BIOS POLICY BRIEF

Shaping the future of Medicine

07/2019

Highlights

The potential of Big Data and Genetic testing for improving healthcare services is enormous. Developments in the field of Bioscience and technology provide health care professionals with the tools to improve their services through personalization of predictions, earlier diagnosis, better treatments, and improved decision. However, medical doctors lack required knowledge to make use of these scientific developments. Efforts are undertaken to tackle these challenges and to integrate more effectively Bioinformatics into clinical practice.

This policy brief explores the developments in the field of Bioinformatics and the benefits thereof for the health care sector. Policy recommendations are provided to show possible solutions to implement effective capacity building in the field.

Evidence and Analysis

Medicine and healthcare are undergoing profound changes. Bioscience and technology are increasing the understanding of the human body and mind, and the ways in which injuries, conditions and diseases can be prevented and treated. Health professionals will be required to keep abreast of these developments as they manifest themselves

Technological advancements in the area of Big Data, continuously expand the potential of health professionals in clinical decision-making and advance care delivery. Healthcare specialists should possess and continuously develop technical skills and experience using health-relevant emerging techniques and methods (EU Skills Panorama, 2016), such as Computational Biology. In the same line, the Joint Action Health Workforce Planning and Forecasting (JA EUHWF) identifies Genomics and precision medicine (Mirnezami et al, 2012) as one of the main drivers shaping health care services for the future, and correspondingly suggests that detailed genetic assessment and treatment skills will be important for the workforces involved in assessment, diagnosis and treatment (Fellows and Edwards, 2016).

In clinical practice, Big Data will yield palpable outcomes for individual patients through personalization of predictions, earlier diagnosis, better treatments, and improved decision support for clinicians in cyclic processes, as well as the development of innovative business models in the field (EC, 2012, 2014).

The use of ICT can have significant benefits for patients: for example, a medical doctor in a hospital can reach the diagnosis more quickly and with greater accuracy by using an ICT expert system than by traditional

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methods. The doctor inserts patients' data in the system, which delivers a diagnosis of consulting character for the expert. The system may be able to draw intelligence from medical books and recent reports/publications to reach the diagnosis and even recommend treatments or additional lab testing.

These technologies also build upon and enrich the government data by digitizing, collating, and analysing patients' records and creating valuable meta-data, thus integrating more powerful information schemas. These inevitably augment and expand health professionals' skills palette. As "intricate analyses of a patient's genomic data are destined to become an integral part of routine medical practice" (Brazas et al, 2014), healthcare specialists should possess, uphold and continuously develop technical skills and experience using health-relevant emerging techniques and methods, as those stemming from the area of Computational Biology.

The Analytical Highlight explicitly stresses that the demand for specialist qualifications in new and emerging technologies opens opportunities for education and training providers, who play a part in healthcare professionals' initial education, as well as in their continued, professional development. This demand goes beyond trainers, limited to the rumination of tedious algorithmic steps, failing to provide better understanding and coupling of these processes, with the underlying biological concepts. It rather aspires to form educational leaders, able to demonstrate the reforming power of bioinformatics, regarding the introduction of Molecular Medicine to Clinical practice, suggesting novel services in patient monitoring and clinical decision-making.

Moreover, needs analysis research aptly highlights the need for health professionals to respond effectively to concurrent demographic, organizational and structural changes shaping the sector, through the development of transversal skills in the fields of risk management, management and communication, and decision-making.

Challenges

Despite these projections and early demonstrations of clinical utility, broad translation of genomic medicine into the clinical setting has not yet been seen. One of the biggest challenges is the availability of healthcare professionals that are able to use the latest information technologies developed in the Big Data analytics era (Rozman et al, 2016).

Thus, the challenge is the education of healthcare professionals: healthcare practitioners require the ability to interpret genomic data and make evidence-based decisions from this data. Healthcare professionals recognize their limitations in evaluating genomic data and readily seek training opportunities, not to become bioinformaticians as through biomedical informatics programs, but to become knowledgeable users, able to move besides the understanding of the output from distinct types of bioinformatic analyses of genomic data to the point where they can competently adopt and elaborate insightful, data-driven, medical decisions (Brazas, ibid.).

Next to detected scarcity of capacity building measures and training opportunities, we further face lack of research and funding in this field and at the same time an inadequate infrastructure of technology (e.g. access to databases) and equipment (e.g. biorepositories).

Moreover, the professional fields of medicine and bioinformatics are insufficiently interconnected, thereby preventing mutual learning and synergies between the two sectors.

Policy Recommendations

To effectively respond to the social, technological and economic changes,

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continuing professional development needs to touch upon a wide range of topics, on top of medical/scientific developments.

Continued, professional development activities need to evolve in line with emerging practices. At the present stage, we need just-in-time, well-designed training/short courses, in order to respond to the emerging need of medical doctors' qualification in the field of bioinformatics. In the long-term, we strongly advocate the introduction of Bioinformatics in formal training at undergraduate level. While not all health professionals need to master programming, incorporating bioinformatics earlier in the education cycle will help to bring more computational minded health professionals into web-lab teams to manage the programming and statistical composition of data analysis. Hence, Bioinformatics should be embedded as a core component of life cycle degree programs. Furthermore, additional training programs are needed to train future trainers and to help disseminate knowledge and best practices.

Next to efforts building up effective education systems, there is a need to foster coordination between policy makers, training and education providers and health professionals' associations. Such required cooperation can be created and maintained through the establishment of interlaced, scientific networks and interactive frameworks between bioinformatics experts and health professionals. Conferences, seminars, collaborative platforms and roundtables are only a few examples of possible instruments to pave the way for a vivid, sustainable and fruitful intellectual exchange between the various stakeholders.

BioS Project

The BioS: Digital Skills on Computational Biology Project approved in the European Framework of Erasmus+ / Sector Skills Alliances Programme and responds to the aforementioned challenges. It aims at advancing the digital skills of European medical doctors through the design, development and delivery of new modular vocational curricula on Computational Biology, as well as transversal skills, straightforwardly responding to the skills needs identified by existing research evidence.

Drawing on the evidence regarding skills needs, the BioS Sector Skills Alliance implements the design and delivery of transnational vocational training content, as well as teaching and training methodologies for the European professional core profile of Medical Doctors, aiming to upgrade their transversal skills as well as their occupation-specific skills in Medical chemistry (biomedical analysis), Medical statistics, Medical interpretation, and Clinical genetics by introducing them to the use of Computational Biology for clinical applications.

The purpose is to provide medical doctors with knowledge, skills and competencies, which will allow them to tackle effectively concurrent challenges in EU healthcare systems, services, and policies, in benefit of the health of EU citizens.

In order to achieve this, the BioS project:

- develops innovative modular curricula that integrate latest advancements in Computational Biology for the Healthcare sector that can be immediately applied by medical doctors in clinical context;
- develops a virtual learning environment aiming to bring together medical doctors, bioinformatic experts, educators and researchers, as well policy-makers across Europe. On this platform, users can exchange experiences and follow virtual lessons;
- delivers BioS training program as a Virtual Open Online Course underpinned by EQAVET;

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- provides participants with interactive experience through work-based learning periods.

The Bios training course includes 4 modules, namely: 1) Introduction to Bioinformatics, 2) Computational Statistics for clinical doctors, 3) Commercial personalized genomics services in patient care, 4) Quality Improvement in Healthcare.

The BioS project will reach out directly to approximately 800 medical doctors from 8 EU countries and beyond. The participating end-users represent more than 10.000 healthcare professionals. Additionally, BioS influences other associate partners and stakeholders incl. educational institutions, managers and policy makers from EU countries. The approach is to "train the trainer", creating a multiplier effect. The virtual learning platform and the educational resources will be available in 8 EU languages (EN, GR, PT, IT, ES, DE, FR, FI) to maximize the pool of possible users.

The BioS Training Course will start in autumn 2019. The project's current effort focusses on attracting suitable candidates to participate and benefit from the innovative course.

For more information on the BioS Project, please visit our website.

Contact

Laura Elisa Dorn
Hohenzollernstr. 12
14163 Berlin
E-Mail: laura.dorn@stw.de

BioS at a glance

Project Name: BioS: Digital Skills on Computational Biology

Consortium: Steinbeis University Berlin (SHB), Enios Applications Idiotiki Kefalaiouchiki Etaireia (e-NIOS), OLYMPIC TRAINING AND CONSULTING LTD (OT), Skybridge Partners, Bioinformatics Barcelona Association (BIB), University of Patras (UPAT), European Medical Association (EMA), European Recreation and Health Valley (EUREHVA), BG Klinikum Murnau gGmbH (BGU Murnau), FOR SRL, HiDucator Ltd, EPRALIMA_Vocational School of Alto Lima, C.I.P.R.L. (EPRALIMA), German Oncology Centre (GOC)

Duration: 01.01.2018 – 31.12.2020

Funding Source: EACEA, Erasmus+ / Sector Skills Alliances Programme

Website: https://www.bios-project.eu/

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