Challenge PC251

HISTORY

This paper challenge was sent to category A and C1 laboratories. The following scenario was presented to participants

SCENARIO

Your microbiology laboratory receives a batch of sheep blood agar plates in April from a local supplier. Several of the plates have one of two colonies of a contaminant in one corner of the plates. The contaminant colonies appear morphologically the same on each of the affected plates. There appears to be some minor beta-hemolysis around the colonies. One of the technologists performs a Gram smear on the bench from one of the plates. The contaminant is a small gram-positive bacillus. The technologist removes the plates that appear to have the contaminant, but proceeds to put the remainder of the batch into circulation for testing clinical isolates.

Please indicate the best option your laboratory should follow.

□ A. Follow what the technologist has done after performing the Gram smear.

□ B. Don't bother to identify the contaminant further.

□ C. Identify the contaminant and then use those plates which don't show the contaminant.

□ D. Destroy all the plates, request immediate re-supply with a different lot number, and educate the technologist(s) about the clinical risk to handling the unknown contaminant on the open bench.

□ E. Don't allow technologists to review supplies of bacterial culture media

□ F. Sue the supplier.

□ G. not applicable to our laboratory

EXPECTED ANSWER

The Technical Committee considered answer D as the best answer.

RESULTS

Reference laboratories

11/13 (85%) laboratories reported D, 2 labs reported C

Participants' results

Table 1. Reported answers

Reported	cat A	cat C1	Total	Grade
A	1		1	1
B	2		2	0
C	5	1	6	1
D	44		44	4
G		1	1	ungraded
Total	**52**	**2**	**54**	

Grading

All challenge components have in-house assigned values based on the most clinically appropriate result; the most clinically appropriate result is determined by expert committee evaluation.

Suitability for grading

A challenge is considered suitable for grading if agreement is reached by **80 percent** of selected **reference group and** at least **50 percent of the participants**. No further statistical analysis is performed on the results.

Table 2. Suitability for grading

Component	% Acceptable responses		Graded
	Reference labs	Participants	
PC answer	85	83	Yes (53)

Maximum grade: 4

COMMENTS ON RESULTS

Option D received strong consensus among both reference laboratories (11/13; 85%) and participant laboratories (44/53; 83%), meeting the CMPT suitability criteria for grading. This response ensures the integrity of culture media used in clinical microbiology and mitigates the risk of contamination-related diagnostic errors or laboratory-acquired infections associated with an unknown contaminant. Contacting the supplier for re-supply would also serve to alert them to the need for an internal review to prevent further contamination and distribution. All participants selecting Option D received the maximum grade of 4.

Option A reflects passive risk acceptance and a breakdown in quality assurance protocols (1/53; 2%). Laboratories selecting Option C (6/53; 11%) failed to recognize the risk that non-visible or low-level contamination may still affect plate sterility. Both A and C were considered unsuitable responses.

Selection B (2/53; 4%) was considered incorrect as failing to identify the contaminant further could be considered a dismissal of standard safety practices and thus received a grade of 0.

MAIN EDUCATIONAL POINTS from PC251

1. Culture media integrity is mandatory; the presence of any contaminant in a given lot of plates warrants potential rejection of the entire lot as contamination may be low level or nonuniform, and batch sterility cannot be assured. Media used for clinical diagnostics must be sterile and quality-assured to prevent erroneous results and patient harm.
2. Unknown contaminants pose a potential biosafety hazard and open-bench handling increases the risk of laboratory-acquired infection and cross-contamination. Technologist training is essential to recognize contamination, understand its clinical and safety implications, and follow proper escalation procedures.
3. Supplier accountability and documentation: Laboratories should inform suppliers of the issue, request a replacement lot, and document the incident as part of internal quality control and continuous improvement efforts.

CLINICAL RELEVANCE

This challenge involves a batch of sheep blood agar (SBA) plates, with apparent nonuniform contamination with colonies of small Gram-positive bacilli demonstrating minor beta-hemolysis. Such findings raise concerns for contamination with potentially pathogenic organisms, such as *Listeria monocytogenes*, which poses a biosafety risk, especially if handled on an open bench without appropriate containment [1]. Given the possibility of *Listeria* contamination, at least the lot of plates should be quarantined for a sufficient period of time to identify the contaminant and determine if it is more likely to pose a threat to infection of laboratory staff (i.e unlikely if only a couple of colonies of a coagulase-negative staphylococcus or other common contaminant). Further, the supplier should be contacted to ensure that information is supplied to other customers regarding the possibility of contamination of the lot with *Listeria*. In this case it is prudent to discard the entire lot. From a diagnostic standpoint, the use of contaminated culture media introduces the risk of false-positive results in diagnostic specimens when contaminants are misidentified as clinical pathogens, or false-negative outcomes if contaminants outcompete the growth of true pathogens. Such inaccuracies can result in unnecessary laboratory workups, inappropriate antimicrobial use, delayed diagnosis, or patient harm.

Destroying the entire contaminated batch represents a precautionary measure consistent with the Clinical and Laboratory Standards Institute (CLSI M22) [2]. Continued use of a compromised batch undermines quality assurance efforts and violates principles of good laboratory practice.

With respect to *Listeria monocytogenes* specifically, it is important to note that this organism is found among multiple natural hosts (humans, sheep, cattle, goats), and that animal listeriosis occurs worldwide [3-5]. Thus, it can contaminate the raw materials used in media preparation. Indeed, there have been reports of *Listeria monocytogenes* pseudo-outbreaks caused by contaminated laboratory media related to listeriosis in the livestock supplying blood for culture media; the media had passed manufacturing quality control likely because of low level and nonuniform contamination [6].

From a lab safety perspective, *Listeria monocytogenes* is classified as a Risk Group 2 pathogen. Listeriosis is a serious illness particularly affecting neonates, pregnant women, older adults, and immunocompromised individuals [3]. Clinical manifestations are variable including septicemia, meningoencephalitis, and perinatal infections. A case of cutaneous listeriosis has been described in a laboratory technician in 1957 (unclear exposure), which reinforces the importance of conducting local risk assessments and following biosafety practices [4].

REFERENCES

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