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Health Informatics Training Programs to Strengthen Health Workforce in Montenegro

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Abstract. Health informatics plays a crucial role in modern healthcare provision. Training and continuous education are essential to bolster the healthcare workforce on health informatics. In this work, we present the training events within EU-funded DigNest project. The aim of the training events, the subjects offered, and the overall evaluation of the results are described in this paper.

Keywords. Health informatics, healthcare workforce training

1. Introduction

International recommendations in biomedical and health informatics (BMHI) education have been published by the International Medical Informatics Association (IMIA) two times: initially in 2000, and as its revision in 2010. Given the recent changes to science, technology, the needs of healthcare systems, and the workforce of BMHI, a modification of the recommendations was necessary. The latest update of the recommendations – published in 2023 – aims to support educators in developing BMHI curricula at different education levels [1].

There are various systematic reviews that report the importance of precision healthcare [2, 3], telehealth [4, 5], artificial intelligence, and machine learning [6, 7], as well as the critical role of clinical decision-support systems [8-11]. The World Health Organization (WHO) plans to be aligned to health-related sustainable development goals

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by 2030. In order to reach this goal WHO predicts a global shortage of 18 million health workforce workers as a need to be aligned to [12].

Digital health necessity was revealed during the COVID-19 pandemic. People appreciate the usefulness of digital healthcare in public health emergencies, and epidemiological surveillance benefits from advanced integrated health information systems. Small-size countries like Montenegro face more serious problems on recruiting healthcare specialists due to the global shortage of health workforce workers.

2. Methods

To support the objectives of the DigNest project, two events organised, aiming at specific theoretical and practical purposes. The theoretical objectives of the first training event were: to increase awareness about public health; to introduce health informatics and technologies applied to public health; to introduce the application of GDPR in public health; to demonstrate what public health is; to share experience and key lessons learnt regarding health informatics and epidemiological surveillance (especially on augmented reality in public health nursing and use cases of health informatics and epidemiological surveillance); to share experience in telemedicine and mobile health, as well as on applications of artificial intelligence and decision-support systems in public health.

During the second training event, the theoretical objectives were: to increase awareness about the use of ICT tools for public health data analysis and presentation; to disseminate the knowledge regarding an introductory issue about the need for data and maps for public health; to spread the knowledge regarding the use of ICT tools for public health data analysis, the use of ICT tools for public health data analysis and presentation Power BI hands-on, the use of graphical machine learning tools for public health data analysis and presentation (Knime hands-on workshop).

3. Results

The first training event – taking place as a live event on 25/02/2022 – consisted of the following subjects: (i) What is public health? (ii) Health informatics and epidemiological surveillance; (iii) The prospects of augmented reality in public health nursing; (iv) Introduction and use cases of health informatics and epidemiological surveillance during epidemics and pandemics; (v) Telemedicine and mobile health; (vi) Applications of mobile health in public health; (vii) Ethical issues on epidemiological surveillance using health informatics; (viii) Artificial intelligence systems and decision-support systems in public health.

Within the second training event – taking place as a live event on 3-4/05/2022 – the following training subjects were presented: (i) Introduction need for data and maps for public health; (ii) The use of ICT tools for public health data analysis and presentation (Power BI hands-on); (iii) The use of graphical machine learning tools for public health data analysis and production (Knime hands-on); (iv) A roundtable discussion for the cooperation between academia and healthcare stakeholders for the development of modern study programs (including lifelong education).

An evaluation questionnaire was used for the assessment of the two training events. The evaluation process was implemented by using Google Forms, and statistical analysis was performed over the downloaded database with the collected responses from all the

trainees. The results on the overall satisfaction level for the first and the second training events were the following: 14 out of 20 individuals were *strongly satisfied* and 6 out of 20 were *satisfied* for the first training event, while 12 out of 20 were *strongly satisfied* and 8 out of 20 were *satisfied* for the second training event.

4. Discussion and Conclusions

The primary goals of the events were to increase awareness regarding digital technologies and to present the subject of digital health as a service of public health, as modern public health systems are exposed to the digital transformation of their operations. The events revealed that the outbreak investigation and the response – defined as steps and phases – have specific technology- and information-related needs. In recent years, public health agencies have benefitted from technological advances that support outbreak detection. In addition, during the COVID-19 outbreak, telemedicine proved a must for delivering health care services. It is also worth mentioning that telemedicine can promote both patients' and health professionals' protection against mistakes. Furthermore, solutions for mobile health applications (e.g., to guide people to drive-through testing centres to monitor the movement of people who tested positive for COVID-19) were successfully applied and presented in some tutorials.

Finally, healthcare specialists encounter an enormous spread of fake news about health-related issues. This is a hectic issue that consists of misinformation and/or disinformation. The main point is that this phenomenon mainly affects the effectiveness of public health policy, especially during pandemics like COVID-19. Digital health develops tools such as machine learning algorithms, adjusted adequately for confronting fake news in healthcare. Past long-term ICT investments in digital health are now relevant to increase responsiveness to public health emergencies. Future investments need to take use cases associated with communicable diseases into consideration.

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