Concise Antibiogram Toolkit

Using WHONET to Create Your Antibiogram

WHONET is free Windows-based database software developed in 1989 by the World Health Organization (WHO). The software is used in laboratories worldwide for the management and analysis of microbiology laboratory data with a special focus on the analysis of antimicrobial susceptibility test results. This software will analyze the culture results of your nursing home facility and supply you with the susceptibility results for your antibiogram.

To learn how to use the software, you will need to complete the tutorials available on the WHONET website. You will need to register, which is free, to begin viewing the tutorials. Please use this document to supplement the tutorials. This document is specific to creating an antibiogram.

A troubleshooting section to address some of the issues you may find is included. WHONET also provides technical support, available once you have registered and logged in.

Downloading WHONET Software Program

1. Go to the World Health Organization's webpage for WHONET Software at http://www.whonet.org/software.html

2. Follow the instructions for installing the software on your computer. If you need guidance or assistance, click on the Contact tab, or send email to help@whonet.org

Using WHONET

WHONET has a set of tutorials to help you learn to use WHONET. These can be accessed by clicking on the Documentation tab.

You may want to start with the BacLink tutorials, as you will need to convert your files in BacLink before they can be used by WHONET.

Converting files in BacLink

The BacLink Tutorials will walk you through converting data into a format that WHONET can read. You will need to first convert the file containing your culture data (often a Microsoft Excel or Access file) into a Text file format. This process is explained in the tutorials. You can then use BacLink to convert that Text file for use in WHONET. The first three tutorials—"Getting started," "Excel, text files, other applications," and "Laboratory Information Systems"—are particularly helpful.

The tutorials will explain how to define the data fields from your database (Culture Date, Organism, etc.) so that WHONET can understand them. You will need to select the data fields from your data file that correspond with the WHONET data fields. Here are some suggestions for how you might define your data fields in BacLink, using the template Access or Excel table included in the toolkit as an example:

Identification Number = Resident ID

Sex = Sex

Date of Birth = Birthdate

Location = Room

Department = Floor*

Specimen number = Culture ID

Specimen Date = Collection Date

Specimen Type = Source

Organism = Organism

*The "Department" field does not necessarily have to be "Floor." It could also be "Bed," or any other location category of interest. WHONET was designed for use in hospitals, so the fields may not fit perfectly in a nursing home setting.

"Antibiotic result" fields can be defined for any or all of the antibiotics for which you have susceptibility results. The templates from the toolkit include a comprehensive list of antibiotics that isolated bacteria are commonly tested against in microbiology laboratories. If your facility's affiliated lab regularly tests only some of the antibiotics on this list, you only need to include those antibiotics.

It is strongly recommended that you get culture data from your affiliated lab electronically. It will be more efficient to convert that electronic file directly to a Text file, instead of entering the data manually into a database. This Text file can then be converted in BacLink for use in WHONET. Data field names will likely differ slightly, but the list above should offer some guidance.

It should be noted that these are just suggestions, and you may end up modifying the field definitions based on your specific data and facility needs.

Using WHONET to Find Percent (%) Susceptibilities

The WHONET tutorials will show you how perform the data analysis to obtain a susceptibilities report. Below are a few tips for Data Analysis in WHONET that should make creating and updating the antibiogram easier. These are covered in detail in the tutorials, but there are some settings for data analysis that make creating the antibiogram easiest:

1. After opening "Data Analysis" in WHONET, click on "Analysis type." A box will open with options.
    - For "Analysis type," select "% RIS and test measurements."
    - For "Report format," choose "Summary."
    - Under "Antibiotics," leave "All antibiotics" selected. This will give you percent (%) susceptibility for all antibiotics that have susceptibility results.
    - Click "OK."

2. Click on "One per patient?" in the top right corner. Another box will open with options.

- At the top, under "Include which result in the analysis of each species?" select "By patient."
- Then select "First isolate only." This will ensure that you are only analyzing the first isolate found for each resident, so results are not biased by residents with recurring infections by the same organism.
- Click "OK."

3. Under "Organisms," select all the organisms that have been found in cultures at your facility.

4. Under "Data files," select the Text file that you created from your culture data.

Running analysis under these settings will display the results in a format similar to the antibiogram. It will list each organism along with the number of residents who had a positive culture for that organism and the percent (%) susceptibility to each antibiotic. These percent (%) susceptibilities can then be manually entered into the antibiogram template provided in the toolkit.

Print the results to make entering the percent (%) susceptibilities into the antibiogram template easier.

Checking Your Results/Troubleshooting

Double check the printout to make sure everything looks correct and fits with your data. A few specific things to look for are:

1. Are all the organisms you have seen in your data listed on the printout?
    - If an organism you expect to see is missing from the printout, first check your settings in the "Data analysis" box. Check to see if the missing organism is listed in the box under the "Organisms" button. If not, click on the "Organisms" button and add the missing organism.
    - If the organism is listed, try going into BacLink and running the file conversion again to make sure WHONET is recognizing the organism correctly. If at the end of the conversion you get a message that WHONET does not recognize all of the codes in your data file, click "Yes" to define the codes. If your missing organism is listed here, define it (along with any other unrecognized codes) and rerun the conversion. Then rerun the Data analysis in WHONET and see if your organism shows up.

2. Do the numbers of first isolates for each organism (listed under the "Number of patients" column; see red arrow in Figure 1 in Tool titled "How to Enter Data Manually Into an Antibiogram Template") seem to fit with the frequency at which you've seen these organisms in positive cultures?
    - Remember, WHONET restricts its results to the first isolate per patient, so the numbers may be smaller than you expected. However, if any number seems unexpectedly low you may want to check your database to see if the numbers are consistent (taking into account repeat isolates from the same person).
    - Make sure that all of the entries for each organism are spelled correctly and consistently in your database. For example, if one of your *S. aureus* isolates was

accidentally entered as "*A. aureus*," it will not be recognized by WHONET and, therefore, will not be included in the results.

3. Are all the antibiotics for which you had susceptibility results showing up in the printout?
    - If an antibiotic that has susceptibility results is missing from the printout, there are two likely reasons:
        a) The antibiotic may not be defined, or may be defined incorrectly, in BacLink. This can happen if you've added an antibiotic or edited an antibiotic name in your database since last running the conversion.
            - Open BacLink, and make sure you are using the Text file created from the most current version of the database.
            - Scroll to the bottom of WHONET's list of data fields and look for the missing antibiotic. If it is not there, click the "Add" button beneath the list to add it. If it is there, confirm that it is set equal to the same antibiotic from your data fields.
            - Run the conversion again and then the analysis in WHONET to see if the antibiotic shows up in the results.
        b) The antibiotic may not have been added when setting up your laboratory in WHONET. If this is the case, the antibiotic will not be listed in the key of antibiotic abbreviations at the bottom of the WHONET printout (see Figure 3 in Tool titled "How to Enter Data Manually Into an Antibiogram Template" for an example of a printout). If, as described above, the antibiotic is improperly defined in BacLink, then the abbreviation key will list the antibiotic but its abbreviation will not be listed as a column header for percent (%) susceptibilities.
            - Open WHONET and confirm that the antibiotic is properly listed for your laboratory.. If the antibiotic is not listed, you will need to add it.
            - Run the analysis again and see if the antibiotic shows up in the results.

4. Any time that the report appears incorrect, first check that you are using the most current form of your database. This is particularly important if you have ever renamed the database or saved it in multiple locations. When you are ready to analyze your data you should always make sure the most current database is converted to a Text file, that that Text file is then selected for conversion in BacLink, and that that converted file is selected for analysis in WHONET. Otherwise, you may be using outdated or incomplete data, which could lead to many of the problems described above.

Other Uses

In addition to making and updating the antibiogram, you can use WHONET to answer more specific infection control questions. For example, you could analyze a specific organism. Or you can click on "Isolates" when setting up data analysis to set more specific criteria for your results (for example, to look at only one floor or one ward). See the WHONET and BacLink Tutorials for more detailed information.