Potential Applications of Emerging Technologies in Disease Surveillance

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Objective

The objective of this presentation is to explore emerging technologies and how they will impact the public health field. New technologies such as blockchain, artificial intelligence (AI), and the Internet of Things (IoT) will likely be incorporated into epidemiological methods and processes. This presentation will provide an overview of these technologies and focus on how they may impact public health surveillance in the future.

Introduction

With the increase in the amount of public health data along with the growth of public health informatics, it is important for epidemiologists to understand the current trends in technology and the impact they may have in the field. Because it is unfeasible for public health professionals to be an expert in every emerging technology, this presentation seeks to provide them with a better understanding of how emerging technologies may impact the field and the level of expertise required to realize benefits from the new technologies. Furthermore, understanding the capabilities provided by emerging technologies may guide future training and continuing education for public health professionals.

Methods

Analysis of current capabilities and potential advances in emerging technologies such as blockchain, AI, and IoT were performed by reviewing articles and whitepapers. In addition to a literature review, interviews will be performed with public health experts to determine how the emerging technologies align with current practices and the extent to which they may solve existing public health surveillance challenges.

Results

The literature review revealed many emerging technologies and potential applications in the public health field, including:

Blockchain

Blockchains can serve as electronic health information exchanges that hold the metadata and access information for patient electronic health records (EHRs) [1]. These systems can ensure data privacy protections while also facilitate relevant data sharing from EHRs to disease surveillance systems. Furthermore, blockchain technology can be used in food supply chain management systems. During food contamination events, epidemiologists can trace through the blockchain to identify possible sources of the contamination [2].

AI

AI can be used to improve the prediction and detection capabilities of disease surveillance systems. Machine learning algorithms can reveal patterns in the data and enable faster anomaly detection. Furthermore, machine learning models can be trained on data to create predictive models.

IoT

Urban IoT systems can monitor environmental indices including water and air quality, energy consumption, waste management, and traffic congestion in smart cities [3]. The data collected from such systems can be incorporated into more comprehensive disease surveillance systems and assist epidemiologists in better understanding populations and environmental risk factors. We will

analyze and discuss such prospective applications with public health professionals to determine their potential impact on public health processes and practices in the next one, five, and ten years.

Conclusions

Blockchain, AI, IoT and other emerging technologies have applications in public health surveillance and impact the field to varying degrees. In addition to technological advances, there will be barriers to adoption that must be overcome before the value provided by the technologies can be realized. Many new technologies will require significant collaboration between public health departments, healthcare providers, and other partners to successfully incorporate the technologies into epidemiological processes. These collaborations include forming consortiums to exchange data in a blockchain and working with IoT providers for data access. Some technologies will require public health professionals to obtain additional training before they can take full advantage of the capabilities provided, while other technologies may be implemented by external partners allowing epidemiologists to utilize the new capabilities without the need to completely understand the underlying concepts. As emerging technologies are introduced into the public health field, a strong understanding of their capabilities and suitable applications will allow public health professionals to fully capture the benefits provided by the new technologies.

References

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