Mahidol University
Faculty of Medical Technology

The External Quality Assessment Schemes in Bacteriology: EQAB

Membership Manual

Department of Clinical Microbiology and Applied Technology
Faculty of Medial Technology, Mahidol University
THAILAND

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1. EQAB Provider

The External Quality Assessment Scheme in Bacteriology (EQAB) is run by the Department of Clinical Microbiology and Applied Technology Sciences, Faculty of Medial Technology Mahidol University. The address is 999 Phutthamonthon 4 Road, Salaya, Phutthamonthon, Nakhon Pathom 73170, Thailand, Tel: +662-441-4370-6 extension 2838, Fax: +662-441-4380. E-mail: eqab.mtmu@gmail.com. Your query via e-mail will be responded within next two working day.

2. Application

2.1 Qualification

The laboratory should provide bacteriological or microbiological laboratory services.

2.2 How to apply

To be a member of the EQAB program, please contact the Center for Standardization and Product validation, Faculty of Medical Technology, Mahidol University, Thailand (E-mail: eqamtmu@gmail.com). The Center is opened for applications in July of each year and will send application document to all registered laboratory members. The date of closing for any applications is about in November each year.

2.3 Application fee (only shipping in Thailand)

1) Program of EQAB 8010: Gram stain. Annual fee is 1,000 THB.
   Each round includes of two bacterial smear slides for Gram staining.
2) Program of EQAB 8020: Acid fast bacilli stain. Annual fee is 1,000 THB.
   Each round includes two sputum smear slides for acid fast bacilli staining
3) Program of EQAB 8050: Bacteria identification and susceptibility testing.
   Annual fee is 1,000 THB.
   Each round includes two bacterial strains in culture media each round

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3. Available EQAB programs

1) EQAB 8010: Gram stain
2) EQAB 8020: Acid fast bacilli stain
3) EQAB 8050: Bacterial identification and susceptibility testing

4. Confidentiality

The EQAB program sends the EQA result to laboratory coordinator only via given e-mail address. The analyzed results of each member will be published only after receiving a permission from the laboratory member, except the overall results from the participant laboratories which be presented in summary and Final reports of the program.

5. Type of EQAB samples

EQAB sample type of each program contains as following;

1) *EQAB 8010: Gram stain* The program contains two bacterial smear slides for Gram staining. Each slide has three spots: the 1st spot for gram positive control, the 2nd spot for gram negative control and the 3rd spot for unknown which consist of two types of bacteria.

2) *EQAB 8020: Acid fast bacilli stain* The program contains two sputum smear slides for acid fast staining. Each slide has one spot of sputum sample.

3) *EQAB 8150: Bacteria identification and susceptibility testing* The program contains two tubes of bacteria in media. Each tube contains only one type of bacteria.

6. Homogeneity testing & Stability testing

6.1 Homogeneity testing

1) *EQAB 8010: Gram stain* Ten smear slides are randomly sampling and examined for Gram staining by at least one expert.

2) *EQAB 8020: Acid fast bacilli stain*

- For positive code, Ten smear slides are randomly sampling and examined for AFB staining by at least four expert.

- For negative code, Ten smear slides are randomly sampling and examined for AFB staining by at least four expert.

3) *EQAB 8150: Bacteria identification and susceptibility testing* Two culture tubes are randomly sampling and subcultured for identification and susceptibility testing by at least one expert.

6.2 Stabitity testing

1) *EQAB 8010: Gram stain* Two smear slides are randomly sampling and examined for Gram staining by at least one expert. The testing perioids include 1) before the delivery date, 2) after storage at room temperature for 3 months and 6 months.

2) *EQAB 8020: Acid fast bacilli stain* Two smear slides are randomly sampling and examined for AFB staining by at least one expert. The testing perioids include 1) before the delivery date, 2) after storage at room temperature for 3 months and 6 months.

3) *EQAB 8150: Bacteria identification and susceptibility testing* Two culture tubes are randomly sampling and subcultured for identification and susceptibility testing by at least one expert. The testing perioids include 1) before the delivery date, 2) after storage at room temperature for 6 months and 12 months.

7. Round shipment

The program sends three rounds of samples each year on February, June and October, via a register post on the 3rd Thursday of the months. If a member does not receive the EQAB package within a week, the laboratory should immediately inform the program via e-mail: eqab.mtmu@gmail.com. Whenever the package lost, the member can request a new one with written document from a chief of the laboratory member.

8. Checking of the EQAB samples

1) Once receiving the panel, check the quality of receiving EQA material. If any damage or abnormality observed, laboratory coordinator shall e-mail the program at eqab.mtmu@gmail.com by subjected_ as “incomplete EQA material” with details of damage

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or abnormality, attach photo, Lab No., Code No., of the damage/ abnormality EQA sample, and Laboratory name.

2) In the package, you will receive packing Insert for participant and Laboratory specific information which included laboratory number, and code for reporting which will be used for reporting via Google form

3) Proceed test the EQA samples per following guidance;

3.1 Perform Gram's staining as routine basis within 5 days after receiving the samples.

3.2 Perform AFB's staining as routine basis within 5 days after receiving the samples.

3.3 Processing bacterial identification and antibiotic susceptibility testing as routine basis within a day after receiving the samples. The interpretation of antibiotic susceptibility testing should be reported followed by Guidance of Clinical and Laboratory Standards Institute (CLSI) as described on the online reporting form.

9. Reporting the results

Submit the result online by record in google form in the weblink or QR code which will be sent to Laboratory Coordinator via given e-mail address. Otherwise, As mentioned above that the participant will receive "code for reporting" in each round of EQAB, this code must be entered in the google form. The reporting system will be closed within three weeks after sending the EQA samples. The program will send a reminder via e-mail to the given Laboratory Coordinator four days before the closing date.

For online reporting: the participant must fill out Report sheet for EQAB 8010: Gram stain, Report sheet for EQAB 8020: AFB stain and Report sheet for EQAB 8150: Bacterial identification and susceptibility testing. For AFB staining, the results should be reported followed guideline of WHO, 1998. For bacterial identification, the results should include genus and species of bacteria, if serotyping performed, the serotype result should be included. For antibiotic susceptibility, the results should be reported followed current CLSI's recommendation and current practice of the laboratory. If the participant laboratory does not report the results, the program will score as" 0" or "not evaluated" depending on the reasonable reason from the laboratory.

10. Program reports

There are three type of reports;

1) Preliminary result: The program will reveal the intended results within a week after closing date of results submitting, by post on the website; www.eqamtmu.com -> schemes: EQAB BACTERIOLOGY -> Notification -> "Preliminary result for EQAB"

2) Summary report: the program will officially send the summary report to laboratory coordinator of all participants through the given e-mail addresses within one month after closing date of results submitting. The laboratory can feedback/complain relating to the report via e-mail address; eqab.mtmu@gmail.com within three weeks after releasing the report.

3) Final report: the program will send the final report to a laboratory coordinator of each laboratory via the given e-mail address within December of each year.

IMPORTANCE: If there is any change on the given e-mail address of the Laboratory Coordinator, please inform the new one through the previous e-mail that you have given or inform the new one by authorized person of your laboratory via e-mail: eqab.mtmu@gmail.com.

11. Scoring

11.1 EQAB: 8010 Gram stain

The total score is 4 per slide. As there are two unknown bacteria in each slide, each bacteria is scored as 2 points per following criteria's.

Reporting	Score
Correct staining, bacterial shape and arrangement	2
Correct staining and bacterial shape and no specific arrngement	2*
Correct staining and bacterial shape, but incorrect/no report of specific arrangement	1**
Incorrect staining and bacterial shape	0
Incorrect staining	0
No report	0

* in case information of bacterial arrangement is not significant to laboratory diagnostic such as gram negative bacilli.

** in case information of bacterial arrangement is significant to laboratory diagnostic such as Gram-positive bacilli in Chinese letter or palisade.

Besides, the scoring criteria may be adjusted base on specific bacterial feature which is significant to laboratory diagnostic such as spore production.

11.2 EQAB: 8020 Acid fast bacilli stain

The total score is 2 per slide.

Reporting	Score
Correct AFB grading	2
Miss the target grading for 1 level	1.5
Miss the target grading for 2 levels	1.0
Report AFB positive as AFB negative	0
Report AFB negative as AFB positive	0

The target grading comes from a consensus among all laboratory participants and from homogeneity testing of the program.

11.3 EQAB 8150: Bacteria Identification

The total score is 2 for one type of bacteria. The reporting should include genus, species, serotype (if applicable) and antimicrobial resistant (AMR) strains, such as, carbapenem-resistant Enterobacteriaceae (CRE), vancomycin-resistant enterococci (VRE) and methicillin-resistant *Staphylococcus aureus* (MRSA) (if applicable). The score is also based on an importance of the bacteria in term of epidemiology, infectious control, treatment and antimicrobial susceptibility testing. Criteria's for scoring as following:

11.3.1 For identification of bacteria that has no significant antimicrobial resistance.

Reporting	Score
Correct Genus and species	2
Correct Genus	1
Incorrect Genus and species	0

11.3.2 For identification of bacteria that has significant antimicrobial resistance.

Reporting	Score
Correct Genus, species and drug resistance	2
Correct Genus and specie but incorrect resistance	1.5
Correct Genus and drug resistance	1
Correct Genus but incorrect drug resistance	0.5
Incorrect Genus, species and drug resistance	0

11.4 EQAB 8150: Antimicrobial susceptibility testing

The total score is 2 for one type of antimicrobial agent. The criteria for selecting the antimicrobial agent will base on; an agent in group A of current standard CLSI guideline, an antimicrobial agent that uses for monitoring in the infection control and epidemiology, antimicrobial that uses for specific clinical sample or bacteria, and antimicrobial that shows no intrinsic resistance. The consensus result is defined among the participant laboratories which agreed no less than 80 % of all participant results. For non-evaluated antimicrobial, the consensus result will be reported in summary report. In addition, the antimicrobial that be reported, must be utilized by at least 60 % of all members.

Criteria's for scoring as following:

Reporting	Target value		
	Susceptible (S)	Intermediate (I) or Susceptible–dose dependent (SDD)	Resistant (R)
Susceptible (S)	2	1	0
Intermediate (I) or Susceptible–dose dependent (SDD)	1	2	1
Resistant (R)	0	1	2

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12. Calculation of standard score

P-score is used in each program which is the standard score to define laboratory performance by below calculation;

$$\text{P-score} = \frac{\text{Total score from each program} - \text{score of participant laboratory}}{\text{standard error}}$$

For Standard error calculation:

For example: if the total score is 2.

1) Calculate value of

   A = (2-average score of A)^2 x number of participant laboratory that got score 2

   B = (1.5-average score A)^2 x number of participant laboratory that got score 1.5

   C = (1-average score A)^2 x number of participant laboratory that got score 1

   D = (0.5-average score A)^2 x number of participant laboratory that got score 0.5

   E = (0-average score A)^2 x number of participant laboratory that got score 0

2) Calculate F value,

   F = (A+B+C+D+E)/total laboratories

3) Calculate G value by Sum F value of each specimen

   G = total sum of F in each specimen

4) Calculate standard error = $\sqrt{G}$ + 0.5

   (0.5 is continuity correction for discontinuous data)

For antimicrobial susceptibility testing program, the relative lab score will be calculated (to be represented as the total score) in each round and mentioned in summary report by below calculation;

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$$\text{Relative lab score} = \frac{\textbf{your total score} \times 10}{\textbf{total score}}$$

13. Acceptant criteria

P-score < 1.96 means acceptable performance.