>	<b>101</b>	<b>40.6</b>	<b>17.6</b>	<b>2.5</b>	<b>27.3</b>	<b>38.0</b>	<b>53.3</b>	<b>86.7</b>
	< 18 years old	11	14.8	4.7	2.5	15.1	17.1	17.6	17.7
	≥ 18 years old	90	43.7	15.9	18.9	30.8	40.1	55.0	86.7
	<b>2009</b>	<b>112</b>	<b>43.1</b>	<b>18.5</b>	<b>7.3</b>	<b>26.9</b>	<b>42.9</b>	<b>55.4</b>	<b>94.7</b>
	< 18 years old	5	14.9	4.3	7.3	15.8	16.0	17.6	17.8
	≥ 18 years old	107	44.4	17.9	18.6	29.2	43.2	56.2	94.7

**Table 6. Distribution by patient gender**

<b>№</b>	<b>City/Sex</b>	<b>2003 (n/%)</b>	<b>2009 (n/%)</b>
<b>1</b>	<b>Vladivostok</b>	<b>74/100.0</b>	<b>58/100.0</b>
	Female	37/50.0	37/63.8
	Male	37/50.0	21/36.2
<b>2</b>	<b>Vladivostok</b>	<b>118/100.0</b>	<b>65/100.0</b>
	Female	54/45.8	26/40.0
	Male	64/54.2	39/60.0
<b>3</b>	<b>Tyumen</b>	<b>92/100.0</b>	<b>81/100.0</b>
	Female	46/50.0	47/58.0
	Male	46/50.0	34/42.0
<b>4</b>	<b>Moscow</b>	<b>87/100.0</b>	<b>66/100.0</b>
	Female	57/65.5	42/63.6
	Male	30/34.5	24/36.4
<b>5</b>	<b>Krasnoyarsk</b>	<b>111/100.0</b>	<b>123/100.0</b>
	Female	39/35.1	47/38.2
	Male	72/64.9	76/61.8
<b>6</b>	<b>Komsomolsky</b>	<b>73/100.0</b>	<b>79/100.0</b>
	Female	37/50.7	51/64.6
	Male	36/49.3	28/35.4
<b>7</b>	<b>Moscow</b>	<b>53/100.0</b>	<b>123/100.0</b>
	Female	34/64.2	80/65.0
	Male	19/35.8	43/35.0
<b>8</b>	<b>Samara</b>	<b>110/100.0</b>	<b>43/100.0</b>
	Female	17/17.5	9/20.9
	Male	93/84.5	34/79.1
<b>9</b>	<b>Bryansk</b>	<b>57/100.0</b>	<b>108/100.0</b>
	Female	20/35.1	61/56.5
	Male	37/64.9	47/43.5

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

<b>10</b>	<b><i>Perm</i></b>	<b><i>161/100.0</i></b>	<b><i>175/100.0</i></b>
	Female	83/51.6	106/60.6
	Male	78/48.4	69/39.4
<b>11</b>	<b><i>Smolensk</i></b>	<b><i>91/100.0</i></b>	<b><i>104/100.0</i></b>
	Female	48/52.7	66/63.5
	Male	43/47.3	38/36.5
<b>12</b>	<b><i>Ufa</i></b>	<b><i>119/100.0</i></b>	<b><i>211/100.0</i></b>
	Female	62/52.1	92/43.6
	Male	57/47.9	119/56.4
<b>13</b>	<b><i>Chelyabinsk</i></b>	<b><i>95/100.0</i></b>	<b><i>124/100.0</i></b>
	Female	45/47.4	55/44.4
	Male	50/52.6	69/55.6
<b>14</b>	<b><i>N. Novgorod</i></b>	<b><i>57/100.0</i></b>	<b><i>73/100.0</i></b>
	Female	28/49.1	31/42.5
	Male	29/50.9	42/57.5
<b>15</b>	<b><i>Samara</i></b>	<b><i>122/100.0</i></b>	<b><i>138/100.0</i></b>
	Female	63/51.6	69/50.0
	Male	59/48.4	69/50.0
<b>16</b>	<b><i>Yaroslavl</i></b>	<b><i>101/100.0</i></b>	<b><i>112/100.0</i></b>
	Female	43/42.6	56/50.0
	Male	58/57.4	56/50.0



**Table 7. Duration of hospitalization**

<b>№</b>	<b>City/Year</b>	<b>n</b>	<b>Mean</b>	<b>Std</b>	<b>Min</b>	<b>25%</b>	<b>Median</b>	<b>75%</b>	<b>Max</b>
<b>1</b>	<b><i>Vladivostok</i></b>								
	2003	74	17.7	8.1	5.0	12.0	16.0	20.0	40.0
	2009	58	15.4	8.1	3.0	10.0	15.0	18.0	42.0
<b>2</b>	<b><i>Vladivostok</i></b>								
	2003	118	16.9	11.3	3.0	9.0	14.0	22.0	56.0
	2009	65	10.8	4.7	2.0	8.0	10.0	14.0	21.0
<b>3</b>	<b><i>Tyumen</i></b>								
	2003	92	15.1	7.1	4.0	9.0	14.0	19.0	41.0
	2009	81	11.6	6.0	2.0	8.0	11.0	15.0	45.0
<b>4</b>	<b><i>Moscow</i></b>								
	2003	87	18.1	10.0	8.0	11.0	15.0	22.0	60.0
	2009	66	12.2	7.7	3.0	8.0	10.0	13.0	40.0
<b>5</b>	<b><i>Krasnoyarsk</i></b>								
	2003	111	22.1	12.7	6.0	14.0	21.0	26.0	77.0
	2009	123	19.0	11.4	5.0	10.0	17.0	23.0	72.0
<b>6</b>	<b><i>Komsomolskiy</i></b>								
	2003	73	11.4	3.6	3.0	9.0	11.0	14.0	21.0
	2009	79	11.1	4.1	2.0	8.0	11.0	14.0	26.0
<b>7</b>	<b><i>Moscow</i></b>								
	2003	53	11.8	6.6	2.0	7.0	9.0	17.0	31.0
	2009	123	5.3	5.9	1.0	1.0	3.0	8.0	49.0
<b>8</b>	<b><i>Samara</i></b>								
	2003	110	23.7	8.0	5.0	19.0	23.0	27.0	62.0
	2009	43	24.1	7.3	15.0	20.0	22.0	25.0	46.0
<b>9</b>	<b><i>Bryansk</i></b>								
	2003	57	16.9	9.5	2.0	11.0	16.0	21.0	42.0
	2009	108	12.2	5.5	2.0	8.0	12.0	15.5	30.0
<b>10</b>	<b><i>Perm</i></b>								
	2003	161	14.5	11.3	1.0	8.0	11.0	18.0	74.0
	2009	175	11.0	6.0	2.0	6.0	9.0	14.0	30.0
<b>11</b>	<b><i>Smolensk</i></b>								
	2003	74	47.7	16.2	14.8	38.6	47.4	59.1	82.9
	2009	104	15.1	8.2	1.0	10.0	13.0	18.5	55.0
<b>12</b>	<b><i>Ufa</i></b>								
	2003	119	20.9	13.4	6.0	12.0	18.0	23.0	87.0

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	2009	211	20.6	11.8	6.0	12.0	18.0	25.0	82.0
<b>13</b>	<b><i>Chelyabinsk</i></b>								
	2003	95	10.9	5.3	3.0	7.0	10.0	13.0	33.0
	2009	124	10.3	5.4	2.0	7.0	9.0	12.5	29.0
<b>14</b>	<b><i>N. Novgorod</i></b>								
	2003	57	13.9	5.8	2.0	11.0	13.0	17.0	31.0
	2009	73	11.1	6.5	2.0	6.0	11.0	14.0	37.0
<b>15</b>	<b><i>Samara</i></b>								
	2003	122	10.2	9.5	1.0	5.0	8.0	12.0	76.0
	2009	138	10.2	7.5	1.0	5.0	8.5	12.0	45.0
<b>16</b>	<b><i>Yaroslavl</i></b>								
	2003	101	14.0	11.2	2.0	8.0	11.0	17.0	90.0
	2009	112	15.6	10.8	2.0	10.0	12.0	17.0	73.0

**Table 8. Distribution of hospitalization type**

<b>№</b>	<b>City/Type</b>	<b>2003 (n/%)</b>	<b>2009 (n/%)</b>
<b>1</b>	<b>Vladivostok</b>	<b>74/100.0</b>	<b>58/100.0</b>
	Urgent	52/70.3	17/29.3
	Planned	22/29.7	41/70.7
<b>2</b>	<b>Vladivostok</b>	<b>118/100.0</b>	<b>65/100.0</b>
	Urgent	100/84.7	58/89.2
	Planned	18/15.3	7/10.8
<b>3</b>	<b>Tyumen</b>	<b>92/100.0</b>	<b>81/100.0</b>
	Urgent	35/38.0	27/33.3
	Planned	57/62.0	54/66.7
<b>4</b>	<b>Moscow</b>	<b>87/100.0</b>	<b>66/100.0</b>
	Urgent	16/18.4	7/10.6
	Planned	71/81.6	59/89.4
<b>5</b>	<b>Krasnoyarsk</b>	<b>111/100.0</b>	<b>123/100.0</b>
	Urgent	45/40.5	109/88.6
	Planned	66/59.5	14/11.4
<b>6</b>	<b>Komsomolskiy</b>	<b>73/100.0</b>	<b>79/100.0</b>
	Urgent	58/79.5	62/78.5
	Planned	15/20.5	17/21.5
<b>7</b>	<b>Moscow</b>	<b>53/100.0</b>	<b>123/100.0</b>
	Urgent	18/34.0	35/28.5
	Planned	35/66.0	88/71.5
<b>8</b>	<b>Samara</b>	<b>110/100.0</b>	<b>43/100.0</b>
	Urgent	2/1.8	1/2.3
	Planned	108/98.2	42/97.7
<b>9</b>	<b>Bryansk</b>	<b>57/100.0</b>	<b>108/100.0</b>
	Urgent	49/86.0	82/75.9
	Planned	8/14.0	26/24.1

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

<b>10</b>	<b><i>Perm</i></b>	<b><i>161/100.0</i></b>	<b><i>175/100.0</i></b>
	Urgent	138/85.7	140/80.0
	Planned	23/14.3	35/20.0
<b>11</b>	<b><i>Smolensk</i></b>	<b><i>91/100.0</i></b>	<b><i>104/100.0</i></b>
	Urgent	35/38.5	50/48.1
	Planned	56/61.5	54/51.9
<b>12</b>	<b><i>Ufa</i></b>	<b><i>119/100.0</i></b>	<b><i>211/100.0</i></b>
	Urgent	48/40.3	50/23.7
	Planned	71/59.7	161/76.3
<b>13</b>	<b><i>Chelyabinsk</i></b>	<b><i>95/100.0</i></b>	<b><i>124/100.0</i></b>
	Urgent	87/91.6	101/81.5
	Planned	8/8.4	23/18.5
<b>14</b>	<b><i>N. Novgorod</i></b>	<b><i>57/100.0</i></b>	<b><i>73/100.0</i></b>
	Urgent	54/94.7	66/90.4
	Planned	3/5.3	7/9.6
<b>15</b>	<b><i>Samara</i></b>	<b><i>122/100.0</i></b>	<b><i>138/100.0</i></b>
	Urgent	89/73.0	129/93.5.0
	Planned	33/27.0	9/6.5
<b>16</b>	<b><i>Yaroslavl</i></b>	<b><i>101/100.0</i></b>	<b><i>112/100.0</i></b>
	Urgent	82/81.2	92/81.3
	Planned	19/18.8	20/17.9

**Table 9. Previous antimicrobial chemotherapy**

<b>№</b>	<b>City/Administered</b>	<b>2003 (n/%)</b>	<b>2009 (n/%)</b>
<b>1</b>	<b>Vladivostok</b>	<b>74/100.0</b>	<b>58/100.0</b>
	Yes	0/0	0/0
	No	74/100.0	58/100.0
<b>2</b>	<b>Vladivostok</b>	<b>118/100.0</b>	<b>65/100.0</b>
	Yes	0/0	0/0
	No	118/100.0	65/100.0
<b>3</b>	<b>Tyumen</b>	<b>92/100.0</b>	<b>81/100.0</b>
	Yes	1 <sup>1</sup> /1.1	4 <sup>2</sup> /4.9
	No	91/98.9	77/95.1
<b>4</b>	<b>Moscow</b>	<b>87/100.0</b>	<b>66/100.0</b>
	Yes	0/0	0/0
	No	87/100.0	66/100.0
<b>5</b>	<b>Krasnoyarsk</b>	<b>111/100.0</b>	<b>123/100.0</b>
	Yes	1 <sup>3</sup> /0.9	5 <sup>4</sup> /4.1
	No	110/99.1	118/95.9
<b>6</b>	<b>Komsomolskiy</b>	<b>73/100.0</b>	<b>79/100.0</b>
	Yes	1 <sup>5</sup> /1.4	0/0
	No	72/98.6	79/100.0
<b>7</b>	<b>Moscow</b>	<b>53/100.0</b>	<b>123/100.0</b>
	Yes	2 <sup>6</sup> /3.8	9 <sup>7</sup> /7.3
	No	51/96.2	114/92.7
<b>8</b>	<b>Samara</b>	<b>110/100.0</b>	<b>43/100.0</b>
	Yes	0/0	0/0
	No	110/100.0	43/100.0
<b>9</b>	<b>Bryansk</b>	<b>57/100.0</b>	<b>108/100.0</b>
	Yes	3 <sup>8</sup> /5.3	5 <sup>9</sup> /4.6
	No	54/94.7	103/95.4
<b>10</b>	<b>Perm</b>	<b>161/100.0</b>	<b>175/100.0</b>
	Yes	0/0	0/0
	No	161/100.0	175/100.0
<b>11</b>	<b>Smolensk</b>	<b>91/100.0</b>	<b>104/100.0</b>
	Yes	0/0	2 <sup>10</sup> /1.9
	No	91/100.0	102/98.1
<b>12</b>	<b>Ufa</b>	<b>119/100.0</b>	<b>211/100.0</b>
	Yes	2 <sup>11</sup> /1.7	4 <sup>12</sup> /1.9
	No	117/98.3	207/98.1
<b>13</b>	<b>Chelyabinsk</b>	<b>95/100.0</b>	<b>124/100.0</b>
	Yes	0/0	0/0
	No	95/100.0	124/100.0

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

<b>14</b>	<b><i>N. Novgorod</i></b>	<b><i>57/100.0</i></b>	<b><i>73/100.0</i></b>
	Yes	2 <sup>13</sup> /3.5	1 <sup>14</sup> /1.4
	No	55/96.5	72/98.6
<b>15</b>	<b><i>Samara</i></b>	<b><i>122/100.0</i></b>	<b><i>138/100.0</i></b>
	Yes	2 <sup>15</sup> /1.6	0/0
	No	120/98.4	138/100.0
<b>16</b>	<b><i>Yaroslavl</i></b>	<b><i>101/100.0</i></b>	<b><i>112/100.0</i></b>
	Yes	1 <sup>16</sup> /1.0	14 <sup>17</sup> /12.5
	No	100/99.0	98/87.5

1 – cefazolin

2 – ampicillin, amoxicillin/clavulanate, cefazolin, furazidin

3 – metronidazole

4 – ampicillin, ceftriaxone (n=3), ciprofloxacin

5 – gentamicin

6 – ciprofloxacin (n=2)

7 – amoxicillin, ceftriaxone (n=7), imipenem/cilastatin

8 – benzylpenicillin, erythromycin, lincomycin

9 – ampicillin, amoxicillin, cefazolin, ceftriaxone, sulfamethoxazole/trimethoprim

10 – cefazoline (n=2)

11 – oxacillin, gentamicin

12 – amoxicillin, amoxicillin/clavulanate, ceftriaxone, ciprofloxacin

13 – amoxicillin, cefazolin

14 – cefazolin

15 – amoxicillin, cefazolin

16 – midecamycin

17 – amoxicillin (n=5), amoxicillin/clavulanate (n=4), cefazolin, azythromycin, ciprofloxacin (n=3)

**Table 10. Antimicrobial chemotherapy in centers where *Practical Guide on Anti-Infection Chemotherapy* was distributed and distance education program was conducted**

INN	Vladivostok (1)		Vladivostok (2)		Tyumen (3)		Moscow (4)	
	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)
Doxycycline	-	-	-	-	3/1.3	-	1/0.8	-
Chloramphenicol	-	-	-	-	-	-	1/0.8	-
Ampicillin	5/2.9	-	9/4.2	1/1.1	32/14.3	10/5.5	5/3.9	-
Carbenicillin	-	-	-	-	1/0.4	-	-	-
Amoxicillin	-	1/0.8	-	-	-	1/0.5	-	-
Ampicillin/oxacillin	-	-	18/8.4	-	3/1.3	-	-	-
Benzylpenicillin	-	-	2/1.0	-	12/5.4	-	-	-
Benzathine benzylpenicillin/Benzylpenicillin procaine	-	-	1/0.5	-	-	-	-	-
Oxacillin	2/1.2	-	5/2.3	-	2/0.9	2/1.1	-	-
Ampicillin/sulbactam	-	-	-	-	-	6/3.2	-	29/36.7
Amoxicillin/clavulanate	4/2.3	8/6.6	4/1.9	7/7.6	-	2/1.1	-	6/7.6
Cefazolin	8/4.7	1/0.8	64/29.8	20/21.7	11/4.9	41/22.5	58/45.0	23/29.1
Cefuroxime	22/12.7	4/3.3	6/2.8	15/16.3	-	-	2/1.6	-
Cefotaxime	31/18.0	12/9.9	13/6.1	11/12.0	75/33.4	53/29.1	1/0.8	4/5.1
Ceftriaxone	2/1.2	2/1.6	8/3.8	10/10.9	-	4/2.2	2/1.6	6/7.6
Ceftazidime	2/1.2	-	2/0.9	-	1/0.4	-	11/8.6	-
Cefoperazone	5/2.9	11/9.1	4/1.9	-	-	2/1.1	-	-
Cefoperazone/sulbactam	2/1.2	4/3.4	-	1/1.1	-	-	-	-

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

Meropenem	-	-	-	1/1.1	-	-	-	-
Doripenem	-	2/1.7	-	-	-	-	-	-
Imipenem/cilastatin	1/0.6	1/0.8	-	-	-	-	-	1/1.3
Sulfamethoxazole/trimethoprim	-	-	-	-	-	-	2/1.6	-
Erythromycin	1/0.6	-	-	-	3/1.3	-	-	-
Spiramycin	-	-	-	-	1/0.4	-	-	-
Azithromycin	4/2.3	13/10.7	-	-	-	4/2.2	1/0.8	-
Clarithromycin	-	7/5.8	-	-	-	1/0.5	-	-
Lincomycin	5/2.9	1/0.8	12/5.6	1/1.1	2/0.9	-	2/1.6	-
Streptomycin	-	-	-	-	5/2.2	-	-	-
Gentamicin	-	-	24/11.2	1/1.1	28/12.5	17/9.3	8/6.2	-
Kanamycin	-	-	4/1.9	-	-	-	-	-
Amikacin	15/8.7	4/3.3	8/3.7	-	12/5.3	10/5.5	-	-
Ofloxacin	-	-	-	-	-	-	1/0.8	1/1.3
Ciprofloxacin	12/7.0	4/3.3	1/0.5	1/1.1	10/4.5	13/7.1	2/1.6	-
Pefloxacin	14/8.1	3/2.5	10/4.7	5/5.4	-	-	-	1/1.3
Norfloxacin	-	-	1/0.5	-	5/2.2	4/2.2	-	1/1.3
Sparfloxacin	9/5.2	-	-	-	-	-	-	-



Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

Levofloxacin	3/1.7	22/18.1	-	-	-	-	-	-
Moxifloxacin	-	3/2.5	-	-	-	-	-	-
Vancomycin	-	1/0.8	-	1/1.1	-	-	-	-
Metronidazole	23/13.4	15/12.4	18/8.3	17/18.5	8/3.5	8/4.4	30/23.3	6/7.6
Nitrofurantoin	-	-	1/0.5	-	-	3/1.6	-	-
Nitroxoline	-	-	-	-	5/2.2	-	-	-
Furazidin	-	-	-	-	5/2.2	1/0.5	2/1.6	-
Rifampicin	1/0.6	-	-	-	1/0.4	-	-	-
Fluconazole	1/0.6	-	-	-	-	-	-	1/1.3
Ketoconazole	-	1/0.8	-	-	-	-	-	-
Itraconazole	-	1/0.8	-	-	-	-	-	-
<b>Total</b>	<b>172/100.0</b>	<b>121/100.0</b>	<b>215/100.0</b>	<b>92/100.0</b>	<b>224/100.0</b>	<b>182/100.0</b>	<b>129/100.0</b>	<b>79/100.0</b>

**Table 11. Antimicrobial chemotherapy in centers where only distance education program was conducted**

INN	Krasnoyarsk (5)		Komsomolskiy (6)		Moscow (7)		Samara (8)	
	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)
Doxycycline	-	-	-	-	2/2.0	2/1.0	3/1.5	1/1.3
Ampicillin	8/3.7	-	53/60.9	27/26.7	-	-	57/28.6	-
Amoxicillin	3/1.4	2/1.0	-	-	-	1/0.5	-	1/1.3
Benzylpenicillin	1/0.5	-	-	-	-	-	-	-
Oxacillin	9/4.2	8/4.0	1/1.1	-	-	-	-	-
Ampicillin/sulbactam	-	4/2.0	-	-	-	-	-	-
Amoxicillin/clavulanate	9/4.2	9/4.5	-	2/2.0	1/1.0	-	-	20/26.0
Amoxicillin/sulbactam	-	12/5.9	-	-	-	-	-	-
Ticarcillin/clavulanate	2/0.9	-	-	-	-	-	-	-
Cefalexin	-	-	1/1.1	-	-	-	-	-
Cefalotin	-	-	2/2.3	-	-	-	-	-
Cefazolin	9/4.2	11/5.4	5/5.7	6/5.9	27/27.6	1/0.5	32/16.1	-
Cefotaxime	37/17.1	-	1/1.1	11/10.9	4/4.1	6/3.1	-	1/1.3
Ceftriaxone	16/7.4	72/35.6	-	11/10.9	4/4.1	71/36.6	4/2.0	11/14.3
Ceftazidime	-	-	-	2/2.0	-	-	-	-
Cefoperazone	-	1/0.5	-	-	1/1.0	-	-	-
Cefoperazone/sulbactam	-	4/2.0	-	-	-	1/0.5	-	-
Cefepime	-	7/3.5	-	-	-	-	-	-
Meropenem	-	1/0.5	-	-	-	-	-	-

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

Imipenem/cilastatin	1/0.5	1/0.5	-	-	-	2/1.0	-	-
Erythromycin	-	-	-	-	-	-	1/0.5	-
Spiramycin	18/8.3	-	-	-	-	-	-	-
Roxithromycin	-	-	-	2/2.0	-	-	-	-
Azithromycin	-	3/1.5	-	4/4.0	-	-	-	-
Lincomycin	25/11.6	1/0.5	1/1.1	2/2.0	-	-	5/2.5	-
Streptomycin	-	-	-	-	-	-	-	-
Gentamicin	24/11.1	-	10/11.4	13/12.4	-	-	29/14.6	-
Amikacin	11/5.1	16/7.9	-	-	-	2/1.0	-	1/1.3
Ofloxacin	-	-	-	-	-	-	1/0.5	1/1.3
Ciprofloxacin	20/9.3	32/15.9	2/2.3	10/9.9	7/7.1	18/9.2	3/1.5	19/24.7
Pefloxacin	9/4.2	4/2.0	2/2.3	7/6.9	1/1.0	2/1.0	-	-
Norfloxacin	1/0.5	-	-	-	6/6.1	17/8.8	3/1.5	-
Sparfloxacin	-	-	-	-	1/1.0	-	-	-
Levofloxacin	1/0.5	-	-	-	1/1.0	1/0.5	-	-
Moxifloxacin	-	2/1.0	-	-	-	-	-	2/2.6
Pipemidic acid	-	-	-	-	2/2.0	-	-	-

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

Vancomycin	1/0.5	-	-	-	-	-	-	-
Fusidic acid	-	1/0.5	-	-	-	-	-	-
Metronidazole	10/4.6	10/5.0	8/9.2	4/4.4	32/32.6	67/34.5	11/5.5	8/10.4
Nitrofurantoin	-	-	-	-	-	-	13/6.5	-
Nitroxoline	-	-	-	-	9/9.2	1/0.5	11/5.5	-
Furazidin	-	-	-	-	-	-	21/10.6	12/15.6
Rifampicin	1/0.5	1/0.5	-	-	-	-	-	-
Furazolidone	-	-	-	-	-	-	5/2.5	-
Fluconazole	-	-	-	-	-	2/1.0	-	-
Ketoconazole	-	-	1/1.1	-	-	-	-	-
<b>Total</b>	<b>216/100.0</b>	<b>202/100.0</b>	<b>87/100.0</b>	<b>101/100.0</b>	<b>98/100.0</b>	<b>194/100.0</b>	<b>199/100.0</b>	<b>77/100.0</b>

**Table 12. Antimicrobial chemotherapy in centers where only *Practical Guide on Anti-Infection Chemotherapy* was distributed**

INN	Bryansk (9)		Perm (10)		Smolensk (11)		Ufa (12)	
	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)
Doxycycline	3/3.4	20/10.7	7/2.5	1/0.4	2/1.1	-	1/0.4	-
Ampicillin	9/10.3	41/21.9	2/0.7	4/1.5	45/25.3	4/2.2	31/11.1	9/1.7
Amoxicillin	1/1.1	6/3.2	-	2/0.8	-	-	1/0.4	1/0.2
Ampicillin/oxacillin	4/4.6	-	7/2.5	-	-	-	44/15.7	-
Benzylpenicillin	24/27.6	2/1.0	2/0.8	-	9/5.1	-	-	-
Benzathine benzylpenicillin/Benzylpenicillin procaine/ Benzylpenicillin	-	-	7/2.6	-	-	-	-	-
Oxacillin	-	-	12/4.3	-	6/3.4	-	1/0.4	9/1.7
Amoxicillin/clavulanate	-	-	-	17/6.4	1/0.6	17/9.3	4/1.4	56/10.7
Amoxicillin/sulbactam	-	-	-	5/1.9	-	-	-	-
Cefalotin	-	-	54/19.4	-	-	-	-	-
Cefazolin	1/1.1	28/15.0	72/25.8	78/29.3	7/3.9	44/24.4	43/15.4	48/9.2
Cefuroxime	-	-	-	4/1.5	-	2/1.1	-	2/0.4
Cefotaxime	2/2.3	12/6.3	5/1.8	27/10.2	16/9.0	22/12.1	27/9.7	89/17.1
Ceftriaxone	-	1/0.5	-	59/21.9	6/3.4	8/4.4	2/0.7	73/14.1
Cefixime	-	-	-	-	-	1/0.5	-	-

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

Ceftazidime	-	-	1/0.4	-	-	-	-	5/1.0
Cefoperazone	-	1/0.5	1/0.4	-	-	-	9/3.3	-
Cefoperazone/sulbactam	-	1/0.5	-	1/0.4	-	1/0.5	1/0.4	4/0.8
Cefepime	-	1/0.5	1/0.4	-	-	-	-	3/0.6
Ertapenem	-	-	-	2/0.8	-	-	-	8/1.5
Doripenem	-	-	-	-	-	-	-	1/0.2
Imipenem/cilastatin	-	-	1/0.4	-	-	-	2/0.7	12/2.3
Sulfamethoxazole/trimethoprim	1/1.1	-	-	-	2/1.1	3/1.6	-	-
Erythromycin	1/1.1	2/1.0	3/1.1	1/0.4	-	-	-	-
Roxithromycin	-	-	-	-	6/3.4	-	-	-
Azithromycin	-	-	-	7/2.6	-	9/4.9	-	-
Lincomycin	8/9.2	3/1.6	9/3.3	1/0.4	2/1.1	6/3.3	11/3.9	6/1.2
Streptomycin	2/2.3	-	-	-	1/0.6	-	-	-
Gentamicin	24/27.6	7/3.7	32/11.5	4/1.5	41/22.8	2/1.1	61/21.8	17/3.3
Kanamycin	3/3.4	-	-	-	1/0.6	-	2/0.7	-
Amikacin	-	5/2.6	27/9.7	2/0.8	6/3.4	2/1.1	1/0.4	16/3.1
Ofloxacin	-	-	-	-	-	-	-	1/0.2

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

Ciprofloxacin	3/3.4	36/19.3	6/2.2	15/5.6	18/10.1	28/15.4	3/1.1	24/4.6
Pefloxacin	-	-	-	2/0.8	-	-	14/5.0	38/7.3
Norfloxacin	-	-	-	8/3.0	1/0.6	-	-	-
Levofloxacin	-	-	-	-	-	1/0.5	-	-
Moxifloxacin	-	-	-	-	-	-	-	1/0.2
Vancomycin	-	-	1/0.4	1/0.4	-	-	1/0.4	6/1.2
Metronidazole	-	21/11.3	28/10.0	25/9.4	7/3.9	32/17.6	21/7.5	53/10.2
Nitrofurantoin	-	-	-	-	1/0.6	-	-	26/5.0
Nitroxoline	-	-	1/0.4	-	-	-	-	1/0.2
Furazolidone	1/1.1	-	-	-	-	-	-	-
Fluconazole	-	-	-	-	-	-	-	10/2.0
Caspofungin	-	-	-	-	-	-	-	2/0.4
<b>Total</b>	<b>87/100.0</b>	<b>187/100.0</b>	<b>279/100.0</b>	<b>266/100.0</b>	<b>178/100.0</b>	<b>182/100.0</b>	<b>280/100.0</b>	<b>521/100.0</b>

**Table 13. Antimicrobial chemotherapy in centers where *Neither Practical Guide on Anti-Infection Chemotherapy* was distributed and the distance education program was conducted**

INN	Chelyabinsk (13)		N. Novgorod (14)		Samara (15)		Yaroslavl (16)	
	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)	2003 (n/%)	2009 (n/%)
Doxycycline	6/3.7	1/0.5	-	-	2/1.0	-	-	-
Ampicillin	42/25.6	11/5.3	7/8.2	-	69/34.0	18/10.3	33/25.0	-
Carbenicillin	-	-	-	-	-	-	3/2.3	-
Amoxicillin	2/1.2	13/6.3	-	2/1.8	-	1/0.6	1/0.8	27/17.0
Ampicillin/oxacillin	-	-	-	-	2/1.0	-	-	-
Benzylpenicillin	1/0.6	-	-	-	-	-	-	-
Oxacillin	-	-	2/2.4	-	5/2.5	7/4.0	-	-
Amoxicillin/clavulanate	4/2.4	13/6.3	-	1/0.9	-	-	-	9/5.7
Ticarcillin/clavulanate	-	-	-	-	-	-	-	1/0.6
Cefazolin	27/16.5	32/15.5	6/7.1	-	9/4.4	61/35.0	9/6.9	22/13.8
Cefuroxime	-	-	1/1.2	-	-	-	-	22/13.8
Cefotaxime	1/0.6	49/23.7	26/30.6	2/1.8	7/3.5	-	32/24.3	-
Ceftriaxone	-	10/4.8	6/7.1	64/58.2	2/1.0	40/23.0	-	42/26.4
Cefixime	-	-	-	-	-	-	-	6/3.8
Ceftazidime	-	1/0.5	-	-	-	1/0.6	-	-
Cefoperazone	1/0.6	-	-	-	14/6.9	-	-	-
Cefoperazone/sulbactam	-	-	-	-	-	1/0.6	-	-
Cefepime	-	1/0.5	1/1.2	-	-	-	1/0.8	-



Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

Imipenem/cilastatin	-	-	-	-	-	-	-	2/1.3
Erythromycin	3/1.8	-	-	3/2.7	1/0.5	-	-	-
Midecamycin	-	-	-	-	-	-	1/0.8	-
Azithromycin	-	10/4.8	-	1/0.9	-	-	-	-
Clarithromycin	-	10/4.8	-	-	-	-	-	1/0.6
Clindamycin	-	-	-	-	-	-	-	2/1.3
Lincomycin	-	-	1/1.2	-	6/3.0	10/5.7	22/16.7	1/0.6
Streptomycin	-	-	-	-	-	-	2/1.5	-
Gentamicin	26/15.9	2/1.0	6/7.1	-	45/22.2	9/5.2	16/12.1	-
Kanamycin	6/3.7	-	-	-	1/0.5	-	-	-
Amikacin	8/4.9	1/0.5	9/10.6	1/0.9	17/8.4	20/11.5	2/1.5	7/4.4
Ciprofloxacin	6/3.6	13/6.3	2/2.4	11/10.0	6/3.0	3/1.7	1/0.8	3/1.9
Pefloxacin	13/7.9	-	11/12.9	-	-	-	3/2.3	-
Norfloxacin	-	-	1/1.2	2/1.8	-	-	-	-
Levofloxacin	-	-	-	-	1/0.5	-	-	2/1.3
Vancomycin	-	-	-	-	-	-	-	1/0.6
Metronidazole	18/10.9	22/10.7	6/7.1	23/20.9	14/6.9	3/1.7	6/4.6	10/6.3
Nitroxoline	-	-	-	-	1/0.5	-	-	-
Rifampicin	-	-	-	-	1/0.5	-	-	-
Fluconazole	-	-	-	-	-	-	-	1/0.6
<b>Total</b>	<b>164/100.0</b>	<b>207/100.0</b>	<b>85/100.0</b>	<b>110/100.0</b>	<b>203/100.0</b>	<b>174/100.0</b>	<b>132/100.0</b>	<b>159/100.0</b>

**Table 14. AM route of administration**

<b>№</b>	<b>City/Route of Administration</b>	<b>2003 (n/%)</b>	<b>2009 (n/%)</b>
<b>1</b>	<b>Vladivostok</b>	<b>172/100.0</b>	<b>121/100.0</b>
	Parenteral	150/87.2	87/71.9
	Oral	22/12.8	34/28.1
<b>2</b>	<b>Vladivostok</b>	<b>215/100.0</b>	<b>92/100.0</b>
	Parenteral	209/77.2	90/97.8
	Oral	6/2.8	2/2.2
<b>3</b>	<b>Tyumen</b>	<b>224/100.0</b>	<b>182/100.0</b>
	Parenteral	197/87.9	165/90.7
	Oral	27/12.1	17/9.3
<b>4</b>	<b>Moscow</b>	<b>129/100.0</b>	<b>79/100.0</b>
	Parenteral	105/81.4	77/97.5
	Oral	24/18.6	2/2.5
<b>5</b>	<b>Krasnoyarsk</b>	<b>216/100.0</b>	<b>202/100.0</b>
	Parenteral	179/82.8	163/80.7
	Oral	37/17.2	39/19.3
<b>6</b>	<b>Komsomolskiy</b>	<b>87/100.0</b>	<b>101/100.0</b>
	Parenteral	79/90.8	82/80.4
	Oral	8/9.2	19/18.8
<b>7</b>	<b>Moscow</b>	<b>98/100.0</b>	<b>194/100.0</b>
	Parenteral	54/55.1	150/77.3
	Oral	44/44.9	44/22.7
<b>8</b>	<b>Samara</b>	<b>199/100.0</b>	<b>77/100.0</b>
	Parenteral	137/68.8	22/28.6
	Oral	62/31.2	55/71.4
<b>9</b>	<b>Bryansk</b>	<b>87/100.0</b>	<b>187/100.0</b>
	Parenteral	77/88.5	127/67.9
	Oral	10/11.5	60/32.1
<b>10</b>	<b>Perm</b>	<b>279/100.0</b>	<b>266/100.0</b>
	Parenteral	248/88.9	230/86.5

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	Oral	31/11.1	36/13.5
<b>11</b>	<b>Smolensk</b>	<b>178/100.0</b>	<b>182/100.0</b>
	Parenteral	142/79.8	115/63.2
	Oral	36/20.2	67/36.8
<b>12</b>	<b>Ufa</b>	<b>280/100.0</b>	<b>521/100.0</b>
	Parenteral	273/96.5	470/90.2
	Oral	7/3.5	51/9.8
<b>13</b>	<b>Chelyabinsk</b>	<b>164/100.0</b>	<b>207/100.0</b>
	Parenteral	135/82.3	160/77.3
	Oral	29/17.7	47/22.7
<b>14</b>	<b>N. Novgorod</b>	<b>85/100.0</b>	<b>110/100.0</b>
	Parenteral	84/98.8	104/94.5
	Oral	1/1.2	6/5.5
<b>15</b>	<b>Samara</b>	<b>203/100.0</b>	<b>174/100.0</b>
	Parenteral	197/97.0	173/99.4
	Oral	6/3.0	1/0.6
<b>16</b>	<b>Yaroslavl</b>	<b>132/100.0</b>	<b>159/100.0</b>
	Parenteral	127/96.2	113/71.0
	Oral	5/3.8	46/29.0

**Table 15. AM purpose of administration**

<b>№</b>	<b>City/Purpose of Administration</b>	<b>2003 (n/%)</b>	<b>2009 (n/%)</b>
<b>1</b>	<b>Vladivostok</b>	<b>172/100.0</b>	<b>121/100.0</b>
	Therapy	136/79.1	100/82.6
	Prophylaxis	36/30.9	21/17.4
<b>2</b>	<b>Vladivostok</b>	<b>215/100.0</b>	<b>92/100.0</b>
	Therapy	191/88.8	77/83.7
	Prophylaxis	24/11.2	15/16.3
<b>3</b>	<b>Tyumen</b>	<b>224/100.0</b>	<b>182/100.0</b>
	Therapy	149/66.5	114/62.6
	Prophylaxis	75/33.5	68/37.4
<b>4</b>	<b>Moscow</b>	<b>129/100.0</b>	<b>79/100.0</b>
	Therapy	44/34.1	20/25.3
	Prophylaxis	85/65.9	59/74.7
<b>5</b>	<b>Krasnoyarsk</b>	<b>216/100.0</b>	<b>202/100.0</b>
	Therapy	205/94.9	178/88.1
	Prophylaxis	11/5.1	24/11.9
<b>6</b>	<b>Komsomolskiy</b>	<b>87/100.0</b>	<b>101/100.0</b>
	Therapy	81/93.1	90/89.1
	Prophylaxis	6/6.9	11/10.9
<b>7</b>	<b>Moscow</b>	<b>98/100.0</b>	<b>194/100.0</b>
	Therapy	26/26.5	51/26.3
	Prophylaxis	72/73.5	143/73.7
<b>8</b>	<b>Samara</b>	<b>199/100.0</b>	<b>77/100.0</b>
	Therapy	193/97.0	77/100.0
	Prophylaxis	6/3.0	0/0
<b>9</b>	<b>Bryansk</b>	<b>87/100.0</b>	<b>187/100.0</b>
	Therapy	68/78.2	150/80.2
	Prophylaxis	19/21.8	37/19.8
<b>10</b>	<b>Perm</b>	<b>279/100.0</b>	<b>266/100.0</b>
	Therapy	261/93.5	159/59.8

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	Prophylaxis	18/6.5	107/40.2
<b>11</b>	<b>Smolensk</b>	<b>178/100.0</b>	<b>182/100.0</b>
	Therapy	171/96.1	172/94.5
	Prophylaxis	7/3.9	10/5.5
<b>12</b>	<b>Ufa</b>	<b>280/100.0</b>	<b>521/100.0</b>
	Therapy	280/100.0	456/87.5
	Prophylaxis	0/0	65/12.5
<b>13</b>	<b>Chelyabinsk</b>	<b>164/100.0</b>	<b>207/100.0</b>
	Therapy	108/65.9	120/58.0
	Prophylaxis	56/34.1	87/42.0
<b>14</b>	<b>N. Novgorod</b>	<b>85/100.0</b>	<b>110/100.0</b>
	Therapy	75/88.2	102/92.7
	Prophylaxis	10/11.8	8/7.3
<b>15</b>	<b>Samara</b>	<b>203/100.0</b>	<b>174/100.0</b>
	Therapy	128/63.1	151/86.8
	Prophylaxis	75/36.9	23/13.2
<b>16</b>	<b>Yaroslavl</b>	<b>132/100.0</b>	<b>159/100.0</b>
	Therapy	67/50.8	96/60.4
	Prophylaxis	65/49.2	63/39.6

**Table 16. Antimicrobial chemotherapy for most frequent diagnoses**

<b>№</b>	<b>City/Diagnosis</b>	<b>AM 2003</b>	<b>2003 (n/%)</b>	<b>AM 2009</b>	<b>2009 (n/%)</b>
<b>Centers where both <i>Practical Guide on Anti-Infection Chemotherapy</i> was distributed and Distance Education Program was conducted</b>					
<b>1</b>	<b>Vladivostok</b>				
	<b>Pneumonia</b>				
		Cefuroxime	8/14.0	Levofloxacin	11/36.7
		Cefotaxime	7/12.1	Cefoperazone	4/13.3
		Sparfloxacin	7/12.1	Azithromycin	4/13.3
		Cefoperazone	6/10.3	Cefoperazone/ sulbactam	2/6.7
		Ciprofloxacin	6/10.3	Moxifloxacin	2/6.7
		Amikacin	4/6.9	Cefuroxime	1/3.3
		Azithromycin	3/5.2	Ceftriaxone	1/3.3
		Lincomycin	3/5.2	Doripenem	1/3.3
		Levofloxacin	3/5.2	Amikacin	1/3.3
		Oxacillin	2/3.4	Vancomycin	1/3.3
		Amoxicillin/ clavulanate	2/3.4	Ketoconazole	1/3.3
		Cefoperazone/ sulbactam	2/3.4	Itraconazole	1/3.3
		Metronidazole	2/3.4		
		Ceftriaxone	1/1.7		
		Ceftazidime	1/1.7		
		Erythromycin	1/1.7		
<b>2</b>	<b>Vladivostok</b>				
	<b>Cholelithiasis</b>				
		Ampicillin	6/24.0	Metronidazole	2/50.0
		Metronidazole	5/20.0	Cefotaxime	1/25.0
		Cefazolin	3/12.0	Pefloxacin	1/25.0
		Pefloxacin	3/12.0		
		Kanamycin	2/8.0		
		Amikacin	2/8.0		
		Ceftazidime	2/8.0		
		Ampicillin/Oxacillin	1/4.0		
		Cefotaxime	1/4.0		
<b>3</b>	<b>Tyumen</b>				
	<b>Burn</b>				
		Benzympenicillin	7/35.0	Ciprofloxacin	6/26.1
		Cefotaxime	4/20.0	Ampicillin/sulbactam	5/21.7

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

		Amikacin	3/15.0	Ampicillin	4/17.4
		Doxycycline	2/10.0	Gentamicin	3/13.0
		Ampicillin	2/10.0	Cefotaxime	2/8.7
		Cefazolin	1/5.0	Oxacillin	1/4.3
		Lincomycin	1/5.0	Ceftriaxone	1/4.3
				Cefoperazone	1/4.3
<b>4</b>	<b>Moscow</b>				
	<b>Adnexitis</b>				
		Cefazolin	2/50.0	Cefazolin	2/50.0
		Metronidazole	2/50.0	Metronidazole	2/50.0
<b>Centers where only Distance Education Program was conducted</b>					
<b>5</b>	<b>Krasnoyarsk</b>				
	<b>Pneumonia</b>				
		Spiramycin	12/37.4	Ceftriaxone	6/31.6
		Ceftriaxone	6/18.8	Amoxicillin/sulbactam	4/21.1
		Gentamicin	3/9.4	Ciprofloxacin	4/21.1
		Lincomycin	3/9.4	Amoxicillin/clavulanate	2/10.5
		Amoxicillin/clavulanate	2/6.3	Pefloxacin	2/10.5
		Ciprofloxacin	2/6.3	Azithromycin	1/5.3
		Cefazolin	1/3.1		
		Cefotaxime	1/3.1		
		Ticarcillin/clavulanate	1/3.1		
		Metronidazole	1/3.1		
<b>6</b>	<b>Komsomolskiy</b>				
	<b>Pneumonia</b>				
		Ampicillin	9/69.2	Cefotaxime	4/28.5
		Gentamicin	2/15.4	Ceftriaxone	4/28.5
		Cefotaxime	1/7.7	Ampicillin	3/21.4
		Ciprofloxacin	1/7.7	Ceftazidime	2/14.3
				Ciprofloxacin	1/7.1
<b>7</b>	<b>Moscow</b>				
	<b>Adnexitis</b>				
		Metronidazole	3/50.0	Metronidazole	5/50.0
		Cefazolin	2/33.3	Ceftriaxone	2/20.0
		Ciprofloxacin	1/16.7	Ciprofloxacin	2/20.0
				Pefloxacin	1/10.0
<b>8</b>	<b>Samara</b>				
	<b>Pyelonephritis</b>				
		Furazidin	19/20.4	Amoxicillin/clavulanate	8/40.0
		Ampicillin	15/16.1	Ciprofloxacin	7/35.0
		Nitrofurantoin	12/12.9	Furazidin	4/20.0

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

		Nitroxoline	10/10.8	Ceftriaxone	1/5.0
		Cefazolin	9/9.7		
		Gentamicin	9/9.7		
		Metronidazole	5/5.4		
		Furazolidone	5/5.4		
		Norfloxacin	3/3.2		
		Ceftriaxone	2/2.2		
		Ciprofloxacin	2/2.2		
		Lincomycin	1/1.1		
		Ofloxacin	1/1.1		
<b>Centers where only Practical Guide on Anti-Infection Chemotherapy was distributed</b>					
<b>9</b>	<b>Bryansk</b>				
	<b>Pneumonia</b>				
		Benzympenicillin	8/38.1	Ciprofloxacin	20/40.0
		Doxycycline	2/9.5	Ampicillin	17/34.0
		Ampicillin	2/9.5	Cefotaxime	3/6.0
		Gentamicin	2/9.5	Doxycycline	2/4.0
		Kanamycin	2/9.5	Amoxicillin	2/4.0
		Amoxicillin	1/4.8	Erythromycin	2/4.0
		Ampicillin/Oxacillin	1/4.8	Cefoperazone	1/2.0
		Cefotaxime	1/4.8	Cefepime	1/2.0
		Streptomycin	1/4.8	Amikacin	1/2.0
		Ciprofloxacin	1/4.8	Lincomycin	1/2.0
<b>10</b>	<b>Perm</b>				
	<b>Pneumonia</b>				
		Amikacin	10/27.8	Cefotaxime	11/37.9
		Cefalotin	9/25.0	Ceftriaxone	5/17.2
		Oxacillin	4/11.1	Azithromycin	5/17.2
		Metronidazole	3/8.3	Ciprofloxacin	3/10.3
		Doxycycline	2/5.6	Cefoperazone/ sulbactam	1/3.4
		Cefazolin	2/5.6	Erythromycin	1/3.4
		Erythromycin	2/5.6	Pefloxacin	1/3.4
		Ciprofloxacin	2/5.6	Vancomycin	1/3.4
		Cefepime	1/2.8	Metronidazole	1/3.4
		Lincomycin	1/2.8		
<b>11</b>	<b>Smolensk</b>				
	<b>Pneumonia</b>				
		Cefotaxime	6/28.6	Amoxicillin/clavulanate	6/26.1
		Roxitromycin	4/19.0	Azithromycin	6/26.1
		Ampicillin	3/14.3	Cefotaxime	5/21.7



Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

		Penicillin G	2/9.5	Lincomycin	2/8.7
		Ciprofloxacin	2/9.5	Metronidazole	2/8.7
		Doxycycline	1/4.8	Ampicillin	1/4.3
		Ceftriaxone	1/4.8	Ciprofloxacin	1/4.3
		Amikacin	1/4.8		
		Streptomycin	1/4.8		
<b>12</b>	<b>Ufa</b>				
	<b>Urolithiasis</b>				
		Ampicillin/Oxacillin	2/28.6	Ceftriaxone	20/33.3
		Cefazolin	2/28.6	Pefloxacin	9/15.0
		Gentamicin	2/28.6	Nitrofurantoin	8/13.3
		Ampicillin	1/14.3	Cefotaxime	7/11.7
				Amikacin	6/10.0
				Ciprofloxacin	3/5.0
				Gentamicin	2/3.3
				Metronidazole	2/3.3
				Ceftazidime	1/1.7
				Imipenem/cilastatin	1/1.7
				Nitroxoline	1/1.7
	<b>Centers where neither Practical Guide on Anti-Infection Chemotherapy was distributed and the Distance Education Program was conducted</b>				
<b>13</b>	<b>Chelyabinsk</b>				
	<b>Acute cholecystitis</b>				
		Ampicillin	7/33.3	Cefotaxime	2/66.7
		Gentamicin	6/28.6	Amikacin	1/33.3
		Amikacin	4/19.0		
		Cefazolin	3/14.3		
		Benzylpenicillin	1/4.8		
	<b>Pneumonia</b>				
		Ampicillin	4/23.5	Amoxicillin/clavulanate	11/25.0
		Amoxicillin/clavulanate	4/23.5	Clarithromycin	8/18.2
		Cefazolin	3/17.6	Azithromycin	8/18.2
		Pefloxacin	3/17.6	Amoxicillin	7/15.9
		Erythromycin	2/11.7	Ceftriaxone	6/13.6
		Amoxicillin	1/5.9	Doxycycline	1/2.3
				Cefepime	1/2.3
				Amikacin	1/2.3
				Metronidazole	1/2.3
<b>14</b>	<b>N. Novgorod</b>				
	<b>Pneumonia</b>				

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

		Cefotaxime	10/50.0	Ceftriaxone	20/58.8
		Pefloxacin	4/20.0	Ciprofloxacin	5/14.7
		Amikacin	2/10.0	Metronidazole	5/14.7
		Cefazolin	1/5.0	Erythromycin	3/8.8
		Cefepime	1/5.0	Azithromycin	1/2.9
		Ciprofloxacin	1/5.0		
		Metronidazole	1/5.0		
<b>15</b>	<b>Samara</b>				
	<b>Appendicitis</b>				
		Gentamicin	4/21.0	Cefazolin	4/80.0
		Metronidazole	4/21.0	Ceftriaxone	1/20.0
		Ampicillin	1/5.3		
		Cefoperazone	3/15.8		
		Oxacillin	1/5.3		
		Cefazolin	3/15.8		
		Amikacin	2/10.5		
		Ceftriaxone	1/5.3		
	<b>Burn</b>				
		Oxacillin	1/25.0	Cefazolin	7/31.8
		Cefazolin	1/25.0	Oxacillin	6/27.3
		Gentamicin	1/25.0	Ceftriaxone	5/22.7
		Ciprofloxacin	1/25.0	Amikacin	3/13.6
				Ampicillin	1/4.5
<b>16</b>	<b>Yaroslavl</b>				
	<b>Sinusitis</b>				
		Ampicillin	11/39.3	Amoxicillin	13/40.7
		Lincomycin	10/35.7	Cefuroxime	9/28.1
		Cefazolin	4/14.3	Cefazolin	3/9.4
		Cefotaxime	2/7.1	Amoxicillin/clavulanate	2/6.3
		Gentamicin	1/3.6	Cefixime	2/6.3
				Clindamycin	2/6.3
				Ciprofloxacin	1/3.1

**Table 17. Antimicrobial chemotherapy adequacy assessment for most frequent diagnoses**

No	City/Diagnosis	Was AM therapy adequate?	2003 (%)	2009 (%)
<b>Centers where both <i>Practical Guide on Anti-Infection Chemotherapy</i> was distributed and Distance Education Program was conducted</b>				
<b>1</b>	<b>Vladivostok</b>			
	<b>Pneumonia</b>			
		Yes	40.0	81.8
		No	46.7	0
		Not evaluable	13.3	18.2
		Total	100.0	100.0
<b>2</b>	<b>Vladivostok</b>			
	<b>Cholelithiasis</b>			
		Yes	11.1	33.3
		No	55.6	33.3
		Not evaluable	33.3	33.3
		Total	100.0	100.0
<b>3</b>	<b>Tyumen</b>			
	<b>Burn</b>			
		Yes	42.9	54.0
		No	57.1	0
		Not evaluable	0	46.0
		Total	100.0	100.0
<b>4</b>	<b>Moscow</b>			
	<b>Adnexitis</b>			
		Yes	22.0	47.0
		No	78.0	40.0
		Not evaluable	0	13.0
		Total	100.0	100.0
<b>Centers where only Distance Education Program was conducted</b>				
<b>5</b>	<b>Krasnoyarsk</b>			
	<b>Pneumonia</b>			
		Yes	73.4	87.5
		No	13.3	0
		Not evaluable	13.3	12.5
		Total	100.0	100.0
<b>6</b>	<b>Komsomolskiy</b>			
	<b>Pneumonia</b>			
		Yes	60.0	92.3
		No	40.0	7.7
		Not evaluable	0	0
		Total	100.0	100.0
<b>7</b>	<b>Moscow</b>			
	<b>Adnexitis</b>			
		Yes	13	42.0

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

		No	87.0	0
		Not evaluable	0	58.0
		Total	100.0	100.0
<b>8</b>	<b>Samara</b>			
	<b>Pyelonephritis</b>			
		Yes	0	73.3
		No	100.0	26.7
		Not evaluable	0	0
		Total	100.0	100.0
<b>Centers where only Practical Guide on Anti-Infection Chemotherapy was distributed</b>				
<b>9</b>	<b>Bryansk</b>			
	<b>Pneumonia</b>			
		Yes	25.0	78.5
		No	75.0	0
		Not evaluable	0	21.5
		Total	100.0	100.0
<b>10</b>	<b>Perm</b>			
	<b>Pneumonia</b>			
		Yes	0	75.0
		No	100.0	25.0
		Not evaluable	0	0
		Total	100.0	100.0
<b>11</b>	<b>Smolensk</b>			
	<b>Pneumonia</b>			
		Yes	57.1	100.0
		No	42.9	0
		Not evaluable	0	0
		Total	100.0	100.0
<b>12</b>	<b>Ufa</b>			
	<b>Urolithiasis</b>			
		Yes	0	73.1
		No	100.0	23.1
		Not evaluable	0	3.8
		Total	100.0	100.0
<b>Centers where neither Practical Guide on Anti-Infection Chemotherapy was distributed and the Distance Education Program was conducted</b>				
<b>13</b>	<b>Chelyabinsk</b>			
	<b>Acute cholecystitis</b>			
		Yes	8.3	50.0
		No	58.4	50.0
		Not evaluable	33.3	0
		Total	100.0	100.0
<b>14</b>	<b>N. Novgorod</b>			
	<b>Pneumonia</b>			
		Yes	61.5	55.5

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

		No	38.5	40.0
		Not evaluable	0	5.0
		Total	100.0	100.0
<b>15</b>	<b><i>Samara</i></b>			
	<b>Burn</b>			
		Yes	33.3	29.4
		No	0	5.9
		Not evaluable	66.7	64.7
		Total	100.0	100.0
<b>16</b>	<b><i>Yaroslavl</i></b>			
	<b>Sinusitis</b>			
		Yes	17.1	15.0
		No	82.9	32.0
		Not evaluable	0	53.0
		Total	100.0	100.0

**Table 18. Distribution of doctors administered AM specialties**

<b>№</b>	<b>City/Who administered</b>	<b>2003 (n/%)</b>	<b>2009 (n/%)</b>
<b>1</b>	<b><i>Vladivostok</i></b>	<b><i>172/100.0</i></b>	<b><i>121/100.0</i></b>
	Surgeon	108/62.9	50/41.3
	Therapist	46/26.7	10/8.3
	ICU specialist	15/8.7	5/4.1
	Clinical Pharmacologist	3/1.7	0/0
	Other	0/0	56/46.3
<b>2</b>	<b><i>Vladivostok</i></b>	<b><i>215/100.0</i></b>	<b><i>92/100.0</i></b>
	Surgeon	183/85.1	19/20.7
	Therapist	0/0	1/1.1
	ICU specialist	32/14.9	16/17.4
	Clinical Pharmacologist	0/0	0/0
	Other	0/0	56/60.8
<b>3</b>	<b><i>Tyumen</i></b>	<b><i>224/100.0</i></b>	<b><i>182/100.0</i></b>
	Surgeon	85/38.0	59/32.4
	Therapist	21/9.4	12/6.6
	ICU specialist	72/32.1	72/39.6
	Clinical Pharmacologist	3/1.3	0/0
	Other	43/19.2	39/21.4
<b>4</b>	<b><i>Moscow</i></b>	<b><i>129/100.0</i></b>	<b><i>79/100.0</i></b>
	Surgeon	128/99.2	70/88.6
	Therapist	1/0.8	0/0
	ICU specialist	0/0	0/0
	Clinical Pharmacologist	0/0	9/11.4
	Other	0/0	0/0
<b>5</b>	<b><i>Krasnoyarsk</i></b>	<b><i>216/100.0</i></b>	<b><i>202/100.0</i></b>
	Surgeon	136/62.9	160/79.2
	Therapist	59/27.3	40/19.8
	ICU specialist	15/6.9	0/0
	Clinical Pharmacologist	1/0.5	0/0
	Other	5/2.4	2/1.0
<b>6</b>	<b><i>Komsomolskiy</i></b>	<b><i>87/100.0</i></b>	<b><i>101/100.0</i></b>

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	Surgeon	20/23.0	51/50.5
	Therapist	22/25.3	50/49.5
	ICU specialist	0/0	0/0
	Clinical Pharmacologist	0/0	0/0
	Other	45/51.7	0/0
<b>7</b>	<b>Moscow</b>	<b>98/100.0</b>	<b>194/100.0</b>
	Surgeon	96/98.0	129/66.5
	Therapist	1/1.0	0/0
	ICU specialist	1/1.0	64/33.0
	Clinical Pharmacologist	0/0	1/0.5
	Other	0/0	0/0
<b>8</b>	<b>Samara</b>	<b>199/100.0</b>	<b>77/100.0</b>
	Surgeon	182/89.6	4/5.2
	Therapist	0/0	35/45.5
	ICU specialist	17/8.4	0/0
	Clinical Pharmacologist	3/1.5	0/0
	Other	1/0.5	38/49.3
<b>9</b>	<b>Bryansk</b>	<b>87/100.0</b>	<b>187/100.0</b>
	Surgeon	31/35.7	108/57.8
	Therapist	38/43.7	70/37.4
	ICU specialist	2/2.3	0/0
	Clinical Pharmacologist	0/0	5/2.7
	Other	16/18.3	4/2.1
<b>10</b>	<b>Perm</b>	<b>279/100.0</b>	<b>266/100.0</b>
	Surgeon	100/35.8	178/66.9
	Therapist	55/19.7	37/13.9
	ICU specialist	20/7.2	47/17.7
	Clinical Pharmacologist	0/0	4/1.5
	Other	104/37.3	0/0
<b>11</b>	<b>Smolensk</b>	<b>178/100.0</b>	<b>182/100.0</b>
	Surgeon	121/68.0	112/61.5
	Therapist	36/20.2	45/24.7
	ICU specialist	21/11.8	23/12.6

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	Clinical Pharmacologist	0/0	2/1.1
	Other	0/0	0/0
<b>12</b>	<b><i>Ufa</i></b>	<b><i>280/100.0</i></b>	<b><i>521/100.0</i></b>
	Surgeon	157/56.0	344/66.1
	Therapist	11/3.9	20/3.8
	ICU specialist	110/39.3	145/27.8
	Clinical Pharmacologist	1/0.4	12/2.3
	Other	1/0.4	0/0
<b>13</b>	<b><i>Chelyabinsk</i></b>	<b><i>164/100.0</i></b>	<b><i>207/100.0</i></b>
	Surgeon	128/78.0	139/67.1
	Therapist	36/22.0	64/30.9
	ICU specialist	0/0	4/1.9
	Clinical Pharmacologist	0/0	0/0
	Other	0/0	0/0
<b>14</b>	<b><i>N. Novgorod</i></b>	<b><i>85/100.0</i></b>	<b><i>110/100.0</i></b>
	Surgeon	59/69.4	60/54.5
	Therapist	20/23.5	29/26.4
	ICU specialist	5/5.9	21/19.1
	Clinical Pharmacologist	1/1.2	0/0
	Other	0/0	0/0
<b>15</b>	<b><i>Samara</i></b>	<b><i>203/100.0</i></b>	<b><i>174/100.0</i></b>
	Surgeon	182/89.6	150/86.2
	Therapist	0/0	0/0
	ICU specialist	17/8.4	9/5.2
	Clinical Pharmacologist	3/1.5	0/0
	Other	1/0.5	15/8.6
<b>16</b>	<b><i>Yaroslavl</i></b>	<b><i>132/100.0</i></b>	<b><i>159/100.0</i></b>
	Surgeon	129/97.7	151/95.0
	Therapist	0/0	0/0
	ICU specialist	3/2.3	5/3.1
	Clinical Pharmacologist	0/0	3/1.9
	Other	0/0	0/0



**Table 19. Distribution of reasons for AM therapy discontinuation**

<b>№</b>	<b>City/Reason</b>	<b>2003 (n/%)</b>	<b>2009 (n/%)</b>
<b>1</b>	<b>Vladivostok</b>	<b>172/100.0</b>	<b>121/100.0</b>
	No clinical efficacy	6/3.5	11/9.1
	Adverse event	0/0	0/0
	Completion of planned treatment course	149/86.6	86/71.1
	Baseless administration	0/0	0/0
	Other	17/9.9	24/19.8
<b>2</b>	<b>Vladivostok</b>	<b>215/100.0</b>	<b>92/100.0</b>
	No clinical efficacy	2/0.9	0/0
	Adverse event	0/0	0/0
	Completion of planned treatment course	186/86.5	83/90.2
	Baseless administration	0/0	0/0
	Other	27/12.6	9/9.8
<b>3</b>	<b>Tyumen</b>	<b>224/100.0</b>	<b>182/100.0</b>
	No clinical efficacy	1/0.4	0/0
	Adverse event	0/0	0/0
	Completion of planned treatment course	217/96.9	174/95.6
	Baseless administration	0/0	0/0
	Other	6/2.7	8/4.4
<b>4</b>	<b>Moscow</b>	<b>129/100.0</b>	<b>79/100.0</b>
	No clinical efficacy	0/0	2/2.5
	Adverse event	0/0	0/0
	Completion of planned treatment course	129/100.0	76/96.2
	Baseless administration	0/0	1/1.3
	Other	0/0	0/0
<b>5</b>	<b>Krasnoyarsk</b>	<b>216/100.0</b>	<b>202/100.0</b>
	No clinical efficacy	16/7.4	14/6.9
	Adverse event	0/0	3/1.5
	Completion of planned treatment course	196/90.7	182/90.1
	Baseless administration	0/0	0/0
	Other	4/1.9	3/1.5
<b>6</b>	<b>Komsomolskiy</b>	<b>87/100.0</b>	<b>101/100.0</b>

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	No clinical efficacy	0/0	4/4.0
	Adverse event	0/0	1/1.0
	Completion of planned treatment course	86/98.9	96/95.0
	Baseless administration	0/0	0/0
	Other	1/1.1	0/0
<b>7</b>	<b>Moscow</b>	<b>98/100.0</b>	<b>194/100.0</b>
	No clinical efficacy	5/5.1	6/3.1
	Adverse event	1/1.0	1/0.5
	Completion of planned treatment course	92/93.9	150/77.3
	Baseless administration	0/0	0/0
	Other	0/0	37/19.1
<b>8</b>	<b>Samara</b>	<b>199/100.0</b>	<b>77/100.0</b>
	No clinical efficacy	4/2.0	0/0
	Adverse event	0/0	0/0
	Completion of planned treatment course	194/97.5	77/100.0
	Baseless administration	0/0	0/0
	Other	1/0.5	0/0
<b>9</b>	<b>Bryansk</b>	<b>87/100.0</b>	<b>187/100.0</b>
	No clinical efficacy	7/8.0	14/7.5
	Adverse event	1/1.1	0/0
	Completion of planned treatment course	70/80.5	156/83.4
	Baseless administration	2/2.4	0/0
	Other	7/8.0	17/9.1
<b>10</b>	<b>Perm</b>	<b>279/100.0</b>	<b>266/100.0</b>
	No clinical efficacy	0/0	3/1.1
	Adverse event	0/0	0/0
	Completion of planned treatment course	278/99.6	263/98.9
	Baseless administration	0/0	0/0
	Other	1/0.4	0/0
<b>11</b>	<b>Smolensk</b>	<b>178/100.0</b>	<b>182/100.0</b>
	No clinical efficacy	28/15.7	26/14.3
	Adverse event	0/0	0/0
	Completion of planned treatment course	150/84.3	156/85.7

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

	Baseless administration	0/0	0/0
	Other	0/0	0/0
<b>12</b>	<b><i>Ufa</i></b>	<b><i>280/100.0</i></b>	<b><i>521/100.0</i></b>
	No clinical efficacy	0/0	39/7.5
	Adverse event	0/0	0/0
	Completion of planned treatment course	276/98.6	448/86.0
	Baseless administration	0/0	1/0.2
	Other	4/1.4	33/6.3
<b>13</b>	<b><i>Chelyabinsk</i></b>	<b><i>164/100.0</i></b>	<b><i>207/100.0</i></b>
	No clinical efficacy	0/0	0/0
	Adverse event	0/0	0/0
	Completion of planned treatment course	164/100.0	207/100.0
	Baseless administration	0/0	0/0
	Other	0/0	0/0
<b>14</b>	<b><i>N. Novgorod</i></b>	<b><i>85/100.0</i></b>	<b><i>110/100.0</i></b>
	No clinical efficacy	0/0	0/0
	Adverse event	0/0	1/0.9
	Completion of planned treatment course	81/95.3	109/99.1
	Baseless administration	0/0	0/0
	Other	4/4.7	0/0
<b>15</b>	<b><i>Samara</i></b>	<b><i>203/100.0</i></b>	<b><i>174/100.0</i></b>
	No clinical efficacy	11/5.4	2/1.1
	Adverse event	0/0	0/0
	Completion of planned treatment course	151/74.4	161/92.6
	Baseless administration	0/0	0/0
	Other	41/20.2	11/6.3
<b>16</b>	<b><i>Yaroslavl</i></b>	<b><i>132/100.0</i></b>	<b><i>159/100.0</i></b>
	No clinical efficacy	0/0	1/0.6
	Adverse event	0/0	1/0.6
	Completion of planned treatment course	129/97.7	143/89.9
	Baseless administration	0/0	0/0
	Other	3/2.3	14/8.9

**Table 20. Distribution of clinical outcomes**

<b>№</b>	<b>City/Outcome</b>	<b>2003 (n/%)</b>	<b>2009 (n/%)</b>
<b>1</b>	<b>Vladivostok</b>	<b>74/100.0</b>	<b>58/100.0</b>
	Cure/Improvement	66/89.2	41/70.7
	Death	0/0	2/3.4
	Move to other ward/hospital	8/10.8	15/25.9
<b>2</b>	<b>Vladivostok</b>	<b>118/100.0</b>	<b>65/100.0</b>
	Cure/Improvement	110/93.2	52/80.0
	Death	7/5.9	4/6.2
	Move to other ward/hospital	1/0.8	9/13.8
<b>3</b>	<b>Tyumen</b>	<b>92/100.0</b>	<b>81/100.0</b>
	Cure/Improvement	91/98.9	79/97.5
	Death	0/0	0/0
	Move to other ward/hospital	1/1.1	2/2.5
<b>4</b>	<b>Moscow</b>	<b>87/100.0</b>	<b>66/100.0</b>
	Cure/Improvement	87/100.0	66/100.0
	Death	0/0	0/0
	Move to other ward/hospital	0/0	0/0
<b>5</b>	<b>Krasnoyarsk</b>	<b>111/100.0</b>	<b>123/100.0</b>
	Cure/Improvement	108/97.3	122/99.2
	Death	0/0	0/0
	Move to other ward/hospital	3/2.7	1/0.8
<b>6</b>	<b>Komsomolskiy</b>	<b>73/100.0</b>	<b>79/100.0</b>
	Cure/Improvement	73/100.0	78/98.7
	Death	0/0	0/0
	Move to other ward/hospital	0/0	1/1.3
<b>7</b>	<b>Moscow</b>	<b>53/100.0</b>	<b>123/100.0</b>
	Cure/Improvement	53/100.0	73/59.4
	Death	0/0	1/0.8
	Move to other ward/hospital	0/0	49/39.8
<b>8</b>	<b>Samara</b>	<b>110/100.0</b>	<b>43/100.0</b>
	Cure/Improvement	110/100.0	43/100.0
	Death	0/0	0/0
	Move to other ward/hospital	0/0	0/0
<b>9</b>	<b>Bryansk</b>	<b>57/100.0</b>	<b>108/100.0</b>
	Cure/Improvement	53/93.0	107/99.1
	Death	1/1.8	0/0
	Move to other ward/hospital	3/5.2	1/0.9

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

<b>10</b>	<b><i>Perm</i></b>	<b><i>161/100.0</i></b>	<b><i>175/100.0</i></b>
	Cure/Improvement	158/98.1	168/96.0
	Death	2/1.2	6/3.4
	Move to other ward/hospital	1/0.6	1/0.6
<b>11</b>	<b><i>Smolensk</i></b>	<b><i>91/100.0</i></b>	<b><i>104/100.0</i></b>
	Cure/Improvement	91/100.0	94/90.3
	Death	0/0	1/1.0
	Move to other ward/hospital	0/0	9/8.7
<b>12</b>	<b><i>Ufa</i></b>	<b><i>119/100.0</i></b>	<b><i>211/100.0</i></b>
	Cure/Improvement	112/94.1	204/96.7
	Death	7/5.9	2/0.9
	Move to other ward/hospital	0/0	5/2.4
<b>13</b>	<b><i>Chelyabinsk</i></b>	<b><i>95/100.0</i></b>	<b><i>124/100.0</i></b>
	Cure/Improvement	95/100.0	124/100.0
	Death	0/0	0/0
	Move to other ward/hospital	0/0	0/0
<b>14</b>	<b><i>N. Novgorod</i></b>	<b><i>57/100.0</i></b>	<b><i>73/100.0</i></b>
	Cure/Improvement	49/86.0	60/82.2
	Death	0/0	0/0
	Move to other ward/hospital	8/14.0	13/17.8
<b>15</b>	<b><i>Samara</i></b>	<b><i>122/100.0</i></b>	<b><i>138/100.0</i></b>
	Cure/Improvement	102/83.6	125/90.6
	Death	1/0.8	2/1.4
	Move to other ward/hospital	19/15.6	11/8.0
<b>16</b>	<b><i>Yaroslavl</i></b>	<b><i>101/100.0</i></b>	<b><i>112/100.0</i></b>
	Cure/Improvement	100/99.0	109/97.3
	Death	0/0	2/1.8
	Move to other ward/hospital	1/1.0	1/0.9
	<b><i>TOTAL</i></b>	<b><i>1521/100.0</i></b>	<b><i>1683/100.0</i></b>

**Institute of Antimicrobial Chemotherapy  
Smolensk State Medical Academy**

**IMPACT OF EDUCATIONAL PROGRAMS ON PRESCRIBING  
PATTERNS OF ANTIMICROBIALS IN MULTIDISCIPLINARY  
HOSPITALS IN DIFFERENT REGIONS OF RUSSIA**

**PROTOCOL**

**Smolensk 2009**

**Table of Contents**

- [1. Background](#) .....
- [2. Objectives](#) .....
- [3. Study characteristics](#) .....
- [3.1. Study design](#) .....
  - [3.2. Study synopsis](#) .....
- [4. Study parts](#) .....
- [4.1. I part](#) .....
  - [4.1.1. Study object](#) .....
    - [4.1.2. Study scheme](#) .....
  - [4.2. II part](#) .....
  - [4.2.1. Study object](#) .....
    - [4.2.2. Study scheme](#) .....
  - [4.3. Data processing](#) .....
- [5. References](#) .....
- [Attachments](#) .....
- [1. Abbreviations](#) .....
  - [2. Contact information](#) .....

## **IMPACT OF EDUCATIONAL PROGRAMS ON PRESCRIBING PATTERNS OF ANTIMICROBIALS IN MULTIDISCIPLINARY HOSPITALS IN DIFFERENT REGIONS OF RUSSIA**

### **PROTOCOL**

#### **1. Background**

Systemic antimicrobials (AM) are one of the most frequently used and most costly group of drugs. About 30% of all drugs and 30-50% of all drugs costs in hospital fall at AM [1]. Some pharmacoepidemiological studies results demonstrated high frequency of irrational AM administrations which characterizes by imprudent use of AMs, inappropriate selection, dose and/or treatment duration. Imprudent and inappropriate use of AMs – is one of the main reasons of antimicrobial resistance [2-4].

Irrational AMs usage can lead to clinical outcomes worsening, drug cost increase and AM resistant strains selection.

One of the ways to improve AM usage practice is educational programs carrying out [5-7]. Thus, AMs guidelines implementation demonstrated to be effective measure for imprudent AMs administration reduction and increase in infectious diseases therapy selection quality [5, 6].

#### **2. Objectives**

To study the impact of educational programs on prescribing patterns of systemic AMs (antibacterial and antifungal) in multidisciplinary hospitals in different regions of Russian Federation.

#### **3. Study characteristics**

##### **3.1 Study design**

Multicenter pharmacoepidemiological study

##### **3.2 Study synopsis**

16 multidisciplinary hospitals (centers) from different regions of Russia will be included in the study. From those in 12 hospitals from 2003 to 2009 educational programs on antimicrobial chemotherapy (Distance Education Program on Antimicrobial Therapy) had been carried out and «Practical Guide on Anti-infection Chemotherapy» had been disseminated, in 4 centers (control group) educational programs and guidelines distribution



had no place. Study will be conducted in different hospital wards. By prescreening procedure 3-8 wards with the most frequent administration/intensive AMs usage will be selected in every center. Work will be coordinated by clinical pharmacologist or doctor who acts as a clinical pharmacologist.

Data will be registered with paper CRFs. Collection and forwarding of CRFs to IAC will be conducted after data capture.

#### **4. Study parts**

1. I part – 2009
2. II part – 2003

#### **4.1 Part I – 2009**

##### **4.1.1 Study object**

Systemic AM administrations (antibacterial and antifungal) in wards with the most frequent usage of that group of drugs.

##### **4.1.2 Study scheme**

Study will be conducted in the I trimester of 2009 (from 01.01.2009 to 31.03.2009) in previously selected 3-8 wards with the most intensive usage of AMs. Wards exact number will be defined by the local coordinator. In every ward single-step study with duration of 14 days (10 working days) will be carried out. Patients admitted to the ward during 24 hours before study beginning (e.g. in the study started at 04:00 p.m. on 01.01.2009 will be included patients admitted to the ward beginning from 04:00 p.m. of the previous day, i.e. 31.12.2008) will be included in the study. AM therapy in patients, included into the study, will be tracked until clinical outcome (hospital discharge, move to the other ward or death).

Prospective information gathering on systemic AMs administration will be conducted according to the following scheme:

- Demographic characteristics of the patient (gender, age)
- Date, time and type of patient's hospitalization
- Basic diagnosis, complications, concomitant diseases (diagnosis will be recorded at the time of patient's inclusion to the study)
- Infection risk factors (intubation, IV catheter presence, full parenteral feeding, cytostatic agents and/or systemic glucocorticoids usage and others)

- Previous AM therapy (during a week before admission to the hospital): presence, AM name, single dosage, route of administration, start and stop date and time
- All AM/AMs (antibacterial and antifungal) trade name/s and administration regimen
- AM administration purpose: AM therapy or AM prophylaxis with indication of the disease required AM administration
- Specialty of doctor administered AM
- Reason for stopping AM therapy

Local coordinator responsibilities:

Working plan in hospital wards working out.

Data gathering with paper CRFs and sending CRFs to IAC.

## **4.2 Part II – 2003**

### **4.2.1 Study object**

Systemic AMs administrations (antibacterial and antifungal) in wards with the most frequent usage of that group of drugs.

### **4.2.2 Study scheme**

Study will be conducted in the I trimester of 2003 (from 01.01.2003 to 31.03.2003) in previously selected 3-8 wards with the most intensive usage of AMs. Wards and ward working plan will be the same as for prospective part of the study. Data gathering will be made on the basis of case histories archive.

Retrospective information gathering on systemic AMs administration will be conducted according to the following scheme:

- Demographic characteristics of the patient (gender, age)
- Date, time and type of patient's hospitalization
- Basic diagnosis, complications, concomitant diseases (diagnosis will be recorded at the time of patient's inclusion to the study)
- Infection risk factors (intubation, IV catheter presence, full parenteral feeding, cytostatic agents and/or systemic glucocorticoids usage and others)
- Previous AM therapy (during a week before admission to the hospital): presence, AM name, single dosage, route of administration, start and stop date and time

Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines  
in Multidisciplinary Hospitals in Different Regions of Russia

- All AM/AMs (antibacterial and antifungal) trade name/s and administration regimen
- AM administration purpose: AM therapy or AM prophylaxis with indication of the disease required AM administration
- Specialty of doctor administered AM
- Reason for stopping AM therapy

Local coordinator responsibilities:

Working plan in hospital wards working out.

Data gathering with paper CRFs and sending CRFs to IAC.

### **4.3 Data processing**

Data will be processed with the computer program developed on the basis of Microsoft Access for Windows XP.

Statistic data processing will be performed by IAC information technologies department using SAS (SAS Institute Program Package, USA, version 8.2). Descriptive statistics will be made for all analyzed indices.

After data processing comparative analysis of results of the I and II part will be conducted between 3 groups (1. centers where both Practical Guide on Anti-Infection Chemotherapy was distributed and DE was conducted; 2. centers where only DE was conducted; 3. centers where only Practical Guide on Anti-Infection Chemotherapy was distributed) and control group.

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## **2. Abbreviations**

**AM** – antimicrobial

**CRF** – case report form

**IAC** – Institute of Antimicrobial Chemotherapy

**DE** – Distance Education Program on Antimicrobial Therapy

### 3. Contact information

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Project Report: Impact of Educational Programs on Prescribing Patterns of Antimicrobial Medicines in Multidisciplinary Hospitals in Different Regions of Russia

CENTER |\_\_| |\_\_| |\_\_| WARD |\_\_| |\_\_| |\_\_| CRF |\_\_| |\_\_| |\_\_| |\_\_|

Patient's first, middle and last letters of name	Date of birth	Sex	Case history №	Date and time of hospitalization	Date of discharge/death	Hospitalization type
_ _ _	_ _ _ _ _ _ _	<input type="checkbox"/> m <input type="checkbox"/> f	_ _ _ _ _	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	_ _ _ _ _ _ _	<input type="checkbox"/> urgent <input type="checkbox"/> planned

**Diagnosis and risk factors**

Basic diagnosis \_\_\_\_\_  
 Complications 1. \_\_\_\_\_ Date |\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_| 2. \_\_\_\_\_ Date |\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|\_|  
 Concomitant 1. \_\_\_\_\_ 2. \_\_\_\_\_ 3. \_\_\_\_\_

Risk factor	Start date	Stop date	Continuing	Risk factor	Start date	Stop date	Continuing
Intubation	_ _ _ _ _ _ _	_ _ _ _ _ _ _	<input type="checkbox"/>	Cytostatic agent usage	_ _ _ _ _ _ _	_ _ _ _ _ _ _	<input type="checkbox"/>
IV catheter	_ _ _ _ _ _ _	_ _ _ _ _ _ _	<input type="checkbox"/>	Systemic glucocorticoid usage	_ _ _ _ _ _ _	_ _ _ _ _ _ _	<input type="checkbox"/>
Full parenteral feeding	_ _ _ _ _ _ _	_ _ _ _ _ _ _	<input type="checkbox"/>	Other _____	_ _ _ _ _ _ _	_ _ _ _ _ _ _	<input type="checkbox"/>
Nasogastric probe	_ _ _ _ _ _ _	_ _ _ _ _ _ _	<input type="checkbox"/>	Other _____	_ _ _ _ _ _ _	_ _ _ _ _ _ _	<input type="checkbox"/>

Previous AM therapy (≤ 7 days):  No  Yes ⇒ AM name, dose regimen and duration \_\_\_\_\_

**Hospital AM therapy**

Trade name	Single dose	Unit	Frequency per day	Route of administration <sup>1</sup>	Start/stop date and time	Purpose of administration <sup>2</sup>	AM therapy type <sup>3</sup>	Doctor administered AM <sup>4</sup>	Reason for stopping AM <sup>5</sup>
1) _____			<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> <input type="checkbox"/> <sub>6</sub>	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> _____	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _   _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	prophylaxis <input type="checkbox"/> therapy <input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> _____ <input type="checkbox"/> <sub>3</sub> _____	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> _____	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> _____
2) _____			<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> <input type="checkbox"/> <sub>6</sub>	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> _____	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _   _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	prophylaxis <input type="checkbox"/> therapy <input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> _____ <input type="checkbox"/> <sub>3</sub> _____	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> _____	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> _____
3) _____			<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> <input type="checkbox"/> <sub>6</sub>	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> _____	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _   _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	prophylaxis <input type="checkbox"/> therapy <input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> _____ <input type="checkbox"/> <sub>3</sub> _____	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> _____	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> _____
4) _____			<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> <input type="checkbox"/> <sub>6</sub>	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> _____	_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _   _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _	prophylaxis <input type="checkbox"/> therapy <input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> _____ <input type="checkbox"/> <sub>3</sub> _____	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> _____	<input type="checkbox"/> <sub>1</sub> <input type="checkbox"/> <sub>2</sub> <input type="checkbox"/> <sub>3</sub> <input type="checkbox"/> <sub>4</sub> <input type="checkbox"/> <sub>5</sub> _____

<sup>1</sup> 1-oral; 2-IM; 3-IV; 4-other (please, specify)

<sup>2</sup> 1-basic diagnosis; 2-complications (please, specify); 3-concomitant disease (please, specify)

<sup>3</sup> 1-empirical; 2-etiotropic

<sup>4</sup> 1-therapist; 2-surgeon; 3-ICU specialist; 4-clinical pharmacologist; 5-other (please, specify)

<sup>5</sup> 1-no clinical efficacy; 2-adverse event; 3-completion of planned treatment course; 4-baseless administration; 5-other (please, specify)

Clinical outcome:  Cure/Improvement  Death: ⇒ Cause \_\_\_\_\_  Move to other ward/hospital \_\_\_\_\_

**ATTACHMENT 2**

Independent Ethics Committee  
of State educational institution of high professional education  
«Smolensk state medical academy of Federal agency of healthcare and social development»  
Legal address: 28, ul. Krupskoj, 214019 Smolensk, Russia  
Operating address: 27, pr. Gagarina 214018, Smolensk, Russia  
Tel.+7 (4812) 63-07-74, FAX. +7 (4812) 61 12 94  
E-mail: lecsigma@antibiotic.ru

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при ГОУ ВПО «Смоленская государственная медицинская академия  
Федерального агентства по здравоохранению и социальному развитию»  
Юридический адрес: 214019 Россия, Смоленск, ул. Крупской, д. 28  
Фактический адрес: , 214018 Россия, Смоленск, пр. Гагарина, д. 27  
Тел. (4812) 63-07-74, Факс. (4812) 61 12 94  
Эл. почта:lecsigma@antibiotic.ru

Dr. A.V.Litvinov  
Professor  
Др. А.В. Литвинов  
Профессор

**ЗАКЛЮЧЕНИЕ ЭТИЧЕСКОГО КОМИТЕТА  
(ВЫПИСКА ИЗ ПРОТОКОЛА №134 ЗАСЕДАНИЯ НЭК  
ПРИ ГОУ ВПО СГМА РОСЗДРАВА)**

Заседание проходило в здании 7 корпуса Смоленской областной клинической  
больницы 26 февраля 2009г в 14-00

Dr. A.L.Savchenkov  
Physician  
Др. А.Л. Савченков  
Врач

На заседании присутствовали: Литвинов А.В., председатель, Савченков А.Л., зам.  
председателя, Коляно И.А., Статенина Н.П., Худовеков С.Н., Белькова Ю.А.,  
Хиондерко О.А.

Dr. V.V.Osipova  
Physician  
В.В. Осипова  
Врач

**Название протокола:** Многоцентровое фармакоэпидемиологическое  
исследование «Влияние образовательных мероприятий на практику  
использования системных антимикробных препаратов в  
многопрофильных стационарах различных регионов РФ».

Mr. I.A. Koljano  
Engineer  
И.А. Коляно  
Инженер

**ЭТИЧЕСКИЙ КОМИТЕТ РАССМОТРЕЛ СЛЕДУЮЩИЕ ДОКУМЕНТЫ:**

1. Протокол исследования.
2. Индивидуальная регистрационная карта.
3. CV главного исследователя.

Mrs. N.P. Statenina  
Lawyer  
Н.П. Статенина  
Юрист

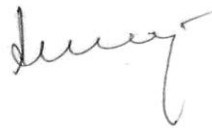
**ЭТИЧЕСКИЙ КОМИТЕТ**

единогласно одобрил представленные документы без внесения  
дополнений и изменений, проведение исследования, а также  
кандидатуру Козлова Р.С. в качестве главного исследователя.

Dr. O.M. Khaykina  
Laboratory doctor  
О.М. Хайкина  
Врач-лаборант

**Председатель Этического Комитета**

Профессор



А.В. Литвинов

Дата

26/02/2009

Mr. S.N. Khudovkov  
Priest  
С.Н. Худовеков  
Священник

Dr. Y.A. Belkova  
Assistant professor  
Ю. А. Белькова  
Ассистент

Ms. O.A. Khionderko  
Medical nurse  
О.А. Хиондерко  
Медицинская сестра



***Database characteristics***

An electronic database was developed for the collection and storage of information on patients and their treatment, and for further data analysis.

The database development used the following products and technologies:

- Operating system (Microsoft Windows Server 2003);
- Web framework (ASP.NET 2.0);
- Database (Microsoft SQL Server 2005); and,
- Development IDE (Microsoft Visual Studio 2008).

The database was designed to register information on any antimicrobial prescription and bind that data to the patient's identification. Information from paper CRFs will be transferred to the database for consequent data analysis.

Statistical data processing was performed by the IAC information technologies department using SAS (SAS Institute Programme Package, USA, version 8.2).