Guide for the interpretation of the EARS-Net laboratory report

Introduction

The EARS-Net laboratory report shows laboratory specific results as well as national results. This feedback can be used by the laboratory for validation purposes and monitoring of antimicrobial resistance (AMR), and offers the opportunity to compare the laboratory results to national results. Those national results are used to support the national descriptive report, to assist validation by national stakeholders and experts, and to monitor AMR in Belgium.

Description of the laboratory report Excel sheets

"Desc" sheet

The first sheet of the Excel file gives a description of all the abbreviations, acronyms and color legends used in the report.

"Main" sheet

This sheet gives an overview of the main results on resistance for the surveillance year (including 4-year trends) detected in the laboratory for all pathogens and the main antibiotic classes under study. The columns "I" and "J" give the national numbers for the actual surveillance year : numbers of participating labs (# Labs) and the resistance percentages (% (I)R (num/den)). Coloring of the laboratory-specific resistance percentages facilitate the comparison with the national results: laboratory results in blue are lower than the median (percentile 50) of the national distribution of laboratory results while the yellow colors highlight higher lab resistance percentages in comparison with national median. The darker the colors are, the further they deviate from the national median. When submitting less than 10 isolates, no comparison is made and results are highlighted in grey. The first ten columns show the results of BLOOD/CSF samples, and the next ten columns the results of URINE samples. Results on these indicators are presented for following inclusion criteria :

(1) General EARS-BE 2018 inclusion criteria, as defined in the surveillance protocol
(2) (1), but for hospital laboratories only;
(3) (1), but for hospital laboratories and EUCAST-interpreted ASTs only
(4) (1) but for non-hospital laboratories only
(5) (1), but for hospitalized patients only ("INPAT");

The "Main" sheet also shows graphical representations of the results on antimicrobial resistance for each pathogen, specimen type (Blood/Cerebrospinal fluid versus Urine), and its relevant antimicrobial groups or tests, and this in the form of 2 graphs (starting at column "T"):

1. (**BW** X.1) Laboratory resistance rate and its 95% Confidence interval (in red), and a 'modified' **B**ox **W**hisker plot of relevant percentiles of the national distribution of the Laboratory means (in green);
2. (**EVO** X.1) Trend graph showing the **evo**lution of antimicrobial over the last 4 years for which data were reported by the laboratory, including the number of samples reported (bar chart in light green);

These graphs are repeated for the sub-groups defined above.

"Overall" sheet

This sheet gives an overview of the characteristics of the laboratory versus all participating Belgian laboratories. It describes indicators such as the laboratory type (hospital or not), the laboratory region (Flanders / Brussels Capital / Walloon region), the hospital type (primary/secondary/tertiary), submission of quantitative results (yes/no) and the number of hemocultures performed. The first ten columns show the results of BLOOD/CSF samples, and in the next ten columns the results of URINE samples. These results are presented for sub-groups defined above.

Pathogen-specific sheets

These sheets show detailed results for each pathogen under study. In addition to results given in the "Main" sheet, the pathogen-specific sheets shows additional results on laboratory, sample & patient characteristics, as well as results on antimicrobial resistance of each susceptibility test under study, as well as results on testing percentages and EUCAST use for each test. These sheets also show national results in more detail as compared to the "Main" sheet.

Results are presented for the sub-groups defined above. Within each section and for each sample type, results are shown for:

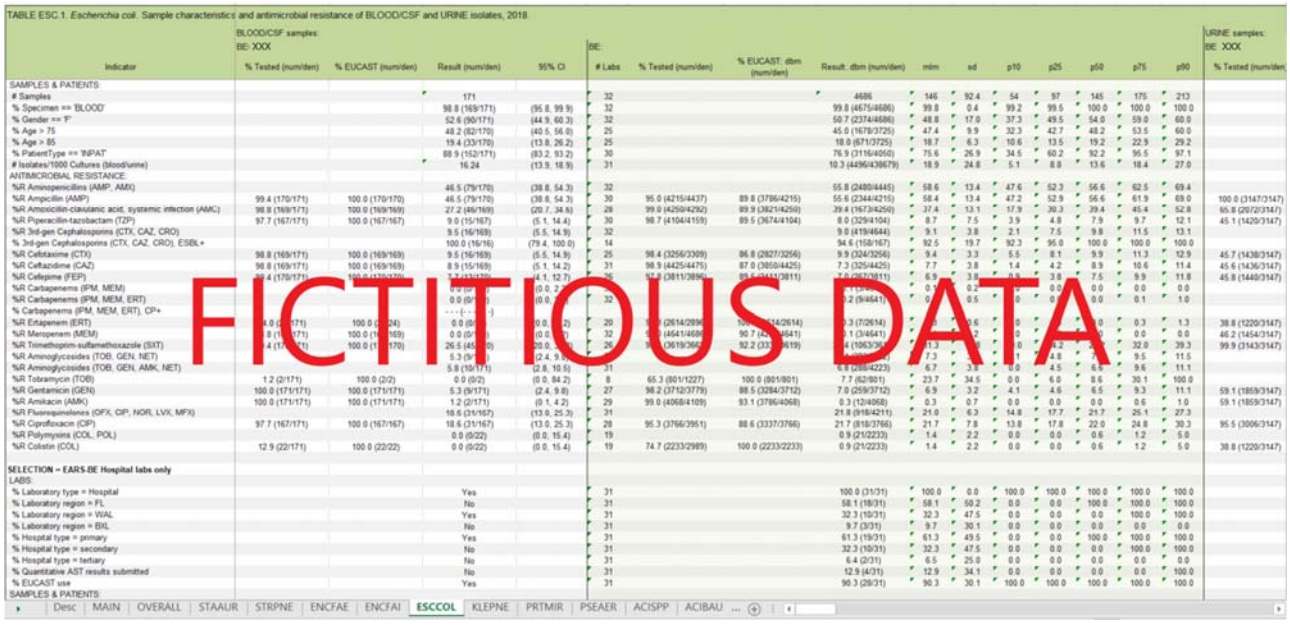
- *laboratory specific indicators* (LABS) : laboratory type, laboratory region, hospital type, submission of quantitative results and EUCAST use;
- *indicators for sample & patients characteristics* (SAMPLES & PATIENTS): Number of samples, Percentage of BLOOD samples, Percentage of female patients, Percentage of patients aged>75, Percentage of patients aged>85, Percentage of hospitalized patients and Number of isolates per 1000 hemocultures;
- *indicators for antimicrobial resistance (ANTIMICROBIAL RESISTANCE)* : these indicators follow table 1 and 2 of the data-call (1).

For each sample type, columns are built-up as follows:

- *laboratory results* (BEXXX) : Percentage of tested isolates (num/den), Percentage of EUCAST breakpoints used (%EUCAST (num/den)), Resistance result (num/den) and the binomial 95% confidence interval in case the indicator is a proportion (column “95% CI”) ;
- *national (“*BE*”) results* : number of laboratories submitting samples, the percentage of tested isolates (num/den), the percentage of EUCAST breakpoints used (% EUCAST: dbm(num/den)), the resistance rate expressed as the database mean including the total number of samples as a denominator (“Result: dbm (num/den)”), the resistance rate expressed as the mean of laboratory means (“mlm”) and percentiles 10, 25, 50 (median), 75 and 90. Figure 1 shows an example of a pathogen specific sheet in an XLS laboratory report.

Rates for antimicrobial resistance are always reported as a percentage (column ”Result(num/den)”), which corresponds to the extrapolated number of samples that were tested as “R=Resistant” (or “IR=Non-Susceptible” if specified in the antimicrobial group or test) over 100 samples tested for the antimicrobials of a particular antimicrobial group or test. The numbers between brackets correspond to the number of resistant or non-susceptible samples out of the total tested samples.

Figure 1: Excerpt from an XLS lab report, pathogen specific sheet:



Validation by the laboratory

Inspection and validation by the laboratory of the results displayed in the XLS Laboratory file is a crucial step in obtaining reliable national results on antimicrobial resistance. We therefore encourage laboratories to suggest any corrections of errors they may encounter and, if deemed necessary, to re-submit corrected laboratory data to Sciensano.

One important error that might occur is that not all tests for which results were submitted by the laboratory are accounted for in the XLS report and this due to improper or insufficient standardization of laboratory-specific antimicrobial test codes. For example, a wrong standard test code might be assigned to a particular laboratory-specific test description, which can result in susceptibility results becoming unavailable for the specific Pathogen x Antimicrobial group combination relying on this specific test. To prevent this error, the laboratory should carefully verify the correspondence between the total number of samples that were submitted for a particular pathogen and the total number of tests that were done for a particular Antimicrobial group, as shown in cells “E19” and cells “E27” and further (Figure 1). Please note that these results are calculated based on de-duplicated data. Any difference between these should be verified to be due to laboratory policy, data not yet submitted, or the possibility of wrongly standardized test codes.

References

1. Mertens K. The European antimicrobial resistance surveillance: Belgium (EARS-BE), protocol 2018 Including data call, case and data definitions, instructions for participating laboratories. (Version 1, December 2018). Sciensano.
http://www.nsih.be/download/EARS_BE_2018_Datacall_Final.pdf