A Clinical Informatics Platform that allows for Multi-modal Infectious Disease Therapy

Wonk Woo-Yeon*

Department of life science, Hannam University, South Korea

Abstract

TInfectious diseases are caused by bacteria, viruses, fungus, or parasites, which are microorganisms. These infections can cause epidemics or even pandemics if they are transmitted directly or indirectly. The infection that results might cause mild to severe symptoms like a life-threatening fever or diarrhoea. Infectious infections might be asymptomatic in some people but can have devastating consequences in others. Infectious infections remain a primary cause of death worldwide, particularly in low-income nations, despite medical improvements. Scientists may now better forecast epidemics, comprehend the specificity of each infection, and find possible therapeutic targets thanks to the development of clinical informatics tools. The goal of infectious disease informatics is to improve the clinical and public health management of infectious diseases through advances in antimicrobial development and use, vaccine design, biomarker discovery for life-threatening infections, a better understanding of host-pathogen interactions, and biosurveillance and clinical decision support.

Keywords

Infectious Disease, Clinical Informatics, ANSD

Correspondence to:

Wonk Woo-Yeon
Department of life science,
Hannam University, South Korea
Email: yeon.wonk-hus@gmail.com

Citation: WWoo-Yeon W (2021) A Clinical Informatics Platform that allows for Multi-modal Infectious Disease Therapy. EJBI. 17(10): 74-75.

DOI: 10.24105/ejbi.2021.17.10.74-75

Received: October 05, 2021

Accepted: October 21, 2021

Published: October 30, 2021

1. Introduction

For patients in low and middle income nations, infectious diseases such as tetanus and hand, foot, and mouth disease can still be life-threatening. In comparison, in new-borns and early children, they are often a benign self-limited sickness. In the infectious disorders indicated above, autonomic nervous system dysfunction (ANSD) is the leading cause of death. The cardiovascular system is particularly affected by ANSD, which can be identified by analysing the heart‘s autonomic control. Clinically, early identification of ANSD is difficult, but once the illness is established, therapy becomes tough. As a result, early diagnosis is a critical task that has the potential to enhance patient outcomes [1]. A contagious sickness in the realm of infectious illnesses, informatics has been classified as a new field that examines knowledge production, sharing, modelling, and management. Rapid increases in the amount of biological and clinical data, as well as demands for data analysis, have propelled its growth. The ensuing combination of experimental and informatics evidence has transformed how infectious disease research is conducted, offering the prospect of improved disease control. According to the authors of this book, informatics has revolutionised not just the scale on which infectious disease research is conducted, but it has also conceptually opened up new ways of managing patients and creating discoveries in the field of infectious illnesses. Advances in microbial genomics, or the sequencing and comparative study of pathogen genomes, and proteomics, or the identification and characterization of their protein-related properties, as well as the reconstruction of metabolic and regulatory pathways, underpin „New Age“ infectious disease informatics [2]. Annotation is the process of extracting biological information from nucleotide sequences. To automate microbial genome annotation and assembly, many software pipelines have been developed. This type of genome decoding allows for the prediction of protein-coding genes and, as a result, the proteins that an organism can create. Clinical informatics may be based on a multi-layer decision-making diagnosis phase that is split into an on-site triage procedure for rapid diagnosis, followed by a longitudinal model for customised diagnosis.

Different fusion strategies and a multi-modal or -stream framework are created. Using low-cost wearable sensors like a pulse oximeter, several physiological data streams are collected from patients with infectious disorders. Different modalities, such as electrocardiogram (ECG) and photoplethysmogram (PPG), could produce these streams [3]. Furthermore, a single modality, such as the traditional 12-lead ECG, may have numerous channels. The electrical activity of the sinoatrial node, which governs the expansion and contraction of the heart, produces ECG signals. When the heart pumps blood into peripheral vessels, PPG signals represent changes in light absorption of the skin, as measured by an infrared sensor emitting light on the skin. On-site triage refers to local modelling and decision-making, i.e. the triage procedure prescreens patients on-site, such as via a mobile device. As a result, due to limited on-site resources and the high dimension of Convolutional neural networks (CNN) features, we propose using a simple classifier, such as logistic regression. For short-duration physiological data from an infectious disease patient, the on-site triage procedure gives an instantaneous Autonomic nervous system dysfunction (ANSD) severity level prediction [4]. Longitudinal modelling aids in encoding the temporal dependency among consecutive samples of the patient and predicting the inference level while taking into account the patient's prior states, i.e. providing a personalised prediction. This can, of course, be extended to anticipate a patient's severity in the future.

2. Conclusion

Using low-cost and inconspicuous wearable sensors that collect artefact-prone physiological data, multi-modal decision making to triage patients with infectious diseases. ANSD is the leading cause of death from infectious disease suffering, and it is generally undetected until late stages of the disease. As a result, an early and automatic diagnostic of its severity level could be used to intervene in a timely manner. As a result, the proposed method would ensure efficient hospital resource utilisation in low-resource clinical settings in developing countries, potentially improving overall patient care. Future research could look into the influence of incorporating an attention model into the LSTM, as this has been found to considerably increase the LSTM's performance in other domains.

References

1. Thuy DB. Tetanus in Southern Vietnam: Current situation. Amer J Tropical Med Hygiene. 2017. 96(1): 93-96.
2. Belle A, Kon MA and Najarian K. Biomedical informatics for computer-aided decision support systems: a survey. Sci World J. 2013.
3. An GC, Faeder JR. Detailed qualitative dynamic knowledge representation using a BioNet Gen model of TLR-4 signalling and preconditioning. Math Biosc. 2009; 217:53-63.
4. Amadoz A, Gonzales-Candelas F. epiPATH: an information system for the storage and management of molecular epidemiology data from infectious pathogens. BMC Infect Dis. 2007; 7: 32.