SH42. Should the universal availability of diagnostic tests influence their utilization in the diagnostic criteria of PJI? (i.e. if next generation sequencing or alpa defensin are not readily available internationally, should they be included?)

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Methodology: This review was focused on the public health and laboratory equity and health equity surrounding diagnostic testing for bacterial infections. A comprehensive literature review was performed to identify all studies on infection screening and health disparities in regards to next-generation sequencing and alpha-defensin. A pubmed, google scholar and MedLine search for "next-generation sequencing," "alpha-defensin," "screening," "infection," "disparities," and "health equity" was conducted. No relevant articles to this specific topic in prosthetic joint infection was identified.

Due to the lack of specific studies addressing this question, and the broad applicability of the identified studies, a narrative review of available literature is presented. This review highlights issues surrounding next-generation sequencing and its mainstream adoption as an infection screening tool, as well as general concerns with implementing newer testing technologies and how it affects different patient populations.

Answer: Unknown. There is no literature on this topic, but literature and narrative reviews and opinion pieces do provide guidelines to consider for adopting these tests as a screening tool for diagnostic criteria.

Strength of Recommendation: Limited (Evidence is insufficient and does not allow a recommendation for or against the intervention)

Rationale:

The American Society of Microbiology recently put out a call for papers to address diagnostic testing and laboratory equity in clinical microbiology in 2024 (Larkin). A whole journal has been dedicated to addressing this topic (Microbiology Spectrum) and hoping to focus on studies that highlight the difficulty in implementing diagnostic assays in low-resource settings, or those without robust diagnostic infrastructure. In regard to Shoulder PJI, next-generation sequencing and alpha-defensin, are two assays that have been gaining traction into standard of care usage in the diagnosis of PJI (their scientific merits to be addressed in separate questions). However, regarding alpha-defensin – there is a commercial lab, and a few academic labs that do it in-house in the United States. In an international setting, this availability may be even more sparse. However, the technology is one that is typically low-cost as it has been around for decades, and barriers to entry reside more in finding a laboratory that can do enough assays to warrant developing quality control metrics and other issues in providing new tests in a clinical, non research-setting.

Next-generation sequencing (NGS) has picked up momentum globally with its utility in quickly diagnosing infectious diseases, and personalized cancer treatments. Thus, NGS may have an advantage in an international setting, as this technology is more widespread. The World Health Organization's (WHO) influenza surveillance system use NGS to help identify local outbreaks, and improved coordination of establishing standards, reporting and interpretation of data could improve NGS utilization and effectiveness (Gwinn 2019). Adoption of NGS is akin to the adoption of PCR many years ago, and what some can consider is akin to adoption of AI in technology. Sequencing costs, data transfer and analysis will become faster and more efficient, and thus barrier to usage will likely decrease as time goes on (Besser, Rodino). At least in the United States, the CDC and federal agencies and American Academy of Microbiology have worked together to standardize, promote, and quality control NGS since 2015 (Gargis, Gwinn 2017). Thus, NGS is still in its infancy in PJI in the shoulder, but its utility in other areas of medicine have become more mainstream.

In conclusion, the question that needs to be considered is first off – are either of these tests good enough to warrant inclusion as a diagnostic criterion (to be answered by other ICM questions), and

secondly, if they are, then both public and private organizations should work together to promote the global adoption of these assays in the setting of shoulder PJI.

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