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QUESTION 4: What is the recommended standardized laboratory culture protocol to minimize differences between medical centers?

RECOMMENDATION: Based on current guidelines from the Infectious Disease Society of America (IDSA), specimens for culture should be transported in sterile containers at room temperature and processed promptly within a two-hour window to limit specimen contamination or desiccation and subsequent death from nutrient deprivation.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 92%, Disagree: 3%, Abstain: 5% (Super Majority, Strong Consensus)

RATIONALE

At the present time, clinical microbiological laboratories utilize various approaches including molecular and classic culture methodologies in order to properly detect pathogenic microorganisms. However, culture remains to be the current preferred method in identification and subsequent classification of the infective pathogens. The practices in place are essential for assuring the correct determination of sensitivity and suitable treatment for patients following identification of the pathogen that led to surgical site infection (SSI) and/or periprosthetic joint infection (PJI). Standard protocols have been implemented for microbiological laboratories serving both large academic medical centers and smaller community programs in order to maintain equitable results and a minimum threshold for the quality of specimen culture and subsequently the care of patients [1].

There are a multitude of factors that should be understood when considering the standardization of culture procedures. Culture yield is influenced by laboratory plating technique, the transport vehicle of the specimen, the time frame before reaching nutrient, the type of growth enabling media used and numerous other factors. A recommendation by the IDSA states that all orthopaedic surgery tissue and fluid specimens sent for culture following intraoperative collection should be processed promptly after transport inside sterile containers and the processing time should not exceed a two-hour window [1]. This is of the utmost importance in limiting the time frame in which the microorganism is without nutrients and in an uninhabitable environment.

The aforementioned IDSA guidelines outline how delicate the lifecycle of prokaryotic and simple eukaryotic organisms can be and how at any time during the specimen collection, transport and processing progression, it can be disrupted or altered leading to misinterpretation of the final result [1]. Incorrect interpretations of the final result, whether by subjective human nature, automated analyses or unwanted contamination, can and will have major implications in the management of patients in which these specimens originated.

In an effort to maintain the same level of certainty in the detection of PJI for revision total joint arthroplasty (TJA) cases, it has been recommended that a minimum of three specimens for culture be taken intraoperatively [1,2]. A prospective study by Atkins et al. examined 297 revision TJA procedures using multiple detection methods included in a mathematical algorithm to determine each diagnostic test's performance in identifying cases with infection [3]. They recommended that there should be five to six specimens collected from revision arthroplasty procedures in order to properly diagnose an underlying infection and at the very minimum, at least three specimens collected should yield growth of the underlying microorganism for adequate diagnosis of infection [3]. They further recommended labs should abstain from using Gram staining as a clinical diagnostic tool.

Studies have shown that there is much needed research in determining how the eventual use of implant sonication, blood culture bottles and other novel molecular techniques once brought into standard practice may further the capability of diagnosing orthopaedic surgery associated infections [4–6].

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