Advanced Techniques in Biology & Medicine
ISSN: 2379-1764
OPEN ACCESS Freely available online
Short Communication

Brief Note on Open Doors for Digitalization in Microbial Science

Arwyn Dias*

Department of Respiratory and Critical Care Medicine, Tan Tock Seng Hospital, Singapore

DESCRIPTION

In clinical microbiology, the diagnostic process is divided into three stages: pre-analytical, analytical, and post-analytical, forming a circle of material and information flow. The collection and quality of samples transferred to the laboratory are addressed in pre-analytics. The filling amount of blood flasks, for example, is directly related to positive rates and analytical sensitivity of blood culture diagnostics. Modern blood culture systems use automated weighing to determine the volume of blood cultures obtained and send feedback to the Laboratory Information System (LIS) [1]. The detection of contaminated blood cultures due to skin flora such as Staphylococcus epidermidis, other coagulase negative staphylococci, and Cutibacterium acnes are further examples of pre-analytical quality. The risk of blood culture contamination can be determined using criteria for a Systemic Inflammatory Response Syndrome (SIRS) and the presence of a central venous line. In the future, combining LIS and Electronic Health Record (EHR) data could enable more sophisticated feedback loops and give microbiologists and clinicians with automated quality assessment reports.

Digital twins, machine-learning-based algorithms in smartphone apps, and chatbots are examples of digital solutions in this field. When patients are exposed to SARS-CoV-2 [2], chatbots have recently been developed to assist with diagnostic evaluation and to prescribe prompt measures. A chatbot, similar to a microbiological consultant, can provide diagnostic information and recommendations, such as the proper transport media for a sample, projected turnaround time, and test performance in specific sample types. Such an interactive tool might serve as a first point of contact for routine and recurrent enquiries, as well as aid in pre-analytical quality control. In our vision, the digital twin functions similarly to a smart shopping list, recommending additional laboratory tests that were previously performed when identical patient criteria were present. As a result, such a tool might make use of the knowledge of other users. For example, in a critically ill immunosuppressed patient with sepsis, a panel PCR directly from a positive blood culture may speed up species identification and lead to antibiotic treatment adaptation, whereas in a younger, otherwise healthy patient, standard culture-based identification may be sufficient.

Analytics includes test results and data generation in the laboratory. Automated microscopy, for example, provides for the acquisition of high-resolution pictures of smears from positive blood cultures and the classification of Gram staining with great sensitivity and specificity [3]. Smartphones can be utilized for image analysis of microscopy data in addition to state-of-the-art automated microscopes. Automated plate reading systems work on a similar pattern recognition principle and can accurately spot bacterial growth on an agar plate, making them useful for pre-screening culture plates. Well-developed reading software can also automate the reading of E-tests and inhibition zone widths surrounding antibiotic-impregnated discs [4]. For many years, expert systems have been used to interpret antimicrobial resistance profiles. Medical validation of phenotypic resistance profiles is typically done to see if there are any unusual resistances that require further testing or confirmation, such as the detection of a potential Extended Spectrum Beta-Lactamase (ESBL) or carbapenemase-producing bacteria due to suspicious MIC levels.

CONCLUSION

In healthcare, digitalization is already having a significant influence on patients. It is believed that the current trends will continue to gather traction. Machine learning is revolutionizing how we handle healthcare data, especially clinical microbiology and infectious disease data. We'll most likely transition from an internet-of-things environment (interconnected datasets in a patient with a sickness) to an internet-of-bodies with (implanted) devices, which will provide extensive healthcare data even when the patient isn't sick. Furthermore, advances in molecular diagnostics, such as metagenomics, will add to the data complexity. Laboratory diagnoses will become even more important over the next decade, according to current trends. This means that today's clinical microbiologists must learn about digital microbiology, learn about data management, and anticipate low-hanging fruit like microbiology dashboards, expert systems, and image analysis of microscopy slides and plate reading. Clinical microbiology laboratories should assess their

Correspondence to: Arwyn Dias, Department of Respiratory and Critical Care Medicine, Tan Tock Seng Hospital, Singapore, E-mail: dias@arwyn.edu.sg

Received: 31-Mar-2022, Manuscript No. ATBM-22-16525; **Editor assigned:** 04-Apr-2022, PreQC No. ATBM-22-16525 (PQ); **Reviewed:** 18-Apr-2022, QC No. ATBM-22-16525; **Revised:** 25-Apr-2022, Manuscript No. ATBM-22-16525 (R); **Published:** 02-May-2022, DOI: 10.35248/2379-1764.22.10.347

Citation: Dias A (2022) Brief Note on Open Doors for Digitalization in Microbial Science. Adv Tech Biol Med. 10: 347.

data handling methods and infrastructure, including storage and data transfer routines, right now. To meet the opportunities and challenges that lie ahead, we must plan strategies for the next 5–10 years. To improve patient care, our community should anticipate developments in digitalization and establish concepts such as machine-readable formats and interoperability among centers.

REFERENCES

1. Khare R. Active monitoring and feedback to improve blood culture fill volumes and positivity across a large integrated health system. Clin Infect Dis. 2020;70:262–268.
2. Battineni G, Chintalapudi N, Amenta F. AI Chatbot design during an epidemic like the novel Coronavirus. Healthcare. 2020;8.
3. Smith K.P, Kang A.D, Kirby J.E. Automated Interpretation of blood culture Gram stains by use of a deep convolutional neural network. J Clin Microbiol. 2018;56.
4. Smith K.P, Richmond D.L, Brennan-Krohn T, Elliott H.L, Kirby J.E. Development of mast: A microscopy-based antimicrobial susceptibility testing platform. SLAS Technol. 2017;22:662–674.