

# **WHONET LABORATORIES ASSESSMENT REPORT**



**AMERICAN INTERNATIONAL HEALTH ALLIANCE**

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## **I. Executive Summary**

The American International Health Alliance (AIHA) established eighteen (18) WHONET laboratories in nine countries of the former Soviet Union (NIS) between 1997-2000. These pilot laboratories chosen to implement the WHONET database were designed to assist the national ministries of health of the NIS countries and their hospitals and reference labs in implementing interventions that facilitate the appropriate use of antimicrobial agents.

AIHA provided culture media and reagents to the labs through 2003 because these supplies were inadequate and did not meet international standards in Eurasia. No additional training or support was provided. In an attempt to evaluate the results and sustainability of the WHONET project, AIHA conducted a phone survey in 2002 to determine if the labs were active (using the WHONET database for data collection, storage, and analysis). Thirteen (13) of the eighteen (18) met the “active” criteria and remain operational. A second phone survey was conducted with the thirteen labs to learn more about the laboratories’ activities and sources of funding as well as to identify factors that facilitate and/or obstruct the successful functioning of the labs.

The thirteen laboratories routinely conduct surveillance of antibiotic resistance at their home institutions and for other facilities and maintain current WHONET databases. Seven of the labs produce recommendations on antibiotic use based on the results of surveillance and respondents from three labs believe they are able to influence policy. Some labs appeared to only perform tests and collect data without much analysis, practical recommendations, or follow-up. Although eleven labs report unusual patterns of resistance revealed through WHONET, such resistance may be an artifact caused by poor quality of supplies or flawed methodology. All the respondents complimented the WHONET software for ease of usage, graphical capabilities, and ability to store and analyze large volumes of data. Most of the WHONET laboratories face the problem of financial sustainability demonstrated by lack of supplies and aged hardware.

## **II. Introduction**

AIHA established three WHONET laboratories (two in Russia, one in Ukraine) in 1997-98 as a cross-partnership infection control demonstration project. The pilot laboratories were developed as part of AIHA’s overall strategy to upgrade the level of microbiology laboratory services and utilization of antimicrobial agents in pilot locations in Eurasia. AIHA worked with WHO and the Society of Health Care Epidemiology of America (INQUAL) to conduct a site needs assessment and develop the project scope of work. Each laboratory received approximately \$10,000 worth of equipment and supplies and \$1,000 for culture media and reagents the following years.

WHO and AIHA partners provided the initial training course for the laboratory staff focused on antimicrobial resistance testing practices and on quality control. Additional technical assistance was provided by US partner institutions. WHONET was translated into Russian and made available in a Windows version in 1999; each lab was provided with a PC and appropriate software package and printer. AIHA and WHO supported the training course on the WHONET database—the faculty for the course included the designers of the original WHONET program from Boston, MA and from WHO, Geneva. Personnel from an additional fifteen (15) laboratories in nine countries were provided WHONET database training and supplies between 1999-2000.

AIHA provided culture media and reagents to the labs through 2003 because these supplies were inadequate and did not meet international standards in Eurasia; no additional training or support was provided to the labs.

### **III. Objectives**

The purpose of the two-pronged survey was to 1) identify how many of the 18 WHONET laboratories were currently active (using the WHONET database for data collection, storage, and analysis) and 2) learn more about the active laboratories' activities and sources of funding as well as to identify factors that facilitate and/or obstruct the successful functioning of the labs. The survey was designed to assist AIHA in determining the overall success of the WHONET project as well as possible future support to the laboratories.

### **IV. Methodology**

The survey instruments were designed by AIHA and AIHA's infection control expert consultant. One AIHA regional program coordinator conducted the phone surveys to ensure consistency in formulating the questions, probing for more detailed answers, and interpreting the responses (first survey September 2002; second survey completed by March 2003). All of the phone interviews were conducted in Russian and each interview took approximately 15-20 minutes. While possibly ensuring consistency, the single interviewer approach in one case resulted in a significant language barrier (in Georgia).

The second survey instrument included seven larger questions, some of which were accompanied by a list of possible responses, while others contained smaller questions (please see the attached questionnaire). The questions were first asked as stated on the questionnaire. If a question prompted an insufficient response, more clues were given to the respondent with an attempt to maintain consistency by the interviewer.

### **V. Findings**

Of 18 WHONET laboratories established by AIHA in Eurasia, 13 laboratories were identified as currently functioning and using the WHONET database for data collection, storage, and analysis. Five labs-- in Ashgabat, Dushanbe, Moscow, St. Petersburg (Reference laboratory), and Tashkent were either not using the WHONET software or not functioning altogether.

Responses to the follow-up survey of the active centers are outlined next.

Responses to Question 1, "Have you implemented WHONET into practice in your lab?" were positive from all thirteen laboratories since only labs actively using WHONET software were surveyed. Thus, all the labs were rated higher than 1 on the suggested scale. To the second part of the same question, "How often do you present your data to AIHA?", eight labs replied that they provided AIHA with their data twice in 2002, thus giving them the highest rating of "5". Two labs submitted data only once, rating them "4" on the scale applied and two labs in Russia had not shared their databases with AIHA (for "data privacy" reasons) thus rating them "3".

Question 2, "Is your laboratory conducting surveillance of antibiotic resistance? (Yes/No. If Yes, what type of surveillance is being conducted?), elicited a positive response with a need for further clues on the "types of surveillance". Respondents were then given such hints as sources

of specimens, if resistance tests are conducted on all isolates, if all the data is entered into the database, and if there are other sources of data besides home institution. All WHONET labs are affiliated with (if not housed by) multi-specialty clinical institutions, which provide material for microbiological tests. All respondents stated that resistance tests are conducted on most if not all isolates and that results of all tests are entered into the WHONET database. At least two centers, also receive test results from other institutions.

Responses to question 3, “How were the data collected by your laboratory used?” varied from quite detailed to insufficient, in which case a choice of answers was provided. If in a detailed response one or more of the choices were not mentioned, they were offered to the respondent as well. Half of the centers (six of thirteen) reported changing antibiotic recommendations for the hospital. Meanwhile, three of these respondents noted that recommendations are not implemented into practice, primarily for economic reasons (both the hospital and patients use whatever is cheaper). The other half of WHONET labs said they do not formulate institutional recommendations on antibiotic use. The majority, nine of thirteen labs, say the results of their tests are utilized to change antibiotic usage in individual patients. Only three labs report influencing the institutional antibiotic purchasing practices. Other usage of data included sharing the data with different institutions, conducting scientific research, and training epidemiologists.

Seven labs responded positively to question 4, “Were new antibiotic resistance patterns identified using the WHONET software? If yes, which organisms and antibiotics were identified?” (Please see details in the table below). In most cases, however, such patterns were not new, but rather unusual or rare.

All respondents positively replied to question 5, “Did the WHONET software help to determine antibiotic use?” Without exception, the respondents hesitated in giving a more detailed answer. Therefore, the respondents were asked to compare their capabilities when performing an analysis on paper by hand, with capabilities provided by WHONET software. Advantages named included ease of data collection, storage, and analysis; population-based research; graphic capabilities; and some others (see more details in a table below).

The majority of WHONET labs do not have an outside source of support other than AIHA. One center reported participation in an international project on STIs in commercial sex workers (the respondent was not able to identify the source of funding). Another center provides some services for a fee (this is part of the funding arrangement in the home institution).

Question 7, in fact, contained eight smaller questions all regarding challenges that face WHONET labs. All respondents gave a positive answer to the question, “Did you find the WHONET software easy to use?” Five labs, though, reported some problems related to the software, and four reported problems with hardware. None of the centers reported any problems receiving training on the use of the WHONET software. Eight respondents said they experience difficulties related to reagents. These included lack of media and discs, and/or their low quality and lack of standardization. Five respondents admitted difficulties related to equipment. Finally, only one respondent expressed concern regarding personnel and its training.

## **Discussion**

The second survey of “active” WHONET labs revealed that the labs maintain up-to-date antibiotic resistance databases and in most cases the labs are ready to share this information with AIHA and other interested parties. Most respondents answering an open-ended question on surveillance of antibiotic resistance had difficulty describing coherently the kind of surveillance

they have been conducting. More detailed questions revealed a pattern common to most labs-- they are collecting specimens from clinical departments of multi-specialty hospitals they are affiliated with, routinely perform antibiotic resistance tests on the cultures, and put all the results into the database. Some labs also perform bacteriological tests for outside institutions, and/or receive results from other institutions to enter into the database.

The use of the data collected varies between labs much more than the methodology. An expected application of the WHONET database would be developing institutional recommendations on antibiotic use which would result in modified purchasing policies of individual departments, hospitals, or whole regions. About half of the centers reportedly formulate such recommendations. However, only three of the labs stated that they have enough clout to impact policy change. The reasons given are primarily financial, i.e. the hospitals and patients buy whatever is cheaper; however this may be only part of the reason because in some cases recommendations are made in favor of cheaper drugs. Another reason why administrators don't follow recommendations may be lack of buy-in to the evidence-based practice on the part of senior hospital officials.

It is unlikely that adjustments to treatment of individual patients mentioned by most respondents can be attributed to the use of WHONET. Changes in the course of treatment are usually made according to the results of sensitivity tests on a particular isolate from the specific patients. This does not require population-based analysis using WHONET software.

An alarming trend was found in five of the laboratories-- no recommendations on antibiotic use where provided. Changing the pattern of antibiotic use from empirical to evidence-based was a significant goal of the WHONET project. The fact that some labs fail to produce recommendations and/or to follow how the data can be used is of concern. It is possible, however, that a phone conversation was not the best method to identify and obtain such specific details. For example, the respondents may not have possessed all the knowledge on the use of the data, or they may be concerned only with some part of its use, such as academic research and teaching. Also, academic labs may be producing practical recommendations in the form of articles, dissertations, or training courses not identified as such during the interview. Nevertheless, a response such as "we don't care [how the data is used]" given by one of the respondents sends an alarming message.

The majority of WHONET labs report some unusual patterns of antibiotic resistance they were able to discover. Several respondents, however, admitted that the nature of such findings as 15% resistance of *Streptococcus*, or 40% resistance of *Staphylococcus* to vancomycin are flawed due to varying quality of discs and media or faulty methodology.

The WHONET software was highly appreciated by the users for its simplicity, graphic capabilities, and ability to store and analyze large volumes of data. Some difficulties the users had experienced with the software they attributed to the learning curve suggestions mostly concerned improvement of the program, not troubleshooting. One response may represent a potential software problem related either to the program itself or its environment (program failures after adding new fields). Several respondents mentioned that they use version five (5) of WHONET software. However, someone noted that version six (6) is "more stable" and asked where it was available.

Most WHONET labs do not have additional sources of funding other than their home institutions. Several respondents mentioned AIHA as an outside donor. The problem of financial sustainability is significant since many labs experience shortages of discs, media, and to a lesser

extent equipment. Only one lab (Samara) demonstrated financial stability. Almost all the labs expressed interest in receiving continued support from AIHA either in the form of supplies or participation in training events.

## FOLLOW-UP SURVEY TOOL

**Question 1:** Have you implemented WHONET into practice in your lab? How often do you present your data to AIHA?

*[Using a scale of 1-5, with 1 representing the minimum value, rate the laboratory based on the amount of data they have collected.]*

*1 = If laboratory has never successfully implemented WHONET*

*2 = If laboratory successfully implemented WHONET, but now inactive*

*3 = If laboratory reports data collection, but cannot substantiate with files*

*4 = If data has been collected and this can be confirmed with receipt of electronic data file on at least one occasion*

*5 = If data has been collected regularly and this can be confirmed with receipt of all electronic data files*

**Question 2:** Is your laboratory conducting surveillance of antibiotic resistance? *(Yes/No. If Yes, what type of surveillance is being conducted?)*

**Question 3:** How were the data collected by your laboratory used? *[Possible uses of data include: (a) to change antibiotic recommendations for a hospital; (b) to change hospitals' antibiotic usage for individual patients; and/or(c) to change antibiotic purchasing practices for hospitals; (d) other]*

**Question 4:** Were new antibiotic resistance patterns identified using the WHONET software? If **yes**, which organisms and antibiotics were identified?

**Question 5:** Did the WHONET software help to determine antibiotic use?

**Question 6:** Is there an outside or local institutional funding source that supports the work of the WHONET laboratory?

**Question 7:** (a) Did you find the WHONET software easy to use?

(b) Did you encounter any problems when working with the WHONET software?

(1) Were the problems related to software?

(2) Were the problems related to hardware?

(c) Did you have any problems receiving training on the use of the WHONET software?

(d) Did you encounter any problems relating to the lack of:

(1) reagents?

(2) tools or equipment?

(3) personnel?

(4) training of personnel?

**FOLLOW-UP SURVEY RESULTS, BY CENTER, IN ALPHABETICAL ORDER**

Center	Question 1	Question 2	Question 3	Question 4	Question 5	Question 6	Question 7
Almaty	[5] Data were submitted to AIHA/Almaty on more than one occasion	Yes Results of all microbiologic tests are entered into the database and analyzed	(a) No (b) Yes (c) No (d) Scientific research	Yes Methicillin and vancomycin-resistant <i>Staphilococci</i> ; Amikacin-resistant Gram-negative organisms	Yes Standardized isolates provided were very helpful	No	(a) Yes (b, 1) No (b, 2) Yes – the computer is old (c) No (d, 1) No (d, 2) Yes – equipment is obsolete (d, 3) No (d, 4) No
Bishkek	[5] The files are available upon request, and they were provided to AIHA/Almaty twice in 2002	Yes All specimens from an outpatient center at the Academy, and from two surgical departments is tested for resistance, and the results are entered into the database	(a) Yes, e.g. penicillin is not used anymore (b) Yes (c) No (d)	Yes 40% of <i>Staph</i> isolates are resistant to vancomycin – likely flawed; up to 80% of <i>Staph</i> isolates are resistant to new macrolides	Yes It provides good graphic capabilities to demonstrate results	Yes AIHA supplied with discs The lab was also involved in research on STIs in commercial sex workers – funding source not clear	(a) Yes (b, 1) Yes, at the learning curve. Need to have capability to enter into database microbial associations (b, 2) Yes, computer is too old (c) No (d, 1) Yes – media and discs are rather expensive (d, 2) No (d, 3) No (d, 4) No
Kyiv	[5] Data available for several years. They were submitted to AIHA twice last year.	Yes Specimens come from the Institute's hospital and polyclinic. Test results are entered into the database and analyzed	(a) No (b) No (c) No (d) Publishing scientific articles (>10 published); collaboration with a hospital; training epidemiologists	Yes <i>Enterobacteriaceae</i> resistant to multiple beta-lactams	Yes It allows to summarize material very effectively; to follow the dynamics of resistance	No	(a) Yes (b, 1) No (b, 2) No (c) No (d, 1) No (d, 2) Yes (d, 3) No (d, 4) No
Kutaisi	[5] Data files are available,	Yes	(a) No (b) No	Yes <i>S. aureus</i> resistant	Yes Helps in	No	(a) Yes (b, 1) Yes. Need to enter

	and are regularly submitted to CDC in Tbilisi. The data were also submitted to AIHA twice in 2002		(c) No (d) The data is sent to CDC in Tbilisi	to cefotaxime but sensitive to amikacin and erythromycin	collecting and analyzing data		another antibiotic (imipenem) into the database. (b, 2) No (c) No (d, 1) Yes, currently experiencing problems with re-supplies (d, 2) No (d, 3) No (d, 4) No
Lviv	[5] The current person has been in charge of the program for the last 9 months – data are available and was submitted twice to AIHA/Kiev in 2002	Yes All specimens from different departments is tested for resistance, and the results entered into the database	(a) Yes, recommendations are made but are not followed, primarily for economic reasons (b) Yes (c) No (d)	No	Yes It makes possible population-based research of antibiotic resistance	No	(a) Yes (b, 1) No (b, 2) No (c) No (d, 1) Yes, there is need for standard media and disks (d, 2) No (d, 3) No (d, 4) No
Odessa	[5] Data available from the start of the center; they were submitted to AIHA/Kiev twice last year	Yes Specimens collected from the regional hospital; test results are routinely entered into the database	(a) No (b) Yes (c) No (d) The lab has not analyzed if it has any impact on the hospital policies	Yes <i>P. aeruginosa</i> resistant to imipenem; <i>Enterococci</i> sensitive only to vancomycin	Yes Resistance data is analyzed upon request from the hospital administration	No	(a) Yes (b, 1) No (b, 2) Yes, there is only one computer for several employees (c) No (d, 1) Yes - Running out of disks (d, 2) Yes - Would like to have analyzers (d, 3) Yes – Would like to have a programmer on staff (d, 4) Yes – see above
Samara	[3] Data available for several years. Data	Yes 1,500-2,000 specimens a month from different	(a) Yes Hospital-acquired infections are	Yes 15% of <i>Streptococcus</i>	Yes Helps summarize data	Yes Fee-for-service	(a) Yes (b, 1) Yes – need capability to print out

	files have not been submitted to AIHA upon request	departments of the hospital. Test results are entered into the database and analyzed	identified; recommendations are made for different departments and buildings; newly marketed drugs are compared with those commonly used, e.g. gentamicin was recently recommended in favor of imipenem (b) Yes (c) Yes (d)	isolates are vancomycin-resistant			results of a single day tests, not the whole database (b, 2) No (c) No (d, 1) No (d, 2) No (d, 3) No (d, 4) No
St. Petersburg, Mechnikov Academy	[3] Data available for many hospitals in the city and the Region for several years. The database is very large and ramified – specific data can be provided upon request	Yes Specimens and data from many hospitals in the city and the Region are analyzed. Staff at many hospitals is trained on using WHONET	(a) Yes (b) Yes (c) Yes, but not at every hospital – it depends on understanding of the issues by the administrators (d)	No Most unusual findings prove erratical	Yes It helps change institutional policies, not just treatment of individual patients		(a) Yes (b, 1) Yes – in v. 5 the database sometimes would not run after new fields are added (b, 2) No (c) No. Hands-on training needs to be emphasized (d, 1) No (d, 2) No (d, 3) No (d, 4) No
Tbilisi	[5] Data files are available, and were submitted twice to AIHA/Tbilisi in 2002	Yes Specimens are provided by the republican hospital. Also, data are sent from other centers in Georgia	(a) No (b) No (c) No (d) The center does not track how the data is used	No	Yes It makes data analysis easier	Yes AIHA	(a) Yes (b, 1) No (b, 2) No (c) No (d, 1) Yes – in 2002, there was shortage of discs for 6-7 months (d, 2) No (d, 3) No (d, 4) No
Vladivostok	[4]	Yes	(a) Yes	Yes	Yes	No	(a) Yes

	Data are available and used by both the lab staff and local medical school. Data were provided to Dr. O'Brien last year	Specimens come from various hospital departments. All cultures are tested for resistance, and results entered into the database	Recommendations are provided to hospital epidemiologist and pharmacologists. Not used in practice (b) Yes (c) No (d) Scientific articles published	Vancomycin-resistant <i>Staph.</i> Intermediate resistance to ciprofloxacin	Helps in summarizing data and comparing different years		(b, 1) Yes, need to analyze data by department, which requires supporting separate databases (b, 2) No (c) No (d, 1) Yes – re-supply by the hospital is not always timely; discs are not standardized (d, 2) Yes – most equipment is obsolete (d, 3) No (d, 4) No
Yerevan, Erebuni	[5] Data are available, and were provided to AIHA twice in 2002	Yes Results of all routine microbiological tests are entered into the database	(a) Yes, the lab prepares methodological recommendations for the hospital (b) Yes (c) No (d) Two other hospitals in Yerevan are being trained by this lab	No	Yes Makes it easy to compare data, and to establish epidemiological links	No	(a) Yes (b, 1) No, but WHONET v. 6 is more stable (b, 2) Yes – one computer for 6 people (c) No, but would appreciate if any courses are offered (d, 1) Yes – discs come from various sources, and not standardized (d, 2) No (d, 3) No (d, 4) No
Yerevan, Emergency Hospital	[4] The data were provided to AIHA at the end of 2002	Yes Specimens are sent from different departments of the hospital, and test results are routinely entered into the database.	(a) No (b) Yes (c) Yes (d)	No	Yes The database stores all the data; it also allows to depict findings graphically	No	(a) Yes (b, 1) No (b, 2) No (c) No (d, 1) Yes – shortage of media (d, 2) Yes – would like to have equipment for anaerobes

							(d, 3) No (d, 4) No
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