WHONET

Laboratory configuration

WHONET Tutorial – Laboratory Configuration

This tutorial includes the following sections.

Part 1. Describing your laboratory
Part 2. Selecting your antibiotics
Part 3. Configuring your antibiotics
Part 4. Patient locations
Part 5. Data fields
Part 6. Isolate alerts
Part 7. Finishing laboratory configuration

The purpose of laboratory configuration is to describe to WHONET details about your institution and your laboratory test practices. This tutorial describes how to create a "new laboratory" from the very beginning.

Note: If you will be using BacLink, there is a short-cut to accomplish most of the following steps. See the BacLink tutorials for more information. The short-cut feature is called "Create a laboratory from a data file", and can be found under the WHONET "File" menu option.

Part 1. Describing your laboratory

Double-click on the WHONET icon on your desktop to begin WHONET. You will see a list of laboratory configurations currently defined on your computer. Click on "New Laboratory" to begin.
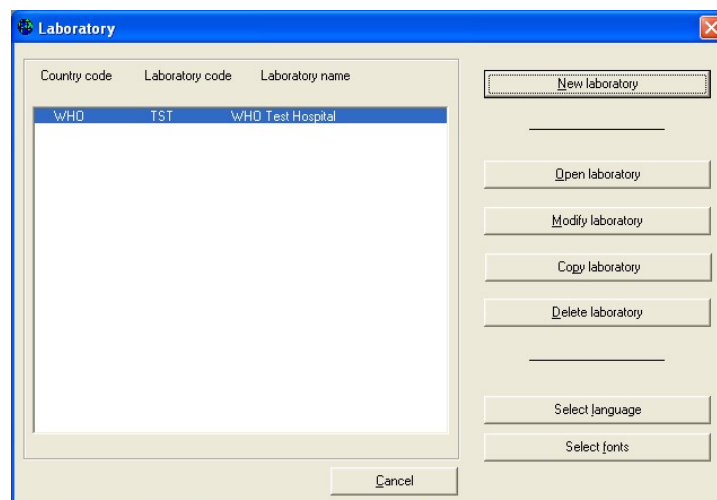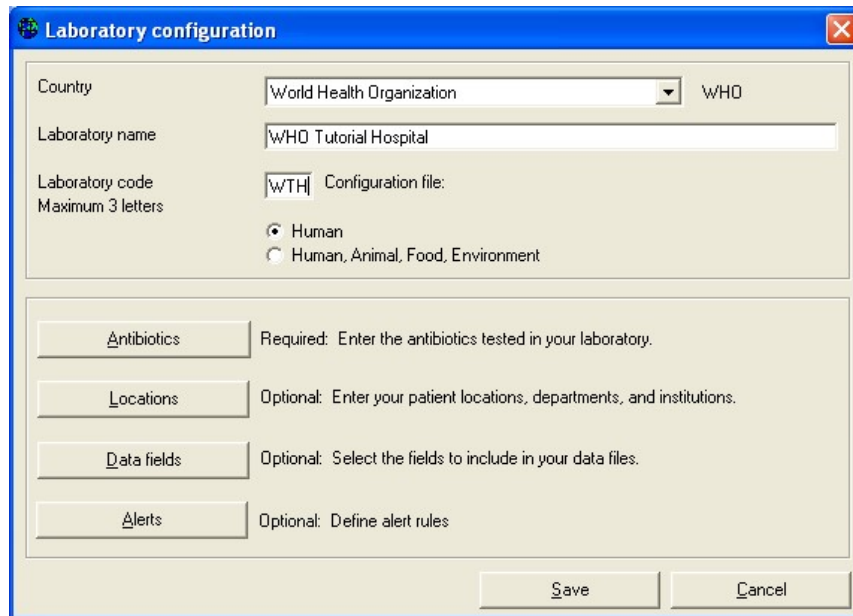
Figure 1. List of WHONET laboratory configurations. Select "New laboratory".

In this tutorial, you will create an institution in the special "country" World Health Organization called "WHONET Tutorial Hospital". So for country, select "World Health Organization", and for the laboratory name, type "WHONET Tutorial Hospital". For the laboratory code, put "WTH". Your screen should look like the below.
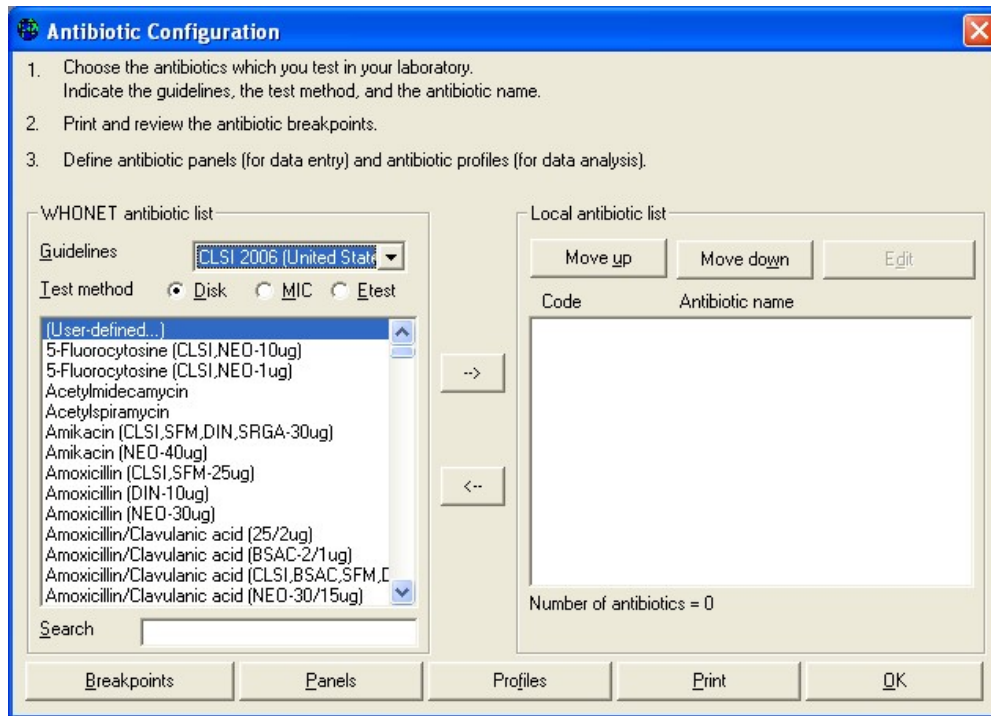

Figure 2. WHONET laboratory configuration screen. Enter the country, name, and code of your laboratory.

Part 2. Selecting your antibiotics

The only part of laboratory configuration which is required is indicating which antimicrobials you are testing in your laboratory. To do this, click on "Antibiotics" to get the following screen. You will see a long list of antibiotics to your left – this is the WHONET list. On the right is the list of antibiotic tests used in your laboratory. At the beginning this list is empty.

Antibiotic Configuration

1. Choose the antibiotics which you test in your laboratory.
   Indicate the guidelines, the test method, and the antibiotic name.
2. Print and review the antibiotic breakpoints.
3. Define antibiotic panels (for data entry) and antibiotic profiles (for data analysis).

WHONET antibiotic list

Guidelines: CLSI 2006 (United State ▼)

Test method: ● Disk ○ MIC ○ Etest

(User-defined...)
5-Fluorocytosine (CLSI,NEO-10ug)
5-Fluorocytosine (CLSI,NEO-1ug)
Acetylmidecamycin
Acetylspiramycin
Amikacin (CLSI,SFM,DIN,SRGA-30ug)
Amikacin (NEO-40ug)
Amoxicillin (CLSI,SFM-25ug)
Amoxicillin (DIN-10ug)
Amoxicillin (NEO-30ug)
Amoxicillin/Clavulanic acid (25/2ug)
Amoxicillin/Clavulanic acid (BSAC-2/1ug)
Amoxicillin/Clavulanic acid (CLSI,BSAC,SFM,D
Amoxicillin/Clavulanic acid (NEO-30/15ug)

Search

Local antibiotic list

Move up | Move down | Edit

Code | Antibiotic name

Number of antibiotics = 0

Breakpoints | Panels | Profiles | Print | OK

To indicate the tests that you are using, you should indicate three things: 1. the reference guidelines (for example CLSI, SFM, DIN, *etc.*); 2. the test method (disk, MIC, or Etest); and 3. the name of the antibiotic and, for disk diffusion testing, the disk potency.

In this tutorial, indicate that the method is CLSI, and you will choose a few drugs tested by disk diffusion and a few tested by Etest. To select an antibiotic, double-click on the antibiotic to move it to the right side of the screen *or* single-click on the antibiotic and hit the "–>" button.

Find the following antibiotics, and move them to the right side of the screen.

    Disk diffusion, ampicillin 10ug
    Disk diffusion, cefoxitin 30ug
    Disk diffusion, ceftriaxone 30ug
    Disk diffusion, ciprofloxacin 5ug
    Disk diffusion, erythromycin 15ug
    Disk diffusion, gentamicin 10ug
    Disk diffusion, imipenem, 10ug
    Disk diffusion, penicillin G 10units
    Disk diffusion, trimethoprim/sulfamethoxazole 1.25ug/23.75ug
    Disk diffusion, vancomycin, 30ug

WHONET assigns a code to each antibiotic test, for example AMP_ND10 indicates a test of ampicillin ("AMP") by CLSI ("N", formerly NCCLS) methods by disk diffusion ("D") with a 10ug disk ("10").

Now enter a few drugs tested by Etest. Click on the option labeled "Etest" and select the following drugs. Since the disk potency is not relevant for Etests, it does not matter which "ceftriaxone" you select from the WHONET list.

    Etest, ceftiaxone
    Etest, penicillin G
    Etest, vancomycin

The corresponding test code for the ceftriaxone Etest done by CLSI (formerly NCCLS) methods would be CRO_NE. After making these selections, you should have the following.
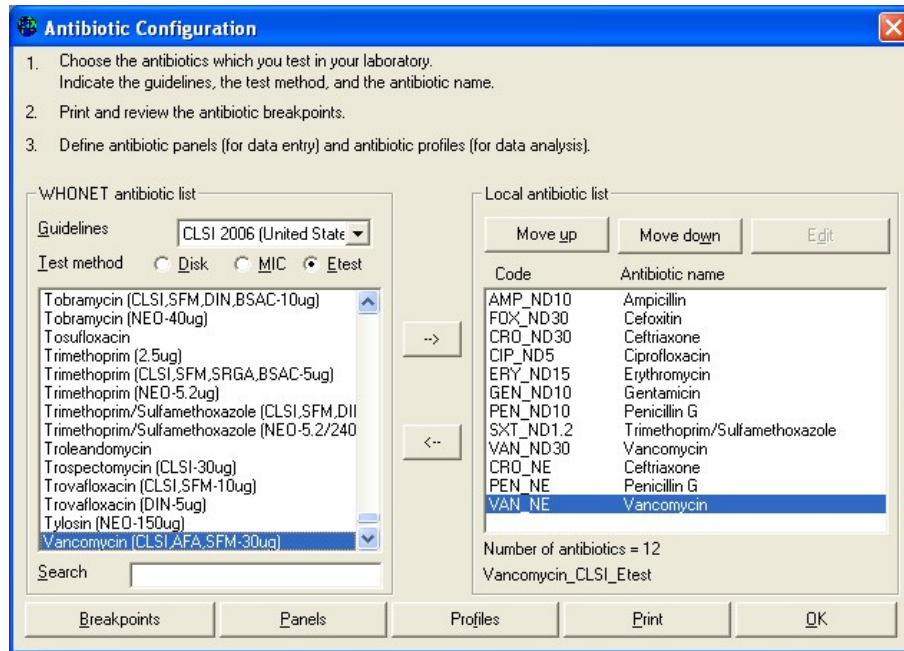

Figure 3. Antibiotic configuration screen. Select from the list of antibiotics shown to the left of the screen. The antibiotic tests used in your laboratory appear to the right of the screen.

If you would like to change the sequence of antibiotics, you can use the "Move up" and "Move down" options. Or you can use the left arrow button "<–" to remove a drug from the list.

After you complete the above steps, it is possible for you to proceed directly with data entry if you would like. There are, however, a number of additional features described in Parts 3 through 6 which may be useful.

Part 3. Configuring your antibiotics

The following steps are not required, but may be useful to you.

Antibiotic breakpoints: When you select antibiotic tests, WHONET automatically sets up the correct official breakpoints according to the reference body that you indicate. In most cases, there will be no need for you to change these yourself. However, if there are no official breakpoints for the antibiotic that you selected *or* if you disagree with the breakpoints used by WHONET, then you may wish to make some manual modifications.

> *Note*: Accurate breakpoints are essential if you are entering quantitative test measurements into WHONET (for example, disk diffusion zone diameters or MIC/Etest values). On the other hand, if you will only be entering test interpretations ("resistant", "intermediate", or "susceptible"), then WHONET does not use the breakpoint values. WHONET does not require the use of test measurements, but for good quality microbiological testing and the most valuable analyses, it is strongly recommended.

In this tutorial, we will not change any of the default breakpoints, but to see the values suggested by WHONET, click on "Breakpoints".

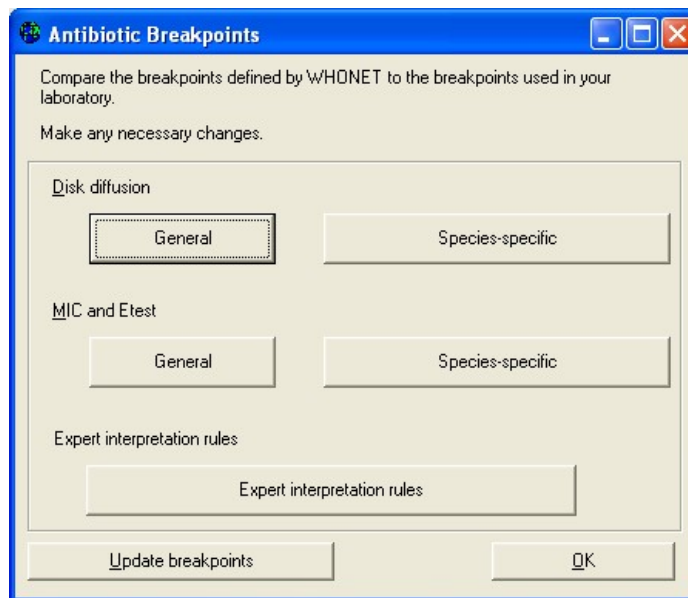Figure 4. Antibiotic breakpoint configuration.

You can then view any of the disk diffusion or MIC/Etest breakpoints. WHONET distinguishes between "General" breakpoints used for most bacterial species and "Species-specific" breakpoints for species in which the recommended breakpoint is different. After reviewing the breakpoints, select "OK", "OK" to return to the antibiotic configuration screen.
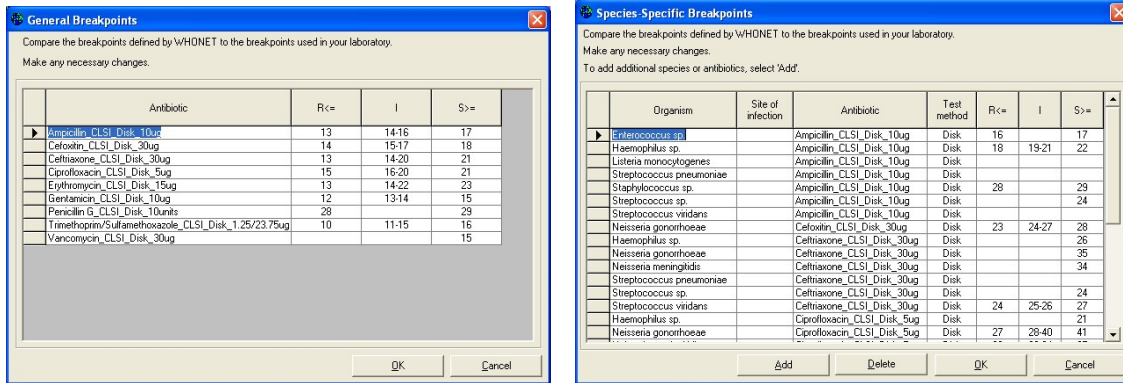
Figure 5. General and species-specific antibiotic breakpoints

General Breakpoints

Compare the breakpoints defined by WHONET to the breakpoints used in your laboratory.
Make any necessary changes.

Antibiotic	R<=	I	S>=
Ampicillin_CLSI_Disk_10ug	13	14-16	17
Cefoxitin_CLSI_Disk_30ug	14	15-17	18
Ceftriaxone_CLSI_Disk_30ug	13	14-20	21
Ciprofloxacin_CLSI_Disk_5ug	15	16-20	21
Erythromycin_CLSI_Disk_15ug	13	14-22	23
Gentamicin_CLSI_Disk_10ug	12	13-14	15
Penicillin G_CLSI_Disk_10units	28		29
Trimethoprim/Sulfamethoxazole_CLSI_Disk_1.25/23.75ug	10	11-15	16
Vancomycin_CLSI_Disk_30ug			15

Species-Specific Breakpoints

Compare the breakpoints defined by WHONET to the breakpoints used in your laboratory.
Make any necessary changes.
To add additional species or antibiotics, select 'Add'.

Organism	Site of infection	Antibiotic	Test method	R<=	I	S>=
Enterococcus sp.		Ampicillin_CLSI_Disk_10ug	Disk	16		17
Haemophilus sp.		Ampicillin_CLSI_Disk_10ug	Disk	18	19-21	22
Listeria monocytogenes		Ampicillin_CLSI_Disk_10ug	Disk			
Streptococcus pneumoniae		Ampicillin_CLSI_Disk_10ug	Disk			
Staphylococcus sp.		Ampicillin_CLSI_Disk_10ug	Disk	28		29
Streptococcus sp.		Ampicillin_CLSI_Disk_10ug	Disk			24
Streptococcus viridans		Ampicillin_CLSI_Disk_10ug	Disk			
Neisseria gonorrhoeae		Cefoxitin_CLSI_Disk_30ug	Disk	23	24-27	28
Haemophilus sp.		Ceftriaxone_CLSI_Disk_30ug	Disk			26
Neisseria gonorrhoeae		Ceftriaxone_CLSI_Disk_30ug	Disk			35
Neisseria meningitidis		Ceftriaxone_CLSI_Disk_30ug	Disk			34
Streptococcus pneumoniae		Ceftriaxone_CLSI_Disk_30ug	Disk			
Streptococcus sp.		Ceftriaxone_CLSI_Disk_30ug	Disk			24
Streptococcus viridans		Ceftriaxone_CLSI_Disk_30ug	Disk	24	25-26	27
Haemophilus sp.		Ciprofloxacin_CLSI_Disk_5ug	Disk			21
Neisseria gonorrhoeae		Ciprofloxacin_CLSI_Disk_5ug	Disk	27	28-40	41

Antibiotic panels: If you will enter results manually into WHONET, it would be useful to the data entry person if you indicate which antibiotics are tested for which organism groups. For example for *S. aureus,* the software should request results from drugs used in Gram-positive infections, while for *E. coli* in urine samples, a different set of antimicrobials would be appropriate.

From the Antibiotic configuration screen, click on "Panels". You will see all of the antibiotics that you have selected in the rows, and a list of various organism groupings in the columns. Place a check mark to indicate which drugs are *usually* tested for each organism.

For this tutorial, put check marks for the following organisms and antibiotics.

"Staphylococcus": cefoxitin, erythromycin, penicillin, trimethoprim/ sulfamethoxazole, and vancomycin
"S. pneumoniae": erythromycin, trimethoprim/ sulfamethoxazole, vancomycin, penicillin-Etest, and ceftiaxone-Etest
 "Gram-negative". ampicillin, ceftriaxone, ciprofloxacin, gentamicin, imipenem, and trimethoprim/sulfamethoxazole

If there is a drug that you test infrequently, for example imipenem for *E. coli* isolates, there is no need to include it in the panel. The user will be able to enter results for either "panel" antibiotics or "all antibiotics" at the time of data entry.
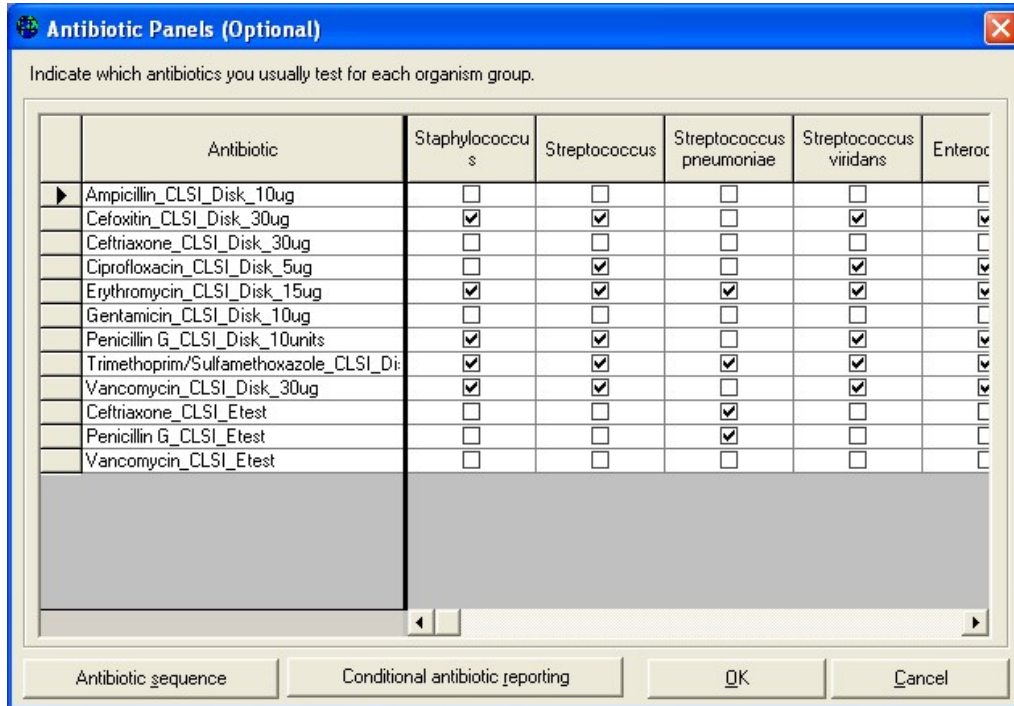
Figure 6. Antibiotic panel configuration. Indicate which antibiotics you test for each organism group.

Antibiotic resistance profiles: This feature is used in the data analysis option called "Resistance profiles". In this analysis bacteria are classified according to their multi-resistance phenotype. This is a very valuable analysis for infection control staff when searching for outbreaks of multi-resistant organisms in the hospital setting. Use and interpretation of this feature is described in the tutorial Data Analysis 2.

In this part of laboratory configuration, you can indicate which drugs should be used to construct the resistant profile.

Figure 7. Antibiotic resistance profile configuration. Indicate the drugs to be used in the study of multi-resistance patterns.

Part 4. Patient locations

If you entry data manually into WHONET, it would be useful to enter a list of the most common patient locations from which you get clinical isolates.

Note: If you work in a public health, veterinary, or food laboratory setting, you can use the "Location" field to refer to whatever location would be of most relevance for your work – hospital, city, farm, abattoir, restaurant, market, *etc.* You can leave the "Department" and "Institution" columns empty if they are not relevant to your work.

Enter the following locations and values for the columns "Location", "Code", "Department", "Institution", and "Location type".

Neurology	neuro	wth	med	inx
Cardiac Surgery	csurg	wth	sur	inx
Neonatal ICU	nicu	wth	neo	icu
Diabetes clinic	diab	wth	med	out
Health Center #5	hc5	oth	out	out

Note: "med" = medicine, "sur" = surgery, "inx" = Inpatient (non-ICU), ICU = intensitve care unit, "out" = outpatient.

You can use the "Edit" buttons to change the list of institutions and departments to match the needs of your institution. When you finish the configuration of your locations, click on "OK" to return to the main configuration screen.

Figure 8. WHONET location configuration. Indicate the locations from which you obtain your samples.

Part 5. Data fields

From the main configuration screen, click on "Data fields". You will see the default list of WHONET data fields. This list includes questions about the patient (identification number, age, date of birth, sex), patient location (location, department, institution, location type), specimen (number, date, type), and microbiological results (organism, serotype, beta-lactamase, ESBL).
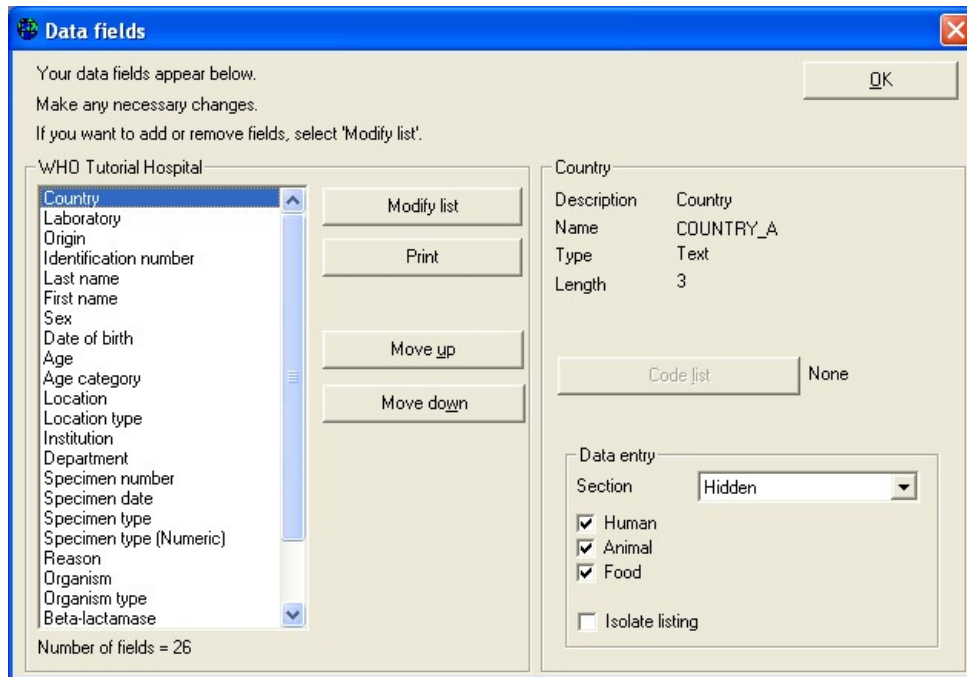

Figure 9. WHONET data field configuration. Indicate and modify the data fields that you want to use in WHONET.

For most laboratories, this list is adequate for routine surveillance purposes and does not need to be edited. However for many laboratories, modifications to this list can be very useful.

Adding or removing fields: You can add additional fields to the list or remove fields that you do not need for your work. Click on "Modify list". On the left, you will see various categories of questions and suggested fields from you to choose from. If you cannot find the field that you need, you may define a "User-defined field".

For this tutorial, click on "Clinical information" as the data category and "Diagnosis" in the "Data fields" list. Use the right-arrow key to pass "Diagnosis" to your laboratory's field list.

Now click on "Microbiology" as the data category, and double-click on "D-Test (ERY, CLI)" to add this test to your list. Then click "OK" to return to the previous screen.
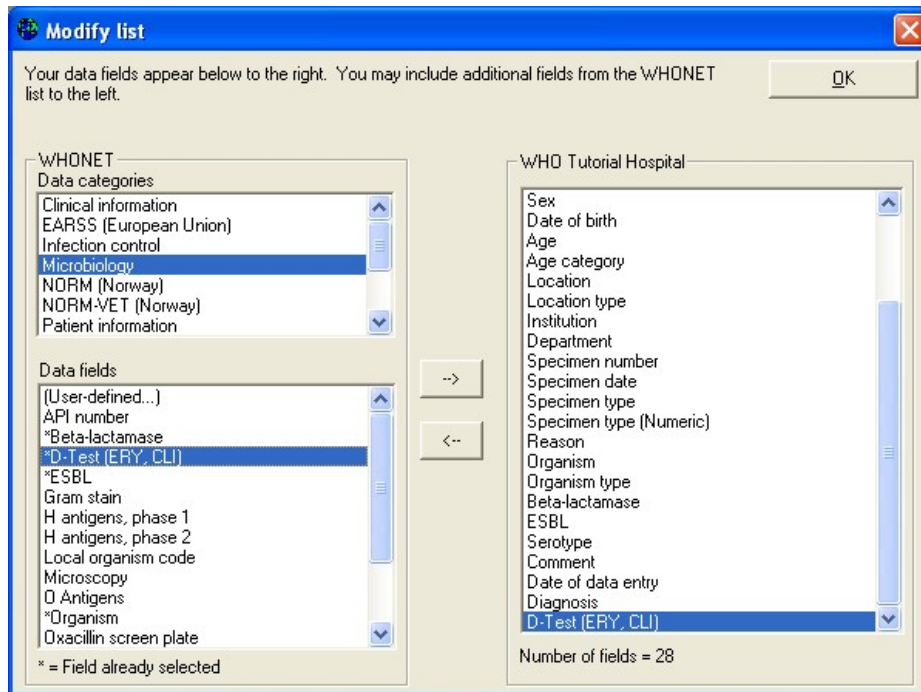
Figure 10. Add additional fields or remove fields from the list of fields for your
laboratory. In this figure, you can see a number of additional microbiological
questions from which to choose. You can also select "User-defined" if the field you
would like does not appear in the WHONET lists.

Changing field lengths: WHONET assigns a default length for each data field, but the
length of most fields can be changed by the user. For example, the location code by
default is at most six characters in length. However, for many laboratories, six letters
may not be sufficient. To change the length, click on "Location", and change the
length on the right side of the screen from 6 to a larger value, for example 20. For
this tutorial, you can leave these settings unchanged.

Appearance of the data entry screen and isolate listings: You can use "Move up" and
"Move down" to change the order of the questions appearing on the data entry
screen. You can indicate whether a question applies to humans, animals, or food.
You can also indicate which "box" the question appears in during data entry, for
example "Location", "Microbiology", "Specimen", *etc.* You can indicate that a
question is hidden from the user by selecting "Hidden", or whether to include a
certain column in the default isolate listing by clicking on "Isolate listing". For this
tutorial, you can leave these settings unchanged.

Code lists: If you add some additional fields to your list, you may also wish to create a
list of codes to use for these fields. For this tutorial, click on the item "Diagnosis" that
you added above. Now click on "Code list". To enter a list of valid codes, click on
"Use codes from the table below". Then put in the following entries under the
"Description" and "Code" columns: "pneumonia"="pneumo", "urinary tract
infection"="uti", "meningitis"="mening". When you finish, click "OK" to return to the
previous screen.

You do not need to enter an exhaustive list. Just indicate the most common or important responses for purposes of standardizing data entry.

Figure 11. Defining a list of valid responses for the Diagnosis field.

Part 6. Isolate alerts

From the main configuration screen, click on "Alerts". You will see a long list of microbiological alerts suggested by WHONET – alerts about possible laboratory errors, important results that should be confirmed at the local or national level, and findings that should be communicated to other groups, such as the infection control team. You can easily activate or deactivate the rules suggested by WHONET.

You can also use "New rule" to define additional alerts specific to your institution or country. When you finish reviewing or defining rules, click on "OK" to return to the main configuration screen.

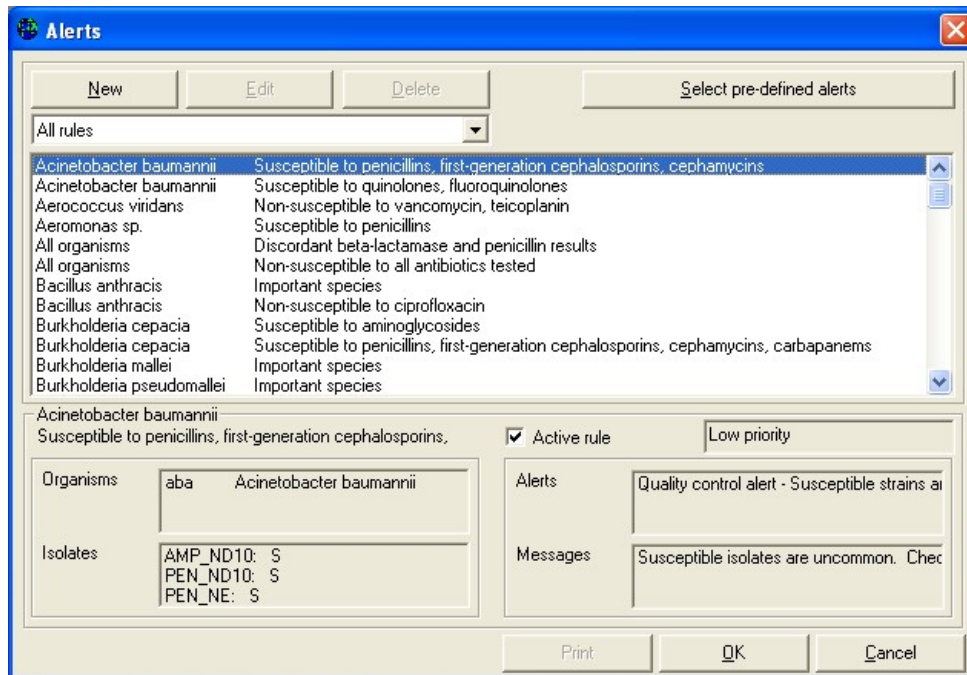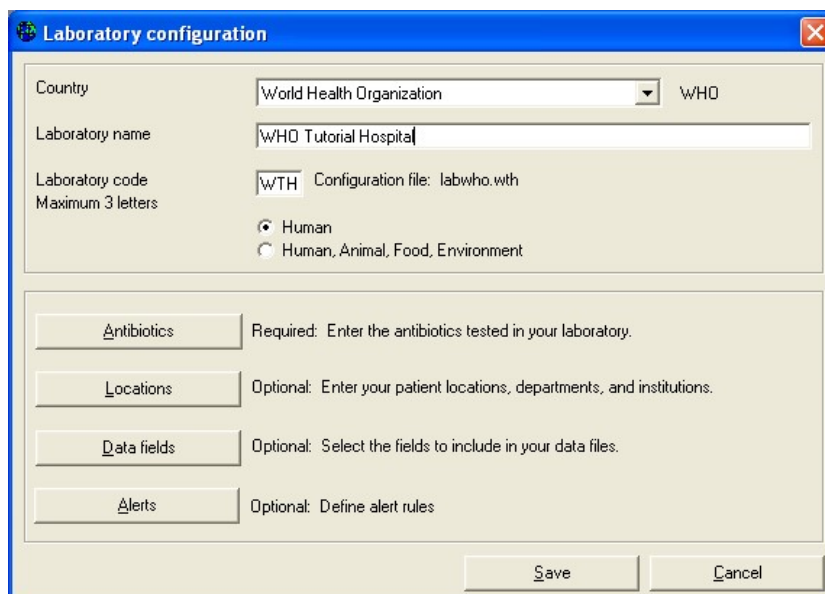These features are described in greater detail in the tutorial "Expert System".

Figure 12. List of microbiological alerts for your laboratory. In addition to the pre-defined WHONET alerts, you can also define your own alerts with "New".

Part 7. Finishing laboratory configuration

You have now finished your laboratory configuration. Click on "Save" to save all of the laboratory details into a "laboratory configuration file. The name of the file has the form "labxxx.yyy" where "xxx" refers to the country code and "yyy" refers to the laboratory code. For example, in this tutorial, the laboratory configuration will have the name "labwho.wth".

You can return to laboratory configuration to make additional changes at any time by selecting "Modify laboratory".

Now that you have finished configuration of your laboratory, you can now continue with the tutorial on Data Entry.