Advanced poc diagnostics: Transforming global healthcare.

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Introduction

This review highlights significant strides in point-of-care diagnostics, detailing advancements in various biosensing platforms, microfluidic technologies, and Artificial Intelligence integration. It discusses how these innovations are making diagnostics more accessible, faster, and suitable for resource-limited settings[1].

This article delves into the synergistic relationship between wearable technology and point-of-care biosensors. It emphasizes their potential for real-time, continuous health monitoring, identifying early disease markers, and personalizing medical interventions, offering a glimpse into proactive healthcare management[2].

The authors examine the critical role of point-of-care testing for infectious diseases, especially after the recent pandemic. They highlight ongoing challenges in test development, regulatory approval, and deployment, while also pointing out significant opportunities for improving public health responses and disease surveillance[3].

This paper reviews the progress in microfluidic technologies as foundational components for point-of-care diagnostic devices. It details how these platforms enhance sample handling, reaction efficiency, and multiplexing capabilities, predicting their pivotal role in miniaturized and high-throughput diagnostic systems[4].

This review explores the application of CRISPR technology in developing highly sensitive and specific point-of-care diagnostic tools for infectious diseases. It emphasizes the advantages of CRISPR in rapid detection, minimal equipment requirements, and its potential to revolutionize decentralized testing[5].

The systematic review investigates the integration of artificial intelligence with point-of-care diagnostics. It highlights how AI algorithms enhance data interpretation, improve diagnostic accuracy, and enable smarter decision-making, particularly in resource-constrained environments, thereby accelerating diagnostic workflows[6].

This article focuses on the evolution of paper-based diagnostic devices, noting their affordability, simplicity, and portability. It discusses the latest material science innovations and assay designs that are making these platforms increasingly effective for various point-of-care applications, especially in low-resource settings[7].

The authors argue for the indispensable role of point-of-care ultrasound in contemporary medical practice. They detail its utility in rapid assessment, guiding procedures, and monitoring patient responses across various clinical scenarios, emphasizing its impact on timely and accurate patient management[8].

This comprehensive review summarizes recent advancements in biosensor technology tailored for point-of-care applications. It covers diverse sensing mechanisms, nanomaterial integration, and signal transduction methods, highlighting their contribution to developing highly sensitive and multiplexed diagnostic devices[9].

This article addresses the critical need for multiplexed point-of-care diagnostics, especially for addressing global health challenges. It explores various platforms capable of simultaneously detecting multiple biomarkers, emphasizing their potential for comprehensive disease screening and surveillance in resource-limited settings[10].

Conclusion

Point-of-care diagnostics are transforming healthcare by making testing more accessible, faster, and suitable for settings with limited resources. Recent developments highlight significant advancements across various technological platforms. For instance, biosensing platforms, microfluidic technologies, and Artificial Intelligence (AI) integration are enhancing diagnostic capabilities, leading to more efficient workflows. The integration of wearable technology with point-of-care biosensors allows for continuous health monitoring, enabling early detection of disease markers and personalized medical interventions. This proactive approach to healthcare management promises to revolutionize how individuals manage their health. Infectious disease testing remains a critical area, especially in the post-pandemic era, with ongoing challenges in development and deployment, alongside opportunities for public health improvement. Microfluidic technologies are foundational to these devices, improving sample handling and reaction efficiency for miniaturized systems. Innovations such as CRISPR

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Received: 01-Apr-2025, Manuscript No. aacbc-212; **Editor assigned:** 03-Apr-2025, Pre QC No. aacbc-212 *(PQ)*; **Reviewed:** 23-Apr-2025, QC No. aacbc-212; **Revised:** 02-May-2025, Manuscript No. aacbc-212 *(R)*; **Published:** 13-May-2025, DOI: 10.35841/aacbc-9.2.212

Citation: Khan F. Advanced poc diagnostics: Transforming global healthcare. aacbc. 2025;09(02):212.

technology offer rapid, sensitive, and specific diagnostic tools for infectious diseases, requiring minimal equipment and supporting decentralized testing. Similarly, AI algorithms are crucial for interpreting data, boosting accuracy, and making smarter decisions in resource-constrained environments. Paper-based diagnostic devices stand out for their affordability and portability, with material science innovations making them increasingly effective. Beyond specific testing, point-of-care ultrasound is now an essential tool, aiding rapid assessment and guiding patient management across clinical scenarios. Overall, the field sees continuous advancements in biosensor technology, including novel sensing mechanisms and nanomaterial integration, leading to highly sensitive and multiplexed devices. The ability to detect multiple biomarkers simultaneously is particularly important for global health challenges, enabling comprehensive disease screening and surveillance in diverse settings.

References

1. Shivani S, Neha K, Sunil R. Point-of-Care Diagnostics: *Recent Developments and Future Prospects. Biosens Bioelectron.* 2024;251:116127.
2. Wei G, Sam E, Hsin HYY. Wearable and point-of-care biosensors for continuous health monitoring. *NPJ Digit Med.* 2024;7:101.
3. Victor MC, David OO, Jan FD. Point-of-care testing for infectious diseases: Challenges and opportunities in the post-pandemic era. *Lancet Microbe.* 2023;4:e741-e755.
4. Jimin L, Young H J, Young J K. Microfluidic platforms for point-of-care diagnostics: *Current status and future directions. Biosensors* (Basel). 2023;13:978.
5. Guosong C, Shan H, Cheng Y. CRISPR-based point-of-care diagnostics for infectious diseases: *A review. J Mol Cell Biol.* 2022;14:mjmc053.
6. Vivek S, Anil KS, Jai S. Artificial intelligence in point-of-care diagnostics: *A systematic review. Crit Rev Clin Lab Sci.* 2022;59:421-440.
7. Ting L, Chun L, Zhenyu Z. Advances in paper-based point-of-care diagnostic devices. *Anal Chim Acta.* 2021;1184:339031.
8. Victor AD, Jessica NK, Kori W. Point-of-care ultrasound: *An essential tool in modern medicine. Am J Med.* 2020;133:1381-1386.
9. Yajuan W, Yong L, You Z. Biosensors for point-of-care applications: *A review of recent advances. Trends Analyt Chem.* 2020;131:116035.
10. Ali KY, José LM, Claudio P. Multiplexed point-of-care diagnostics for global health. *ACS Nano.* 2019;13:12423-12444.

Citation: *Khan F. Advanced poc diagnostics: Transforming global healthcare. aacbc. 2025;09(02):212.*