

TML\MSH Microbiology Department Policy & Procedure Manual	Policy # MI\QC\05\v02	Page 1 of 5
Section: Quality Control Manual	Subject Title: Kirby Bauer Quality Control	
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KIRBY BAUER QUALITY CONTROL

A. CONTROL STRAINS

1. To control the precision and accuracy of the test procedure, the following organisms are to be maintained:

<i>Staphylococcus aureus</i>	ATCC 25923
<i>Escherichia coli</i>	ATCC 25922
<i>Pseudomonas aeruginosa</i>	ATCC 27853
<i>Haemophilus influenzae</i>	ATCC 49247
<i>Enterococcus faecalis</i>	ATCC 29212

2. Working cultures are stored on TSB agar slants at 4° to 8°C (Chocolate agar for *H. influenzae*). Stock cultures are stored in trisodium citrate glycerol at -70° C.
3. Before testing cultures are subcultured from the working culture slants (*Haemophilus* is subcultured on alternate days).
4. Replace working cultures monthly from frozen stock cultures.
5. For testing, inoculate the culture onto Blood agar or Chocolate agar to obtain single colonies.
6. Choose colonies for testing according to the recommended procedures.
7. Continue to use these cultures as long as there is no significant change in the mean zone diameter that cannot be attributed to methodology. Obtain fresh cultures from the ATCC or any reliable commercial source.

B. ANTIBIOTICS TO BE TESTED

1. Test the control organisms using the antimicrobial discs which are used to test clinical isolates. The discs currently in use and the appropriate organisms for testing are listed in Table 1.

TML\MSH Microbiology Department Policy & Procedure Manual	Policy # MI\QC\05\v02	Page 2 of 5
Quality Control Manual		

2. Each new batch of Mueller Hinton agar must be tested for unsatisfactory levels of inhibitors. This is done by performing the tests with *E. faecalis* (ATCC 29212) and sulfonamide and trimethoprim/sulfamethoxazole (co-trimoxazole) discs.

C. ZONE SIZE LIMITS

Table 2 (NCCLS Table 3, 3A) lists the maximum and minimum zone diameters (the accuracy) that should be observed with a single control test. Enter zone diameters into the LIS KB-QC charts.

- (a) No more than one out-of-control result in 20 consecutive control tests is allowed. Any more than this requires corrective action.
- (b) Anytime corrective action is taken the count of 20 begins again.

D. FREQUENCY OF TESTING

1. Each new lot of Mueller Hinton agar must be tested with the control strains when the medium is prepared. In addition media depth, pH and sterility must be tested and documented.
2. Each new lot of antimicrobial discs must be tested with appropriate control strains before being introduced into routine use. Preferably this will be done when the discs arrive in the laboratory.
3. The overall performance of the procedure should be monitored daily. Weekly monitoring will be done in this laboratory provided that the following conditions exist:
 - (a) documentation that the control strains were tested for 30 consecutive test days
 - (b) no more than 3 of the 30 zone diameters were outside the accuracy control limits stated in Table 2.

When these requirements are fulfilled, each control strain must be tested:

- (i) once a week
- (ii) whenever any reagent component is changed.

TML\MSH Microbiology Department Policy & Procedure Manual	Policy # MI\QC\05\v02	Page 3 of 5
Quality Control Manual		

4. If any zone diameter is outside the control limit when tested weekly, you must return to daily testing until the problem is resolved. If resolution of the problem cannot be documented, you must continue daily control tests. To return to weekly testing, documentation of satisfactory performance for another 30 consecutive days must be done.

E. RESOLUTION OF THE PROBLEM

1. Resolution of any problem must be documented in the LIS as a "Procedure Comment" or "Result Comment".

2. Corrective Action During Daily Testing.

- (a) One out-of-control measurement is not cause for immediate attention.
- (b) Corrective action must be taken if any of the following circumstances arise:
 - (i) 2 consecutive measurements of any drug-microorganism combination fall outside the range
 - (ii) 3 or more in 20 consecutive test results fall outside the range

3. Corrective Action During Weekly Testing.

If a zone falls outside the accuracy control/limits, the following are required:

- (a) Appropriate control strain(s) must be tested for 5 consecutive test days.
- (b) For each drug-microorganism combination, all 5 zones must be within the accuracy control limits.
- (c) If any result is outside the accuracy or precision control limits, daily control testing must be resumed for a minimum of 30 consecutive test days.

**TABLE 1
ANTIBIOTICS TO BE TESTED FOR KIRBY BAUER QC**

	<i>S. aureus</i> ATCC 25923	<i>E. coli</i> ATCC 25922	<i>Ps. aeruginosa</i> ATCC 27853
Gram Positive			
E	X		
OX	X		
DA	X		
VA	X		
CN	X		
KZ	X		
P	X		
SXT	X		
Gram Negative			
AM		X	
CN		X	X
KZ		X	
CRO/CAX		X	
SXT		X	
TE		X	
F		X	
C		X	
TOB		X	X
CAZ		X	X
CP		X	
PRL			X
AMK			X

Haemophilus (to be tested on Haemophilus Test Medium)

H. influenzae
ATCC 49247

AM	X
CRO/CAX	X
C	X

TABLE 2
ACCEPTABLE ZONE DIAMETERS FOR KIRBY BAUER QC (mm)

	<i>S. aureus</i> ATCC 25923	<i>E. coli</i> ATCC 25922	<i>Ps. aeruginosa</i> ATCC 27853
E	22 - 30		
OX	18 - 24		
DA	24 - 30		
VA	15 - 19		
CN	19 - 27		
KZ	29 - 35		
P	26 - 37		
SXT	24 - 32		
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AM	16 - 22		
CN	19 - 26		16 - 21
KZ	23 - 29		
CRO/CAX	29 - 35		
SXT	24 - 32		
TE	18 - 25		
F	20 - 25		
C	21 - 27		
TOB	18 - 26		19 - 25
CAZ	25 - 32		22 - 29
CP	30 - 40		
PRL			25 - 33
AMK			18 - 26

Haemophilus (to be tested on Haemophilus Test Medium)

H. influenzae
ATCC 49247

AM	13 - 21
CRO/CAX	31 - 39
C	31 - 40