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Aims and Scope

The *International Journal on Biomedicine and Healthcare* is an online journal publishing submissions in English and/or Czech languages. The journal aims to inform the readers about the latest developments in the field of biomedicine and healthcare, focusing on multidisciplinary approaches, new methods, results and innovations. It will publish original articles, short original articles, review articles and short format articles reporting about advances of biomedicine and healthcare, abstracts of conference submissions, case-studies and articles that explore how science, education and policy are shaping the world and vice versa, editorial commentary, opinions from experts, information on projects, new equipment and innovations.

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EFMI STC 2013: Data and Knowledge for Medical Decision Support

Jana Zvárová
Editor in Chief

With this first issue of the volume 2013 the readers get the abstracts of submissions presented at the Thirteenth EFMI Special Topic Conference held in Prague, Czech Republic, from 17-19 April 2013. The EFMI STC 2013 (www.stc2013.org) is Europe's leading forum for presenting results of current scientific work focusing on the special topic Data and knowledge for medical decision support. The EFMI STC 2013 was organized by the European Federation for Medical Informatics (EFMI) in cooperation with the Society of Biomedical Engineering and Medical Informatics of the Czech Medical Society J.E. Purkyne. Nearly thirty years after the conference Computer-aided medical decision making held in Prague 1985 [1] this conference showed many new developments of methods and systems focused on medical decision support.

The conference Data and knowledge for medical decision support was running in two parallel sessions and was enriched by several workshops. All submissions with abstracts are published in this issue and assigned to groups according to the topics of the conference and topics of workshops. Topics of the conference were:

- Assistive diagnostic technologies for medical decision support
- Knowledge discovery in biomedical databases for decision support
- Knowledge management
- Formalization of knowledge, ontologies, clinical guidelines and standards of health care
- Intelligent interoperability and telemedicine
- Data and knowledge management for decision support in forensic medical disciplines
- eHealth decision support systems for GPs, clinicians, nurses, health care managers and patients
- Education and training for decision support
- Evaluation of decision support systems
- Diagnostic, therapeutic and prognostic decision support

More detail information about submissions can be found in the conference proceedings (including all full papers) published by the IOS Press [2]. Selected posters and short communications will be rewritten and published as original articles in the European Journal for Biomedical Informatics (www.ejbi.org) an official journal of EFMI. Medical decision support is an important constituent in different eHealth applications. Most of the developed decision support systems can be more or less easily integrated into clinical information systems both as part of those systems connected through standardized interfaces or as services to be remotely accessed.

References

[1] Jan H. van Bemmel, Francois Grémy, Jana Zvárová (eds.): Diagnostic Strategies and Expert Systems. Elsevier, North Holland, Amsterdam 1985.

[2] Arie Hasman, Bernd Blobel, Jana Zvárová (eds): Data and Knowledge for Medical Decision Support. IOS Press, Amsterdam 2013.

Errors in the Coding of Diabetes in Electronic Records Implications for Care

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Abstract

Introduction: Errors in the classification and coding of diabetes lead to patients potentially failing to be recalled for treatment, clinicians involved in their care not getting prompt or reminders, and the patients themselves receiving the wrong educational programme, and treatment.

Aim: To describe the process of identify and classification of diagnostic errors in people with diabetes managed in primary care settings.

Methods: We explored the extent to which codes for diabetes in computer systems could be mapped to the WHO classification for diabetes; we next developed a taxonomy of errors: misclassification, miscoding, and misdiagnosis. We developed manual algorithms and machine processable algorithms to sort them. Finally we recognised that needed different types of sort process for more strictly problem orientated medical record (POMR) systems.

Results: We report how many codes commonly used in diabetes can either be directly, possibly, or have no clear mapping with the WHO classification of diabetes. We used hand and automated searches to detect errors in clinical coding and developed self-audit tools that could be used to identify cases with coding errors. We found 40% and 60% of these in two separate evaluations to be clinically significant. Finally, we have demonstrated different search strategies are needed for POMR systems compared with those which are episode orientated as the former have less coding variation.

Conclusion: Coding errors in diabetes, and other conditions, are clinically significant and informaticians could take a major role in correcting them.

Keywords

Diabetes mellitus, medical record systems, computerized

Information-based Holistic Electronic Healthcare

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Abstract

The article discuss important development in medical informatics from the past and in the present by way of examples. The word 'informatics' is discussed as well as the relationship of the disciplines like biomedical informatics, health informatics and healthcare informatics to medical informatics. These cross-sectional disciplines form one of the bases for biomedicine and healthcare. They play the significant role in the new presented concept of the holistic information-based healthcare.

Keywords

Medical informatics, biomedical informatics, health informatics, healthcare informatics, electronic healthcare

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1 Introduction

Opinions that I present in the article are influenced by many open-minded persons that I have had the opportunity to meet during my life. Some of them have passed away and I cannot ask them for valuable advices now.

Figure 1: Jaroslav Hájek and graduates at Carolinum in 1965.

During my studies of mathematical statistics at Charles University in Prague, Faculty of Mathematics and Physics I received a lot new knowledge from Jaroslav Hájek († 1974), an outstanding scientist and university professor that unfortunately died at the age of 48 years after the transplantation of kidney. After my graduation in 1965 (Figure 1), I started to work with the Faculty of Pediatrics of Charles University in Prague. I realized the huge complexity of medical research and I decided to continue in doctoral studies focusing on such parts of mathematics that can support applications of mathematical methods in medicine and healthcare.

In 1967 I started my Ph.D. studies in theory of information under the supervision of Albert Perez from the Institute of Theory of Information and Automation of the Czechoslovak Academy of Sciences. Albert Perez († 2003) was a leader of the Czech school of information theory and also member of IFIP. The IFIP-TC4 was founded by Francois Grémy in 1967. Albert Perez introduced two of his Ph.D. students to medical informatics topics and mediated first interactions with activities in IFIP-TC4. Due to the political changes in Czechoslovakia in the late sixties, I could apply for the postgraduate studies at the Medical Faculty, University of Edinburgh in 1967. My application was successful, but normalization processes that started in Czechoslovakia after 21st August 1968 forced me to interrupt my postgraduate studies and return to Czechoslovakia in July 1969. Nevertheless, the one year stay in the United Kingdom gave me new knowledge on practice of medical computing. At the Department of Social Medicine, Medical Faculty, University of Edinburgh, I met many new approaches and ideas on medical data analysis and computing. Some of them were published later in [1]. The International Medical Informatics Association (IMIA) grew out of the former TC4 of the IFIP in 1979. Francois Gremy († 2014) from France (the first IMIA president) and Peter Reichertz († 1987) from Germany, one of presidents of EFMI (European Federation of Medical Informatics) deserve credit for the spread of the term medical informatics all over the world. In 1978 I established medical informatics group in frame of the present Czech

Introduction to technology acceptance

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Abstract

This contribution introduces a number of user satisfaction and technology acceptance approaches. User satisfaction appears to be a bad predictor for system acceptance and usage but is a good diagnostic to be used for system design. Since information systems are still underutilized, application of models of user technology acceptance can provide important clues about what can be done to increase system usage. The more so when models for user satisfaction and technology acceptance are integrated. Various user technology acceptance models are introduced.

Keywords

Health IT acceptance, user satisfaction, TRA, TAM, evaluation, integration of user satisfaction and technology acceptance aspects

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Introduction

Information technology adoption and use in the workplace remains a concern of information systems research and practice. Underutilized systems still exist. Therefore understanding and creating the conditions under which information systems will be adopted by a human organization remains a high-priority research issue. There is a need for methods with which one can predict – on the basis of information from (potential) users - whether an information system will be successful. The method would be even more useful when in case of a negative prediction it is able to indicate which factors should be changed to get a successful system. And finally, it would be very nice if the method would work even when the potential users are only briefly introduced to the system.

In this contribution we will focus on user acceptance, defined as the demonstrable willingness within a user group to employ information technology for the tasks it is designed to support. In their effort to explain system use, researchers first developed tools for measuring and analyzing computer user satisfaction [1]. User satisfaction is often considered as a surrogate of system success. But how do we define a successful system and is user satisfaction indeed a surrogate of system success? First this question will be discussed and then we will continue with some approaches that focus on user satisfaction. Next we will introduce the Theory of Reasoned Action (TRA), stemming from social psychology. TRA is a general model applicable to many domains. Then we discuss the three versions of the technology acceptance model (TAM). TAM is based on TRA. Finally we will introduce the Unified Theory of Acceptance and Use of Technology model.

1 How to define information system's success?

As stated above, user satisfaction was often considered as a surrogate measure for success. DeLone and McLean [2] investigated how IS success can be defined. They reviewed many studies that were conducted to identify factors that contribute to IS success, but the definition of IS success – the dependent variable – was an elusive one to define. They noted that information flows through a series of stages from its production through its use or consumption to its influence on individual and/or organizational performance, leading to six different aspects or categories of information systems: System quality, Information quality, Use, User satisfaction, Individual impact and Organizational impact. IS success clearly is multidimensional. In the literature for each of the mentioned success categories many different measures of success were proposed. User satisfaction appeared to be the most widely used single measure of IS success. DeLone and McLean developed an IS success model on the basis of the results of their literature review. Success not only is a multidimensional concept but the six aspects also appeared to be interde-

Clinical Algorithms: purpose, content, rules, and benefits

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Abstract

This paper describes the advantages and disadvantages of Clinical Algorithms (CAs) in the graphical format of Flow Charts, their design and symbology, their current use in clinical practice, their implementation on computer systems, software used in their production, proposals for international CA standards, and novel ideas for incorporation into future Algorithms.

In this Paper, detailed rules and techniques for drawing Flow Charts will be discussed. This will be followed by illustrations of the value of Clinical Algorithms in Medicine and examples of well-designed such Algorithms.

Keywords

Algorithms, Clinical Algorithms, Decision Making, Flow Charts, Medicine

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1 Introduction

With the establishment of Evidence-based Medical Practice, Clinical Algorithms (CAs) for all aspects of medical care are appearing in research papers, guidelines, and protocols, in increasing numbers. Unfortunately many Algorithms published in the medical literature contain logic errors that may ultimately impact on patient safety and the quality of care provided. The objective of a CA is to present a sequence of medical processes and decisions with its associated logic in a clear, concise and simple way using a well-designed graphical format of a Flow Chart. It is a step-by-step set of instructions for carrying out a medical procedure or solving a medical problem e.g. a diagnosis.

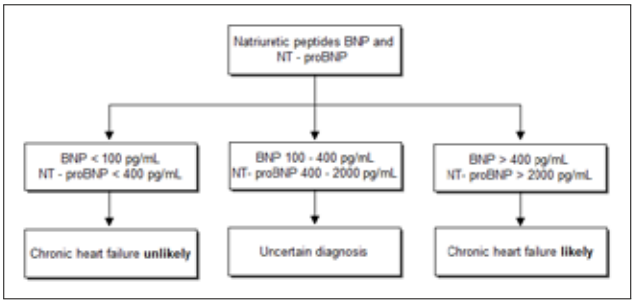

Figure 1: An Algorithm stratifying BNP and NT-proBNP levels in normal individuals, patients with an uncertain diagnosis and patients with CHF. (From [4] with permission).

A CA can also be described using prose and is one method of modelling a medical decision process, the others being disease-state maps that link decision points in patient management over time, scenarios that specify sequences of clinical activities that contribute towards a goal, and workflow specifications that model care processes in a health care organisation [1]. Sailors [2] has identified 5 types of CA that encompass the aforementioned paradigms starting with level 0 – a macro view of the decision process up to level 5 – a micro view of the individual decisions being made and processes executed including computer-based implementation. A CA Flow Chart can also be constructed from, and analysed, using a Decision Table [3].

2 The Flow Charting of Clinical Algorithms

2.1 Is a Clinical Algorithm the best way of solving the clinical problem?

An Algorithm may not be the best format for displaying and solving a clinical problem. Figure 1 shows a simple Algorithm illustrating how BNP and NT-proBNP levels vary in normal patients and those with chronic heart failure (CHF). Elevated blood levels of the natriuretic peptides, BNP (Brain Natriuretic Peptide) and NT-proBNP (the N-terminal prohormone of BNP), are found in the

Paradigm Changes of Health Systems Towards Ubiquitous, Personalized Health Leads to Paradigm Changes of Security and Privacy Ecosystems

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Abstract

Paradigm changes regarding organizational, methodological, and technological aspects of health systems lead to paradigm changes for security, privacy, trustworthiness requirements and solutions. This is especially true for personalized, preventive, predictive, and participative health services based on Big Data and Analytics. The paper roughly defines the concepts of Big Data, Analytics, security, privacy and trust, and describes the challenges for security and privacy ecosystems when collecting and deploying massive data volumes from multiple sources in multiple formats for data-driven decision support. Traditional concepts for security and privacy are too rigid for meeting the requirements of an extremely complex, unpredictable and flexible Big Data ecosystem. Therefore, the consideration of the context of those data and the deployment scenarios as well as the establishment of ethical and fair information principles is inevitable. Context and conditions, expectations and preferences, rules and regulations must be formalized in proper policies. The paper highlights the need for appropriate architectures, infrastructures, and tools, and refers to another contribution in this volume about policy design and representation.

Keywords

Big Data, Analytics, personal data, personal health information, privacy, security, policies

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1 Introduction

Health systems around the globe are undergoing paradigm changes for improving quality and safety of patient's care and enhancing the care process efficiency and efficacy. Those paradigm changes address organizational, methodological, and technological issues. Organizationally, health systems turn from organization-centric through process-controlled to person-centric care.

Regarding the methodology applied, traditional health settings realize a phenomenological approach by addressing health problems generally. Stratifying the population for specific clinically relevant conditions, we move to evidence-based medicine for dedicated care. In the next step, systems medicine enables the multi-disciplinary understanding of the mechanisms of diseases and their therapy from elementary particle to society. Considering the individual health status of citizens, conditions and context, care gets personalized, preventive, predictive, and participative (P4), so best meeting the aforementioned objectives of improving quality and safety of patients' care and enhancing the care process efficiency and efficacy. Care delivery is provided ubiquitously, i.e. independent of time and of the location of actors involved.

Regarding the technology in hardware and software applied, mainframes and client-server architectures are replaced by distributed systems using the Internet. Mobile technologies, nano and bio technologies, knowledge representation and management, Artificial Intelligence, Big Data and Business Analytics, Cloud Computing, and social business are coming to play with increasing data capacity from KB through PB up to YB, and complex as well as highly parallel real time computing. More details on the aforementioned paradigm changes can be found, e.g., in [1].

The Use of Epidemiological Data for Cancer Risk Assessment in Persons Exposed to Carcinogenic Agents

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Abstract

The traditional approaches and study designs in cancer epidemiology have not been very successful in identifying and evaluating adequately the potential risk and/or protective factors associated with the disease. The main reasons for the failure are often due to small study sample size, and inadequate exposure information. In this paper, we discuss issues and approaches relevant to these two challenges.
Multicentre study is proposed as a way to increase study size and to mitigate criticism about meta-analysis of independent studies. A multicenter study of large cohort or case–control studies also offers an exciting opportunity to study the contribution of epigenetic events that may be associated with life-style and environment risk factors for human health. Optimizing methods for exposure assessment and how to reduce exposure misclassification represent a difficult component in epidemiology studies.
A potentially useful approach for improving exposure estimate is to rely on biomarkers of exposures. An example is provided to demonstrate how biomarkers of exposures could provide valuable information in addition to exposure measurements in traditional epidemiological studies.
Finally, it is argued that risk assessment and the precautionary principle should not be viewed as conflicting paradigms but, rather, as a complementary approach for developing appropriate policies to address risks posed by exposure to carcinogens and a wide spectrum of other health hazards.

Keywords

Epidemiological data, risk assessment, precautionary principle, cancer epidemiology, carcinogenicity, multicentre studies, genomics of cancer, epigenomics

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1 Introduction

The field of epidemiology has reached a crucial point with challenges and opportunities. In one hand, it seems that most of the major occupational carcinogens have already been identified. Many of chemicals classified as carcinogens by the International Agency for Research on Cancer (IARC) were first evaluated in the workplace. In the last decades, occupational exposure to known human carcinogens has diminished in many countries and awareness of their hazard has increased. On the other hand, we are still confronted with a long list of substances for which epidemiological data are lacking or inconclusive. Estimates of the number of chemicals in commerce range from tens of thousands to over 140,000 [1]; for most of them, relevant toxicological information needed for setting up regulatory standards are still lacking [2].

We are now at an important crossroad; advances in the interrelated disciplines on which health risk assessment depends hold promise for comprehensive understanding of the influence of environmental stressors on human health. Last decades have been marked with major developments in the field of cancer risk assessment. There have been remarkable advances in the broad area of cancer epidemiology, including researches not only on human exposures to major cancer risk factors in environmental and occupational settings, but also on lifestyle and nutrition related risks. The traditional approaches and study design in cancer epidemiology have not been successful in identifying and evaluating these potential risk and/or protective factors. Two main reasons for this failure are often due to insufficient study size, and inadequate exposure assessment. In this paper, we discuss issues and approaches relevant to these two challenges, and the new opportunity of using emerging genomics information in epidemiology studies.

Opportunities and Challenges of Big Data

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Big Data is the new phenomenon enable by technology. This topic has generated many opportunities to acquire new knowledge and increase our ability to discover more precise information about disease and sub-disease and outcomes as a function of details of an individual. The timing of Big Data leads the announcement of U.S. President Obama on the Precision Medicine Initiative. Big Data provides the detailed and individualized data to learn individualized outcomes. Pragmatic clinical trials across large amounts of data far expand the numbers of individuals contributing to clinical trials. Patients at the beginning of a disease can be matched with groups of similar patients who are further along the disease path to help understand and predict the course of the disease.

Big Data has been defined as having 3 major characteristics: volume, velocity, and variety. The inclusion of behavioral, genomic, environmental, societal, and economic data with clinical data result in increased volume as well as variety. Variety also includes many new forms of data such as images, videos, geospatial, patient reported, and others. Wearable sensors overwhelmingly create big data with great velocity and volume. The challenge becomes how to analyze this data in acceptable time frames as well as adequately filter the data for human consumption.

Challenges include how to establish quality and noise reduction sufficient to validate studies derived from big data. Completeness and consistency of data are challenges. What will be the impact of the lack of a global common data model with consistent meaning, units and other attributes? How do you discover new knowledge? Clearly, spreadsheets are inadequate to see patterns. Finally, misinterpreting correlations of data across large data creates some interesting spurious correlations.

Gaming Technology as a Tool for Active Engagement of Users in Self-Management of Health State

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Abstract

This paper deals with several user-centred aspects of development of mobile technologies and serious games applied in health care environment. Main discussed issues are motivation and active engagement of users in self-management of the health state, design of user interface and user involvement in the whole process.

Keywords

Health Informatics, User Acceptance, User Interface, Gamification, User-Centred Design

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1 Introduction

Recently, the research and development of eHealth and ambient assisted living systems have offered many technological solutions. At the same time, there are running discussions about ethical and legal issues connected with application of these technologies. However, the question of self-sufficiency and the right moment for introducing technology for health state monitoring and home environment control have not yet been satisfactorily investigated. There can be two extreme views. The first one is too technocratic: monitor the health state of a person passively 24/7 and make the house/flat as smart as possible, introduce automation everywhere. The second one we can call minimalistic: try to use health monitoring as source of information for self-management of the health and introduce technology only in cases when the human function or ability needs obvious support or replacement. Recently, several applications have been developed that help to assess self-sufficiency of a person and recommend type of aid that can support the personÂ´s activities. However, the reality is usually more complex and the application of various tools and devices should be at least to a certain degree personalized.

With introduction of new systems we have to ask where the border is when we should start supporting the deteriorating cognitive or physical abilities of individuals. It is necessary to distinguish between passive and active support. In particular the systems and tools determined for elderly users should have adaptive and learning features so that they can be adjusted to personal needs and motivate the user to certain activity.

2 Objectives

In our research we focused on several aspects connected with design of mobile applications that can be used in self-management of the health state. In particular, we discuss utilization of digital gaming technologies. Another issue is user interface design where besides graphical layout amount of information displayed to the user plays an important role. Active user involvement might positively influence the whole development proces.

The potential users of the above mentioned technologies can be found among both children and adults. In all age groups we can find patients that suffer from chronic health conditions, e. g. diabetes, asthma, COPD. Standard approach is based on medical treatment and medication. However, it is welcome that the patients are actively involved in the treatment process. In this respect we speak about self-management of the health state. With the development of sensor systems and mobile applications it is

Electronic Oral Health Record in Dental Care

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Abstract

Structured representation of dental information in an electronic oral health record is important for reuse of information in medical decision support, statistical analysis of data, interoperability issues and automatic speech recognition. We developed an ontology representing basic human dental structures and designed the new model of electronic oral health record based on this ontology. The software prototype for electronic oral health record with Lifelong Dent Cross user interface was developed. It can display information in four languages (Czech, English, German and Spanish). It has been applied in dental care at the Department of Stomatology, 2nd Faculty of Medicine of Charles University and University Hospital in Prague-Motol and in forensic dentistry. For English and Czech languages Lifelong Dent Cross user interface can be controlled by voice.

Keywords

Electronic health record, user interface, dentistry, structured information, oral health

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1 Introduction

Electronic health record (EHR) that is based on common information architecture with highly standardized data definitions [1] will play the key role in electronic healthcare. It makes possible to describe, collect and store information about patient state and given procedures in a structured and consistent way [2, 3], and to use patient information for computer-supported decision-making, automated medical-error detection, and rapid patient population analyses for medical research, public health statistics and examination of quality of healthcare services.

Main goals of EHRs are supporting continuing, efficient and high quality integrated healthcare by sharing patient health information between authorized users. For that purpose, EHR contains all patient medical information from multiple sources, which is retrospective, concurrent and prospective. In addition, EHRs may contain data about medical referrals, medical treatments, medications and their application, demographic information and other non-clinical administrative information. In the ideal situation, the information in EHR is continuously updated and current. Terms commonly used in describing the EHR include interactive user interfaces and structured data entries, interoperability and standards, real-time and point-of-care usage, privacy enhancing techniques improving security aspects, semantic interoperability by ontology based approaches, or decision support systems. By meeting specific prerequisites, the EHR allows collection of data for other reasons than for direct patient care, such as quality improvement, outcome reporting, resource management and public health communicable disease surveillance, but also research and development (see e.g. [1, 4, 5, 6, 7, 8].

To enable data entry into the EHR systems during examination of a patient, the systems should be supported by user-friendly interfaces.

The part of EHR focused on oral health information is called Electronic Oral Health Record (EOHR), see [9]. In healthcare establishments with dental clinics, EOHR can retrieve additional information such as past medical history or laboratory test results from the hospital EHR directly.

The first pilot application of an EHR for dentistry with the user interface DentCross was developed for permanent dentition and presented in [10] and [11]. In the following, we describe the new model of EOHR for lifelong dental care. It enables to enter data not only for permanent, but also for mixed and deciduous teeth, with support of the user interface Lifelong DentCross.

2 Methods

Based on our extensive experience with the interactive DentCross component for permanent dentition, we have created a brand new object-oriented model compatible with HL7 RIM, thereby implementing the EHRcom

An Austrian perspective on medical informatics

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Abstract

After 20 years of working in the field of medical informatics, this paper summarizes career highlights, the state of education and research on health informatics in Austria as well as future prospects of the field. In 1981, the Austrian Working Group Medical Informatics was founded that now represents Austria within IMIA and EFMI. Austria has a good maturation of clinical IT and is now on the way to establish a comprehensive national eHealth infrastructure and a lifelong electronic health record (ELGA – Elektronische Krankenakte) to exchange patient-related data between health care institutions. Future prospects of health IT in Austria include patient-centred care across health care institutions, an increasing demand for health informatics experts with various backgrounds, secondary use of clinical data and health IT to support patient empowerment.

Keywords

Medical informatics, evaluation studies, telemedicine, patient participation

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1 Entering the field of medical informatics

Already during my school time, I got interested in computer science, due to the structure and predictability of computers, as well as in medicine, as I came from a family of doctors. I was unsure which of the two fields I should pursue. Fortunately, a school advisor knew about a programme in medical informatics at the University of Heidelberg in cooperation with the University of Applied Sciences Heilbronn. So, he told me: "If you are interested in both fields, why not study medical informatics?" It was the first time that I had heard of medical informatics (it was around 1988), but I was immediately intrigued by the opportunity to combine both fields. I thus started my studies in medical informatics in 1991. In 1997, I graduated.

At that time, I was offered a position as research assistant at the Institute of Medical Biometry and Informatics at the University of Heidelberg that was directed by Prof. Dr. Reinhold Haux. I got the chance to participate in several research projects and quickly was able to initiate my own projects. I very much enjoyed the open and supportive atmosphere at that Institute and I am very thankful for the trustful relationship with and strong support from my mentor, Prof. Reinhold Haux, throughout my career.

In 2001, I completed my PhD. At that time, I was unsure whether to continue a scientific career or to go into the health IT industry. At that time, Reinhold Haux was asked to take over the first rectorate of the newly founded Tyrolean University UMIT – University for Health Sci-

A Personal Journey into the field of Healthcare Informatics:

Looking back and considering the future

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Abstract

The first section of this paper gives an overview of how the author got into the field of healthcare informatics as a profession, and reviews the state of healthcare informatics as it was, in the United States, at the beginning of her professional career. The second section of the paper focuses on the present state of healthcare informatics in the United States. The paper concludes with the author's vision of new technologies, new opportunities, and new challenges for this field.

Keywords

Healthcare Informatics, Patient centered care, Point of care, Nursing Informatics, history of Medical Informatics, Healthcare education, Healthcare information systems, Human factors, Mentoring

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1 How I Got into the Profession

As I look at my career over many years, I was fortunate to have some outstanding mentors who have guided me throughout my career and made possible many of my contributions to the field of health informatics. I would like to acknowledge the following individuals at this point as I share my career achievements with the reader. First, my father and mother, Dr. Ernst Jokl and Erica Jokl, and my husband Dr. John C. Ball. Secondly, Dr. Wellington P. Steward, Dr. Morris F. Collen, and Dr. Donald A.B. Lindberg. Internationally, my career was strongly influenced by Dr. Hans Peterson and Dr. Jan van Bemmel.

At the beginning of my career I was fortunate to be introduced to the field of medical informatics by working at the University of Kentucky for a pathologist by the name of Dr. Wellington P. Steward (Pete). He was a brilliant laboratory scientist. As Director of the pathology clinical laboratory at the University of Kentucky, he implemented one of the first computerized clinical laboratory systems in the nation. This was an IBM 1800 data acquisition and control system and at that time this was an innovative pioneering effort on the part of Dr. Steward. This involvement "hooked" me into the use of computers in healthcare. Consequently, one of my first books in the field was entitled "Selecting a Computer System for the Clinical Laboratory" published by Charles C. Thomas.

Shortly after, I accepted a position at Temple University where I became the Director of Computing for the Health Sciences Center, propelling me into the use of

e-Health in Switzerland:

developments and challenges

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Abstract

This article presents the situation of eHealth in Switzerland and its evolution since 1996 with a focus on an initiative to improve the quality of online health information on the Internet. With the ever-increasing amount of online health content, the HONcode attempts to standardize and improve online health information quality.

Keywords

Internet, eHealth, trust, quality standard, search engine

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Célia Boyer

1 My e-Health journey

In 1995, the terms e-Health, eHealth or eHealth informatics had not been heard. Geneva, Switzerland was put on the map in the virtual world thanks to Sir Tim Berners Lee, who was working at CERN at the time he discovered and invented the World Wide Web. It was a revolutionary find and now, more than 20 years later, almost everything in our lives has been taken over by the Internet.

But at that time, when the Internet was still brand spanking new, health was one of the first domains to start using the Internet for its own advancement. At that time, it was very difficult to anticipate the outcome of this particular technology. However, a few visionaries, such as Prof. Jean-Raoul Scherrer, Prof. Donald Lindberg MD, Prof. Marion Ball, Prof. Jan van Bemmel, Prof. Denis Hoschtrasser, and Prof. Ron Appel, foresaw that the World Wide Web would become a major asset and change the way the world works, especially in the health [1]. And just as predicted, indeed it has.

eHealth is now a well recognized area of healthcare, with its own experts, articles and book chapters, university programs and hospital departments. Indeed, eHealth is the future.

1.1 How did I enter the field of eHealth informatics?

The early 1990s was the early stage of Internet use, accessible to computer scientists or researchers, and only though universities or major administrations. As a computer engineering student, I was at the forefront of the latest technologies and had access to the networks that the Internet brought. I was amazed by the power of the Internet as a major international communication network – it was as if computers were communicating among themselves. Indeed, at that era communication would not be impacted simply by the failure of one connected computer. In terms of robustness and efficacy, this fact was quite amazing. It also meant that the information transmitted

An Irish engineer's perspective on Health Informatics

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Abstract

This paper presents a personal perspective on Health Informatics from the point of view of an Irish engineer. It describes how the author initially became involved in the field and the contribution she has made. A brief overview of the state of Health Informatics in Ireland is given together with some thoughts on the future of the field.

Keywords

Health Informatics, policy, standards

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1 Becoming a health informatician

I graduated in Engineering from the University of Dublin, Trinity College in 1970 following which I obtained my masters and doctorate in Computer Science from the Universities of Toronto and Edinburgh, respectively. I returned to Trinity as a lecturer in 1980. Prior to my retirement in 2014, I was seconded as Director of Health Information and then as Acting Chief Executive of the Health Information and Quality Authority, the newly established Irish health and social care regulator established in 2007 [1].

I first became interested in Health Informatics, or Computers in Medicine as it was called then, in the early 1970s while studying for my Masters in Computer Science at the University of Toronto. I was asked to write a program to analyse the workload in his Laboratory by a relative, a haematologist in Toronto General Hospital who wanted evidence to support a reduction in unnecessary typing and cross-matching of blood in advance of surgical procedures. It was this relatively simple piece of work which gave me a first, albeit small, glimpse into the potential of ICT in healthcare.

Health Informatics is an interdisciplinary field in which health, computer and management sciences, statistics and engineering are all represented. Apart from the direct contribution which engineering knowledge and expertise makes to the development of Health Informatics, Engineering is a good preparation for entering the field as we are trained to solve problems whose solutions matter to people and society. And furthermore, the solutions have to be practical and implementable and are subject to many different types of constraints – financial, environmental, safety, etc. So while I had a lot to learn about the healthcare field itself when I started working in Health Informatics, my background in Engineering gave me a firm foundation on which to build. I found it particularly beneficial to spend time in the hospital observing work practices and in particular the management and use of information. It therefore became standard practice in my research group for new postgraduate students who came from a technical background to do the same. This helped to ensure that our research was practical and grounded in reality.

The Health Informatics research of a Dutch female scientist

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Abstract

This paper describes how I, as a female scientist, entered the field of Health Informatics; how health informatics evolved in the Netherlands; my own research and educational activities, and my focus on the future focus of Health Informatics research.

Keywords

Health informatics career; female scientist

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Nicolette de Keizer

1 How I entered the field of health informatics

Since I was a little girl I wanted to become a physician. At the time I finished high school the Dutch universities used a selection process based on drawing of lots. Unfortunately I was not one of the lucky ones that 'won' access to the Medicine program but found an, in 1990 new to start, Medical Informatics program at the University of Amsterdam. At that time my experiences with and interest in computers was limited but I always liked mathematics and data analyses so a study in which you can learn how to obtain new knowledge from medical data and how to implement new knowledge into medical care sounded very attractive. Although I started with the idea to change to Medicine in the next year, I never draw a new lot as I felt I already won the lottery with the discovery of this new field.

2 Health Informatics in the Netherlands

Founding fathers of Medical Informatics in the Netherlands are among others prof. dr. Jan van Bemmel, prof. dr. Arie Hasman and Dr Jan Talmon. Coming from physics they started to develop the field with research on signal processing. As they were based in a university hospital that was involved in the development of a national hospital information system, the field evolved into the direction of among others hospital and GP information systems, structured data entry and standards.

In 1990 the Academic Medical Center and University of Amsterdam started a Master program in Medical Informatics. No other Dutch university offers a program in Medical Informatics although some related Master programs exist such as technical medicine, mostly offered at technical universities.

Health or Medical Informatics in Education, Healthcare, and Research:

The Croatian Perspective

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Abstract

This paper starts by outlining the author's early career in health (or medical) informatics in Croatia. It offers a dedicated overview of the Croatian field as it developed, particularly from the educational viewpoint. There are special insights into the curriculum at the School of Medicine at the University of Zagreb. How to improve electronic healthcare applications, and a focus on data analysis, have been focii of the author's later career development. The paper ends by exploring five key elements at the intersection of (future) information technology and medicine/health care.

Keywords

Medical informatics profession, Medical informatics education, Medical informatics research

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1 How I got into the profession

After graduating from the University of Zagreb, Faculty of Science in 1972, I got a job as a statistician in the epidemiological project at the Andrija Štampar School of Public Health. Programming statistical routines was one of my duties. Data processing and interpretation of results were the others. At that time, the curriculum of School of Medicine already contained the subject on computers in medicine and health care. It was introduced by Professor Deželić several years ago. However, it was only rough information on the topic.

My first steps in health (or medical) informatics started with education of medical students. It was a demonstration of how to prepare the medical data and how to process them. In the early-1980s design of integrated health information system for Croatian health care system was initiated, and, especially, for health center (in much more details). I was involved in both of these projects. Work on the project required knowledge of the health care system:

The evolution of medical informatics in Germany:

From structured clinical documentation to decision support for individualized therapy

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Abstract

A major prospect of Medical Informatics are methods, tools and infrastructures to support data-driven medical care and biomedical research. We need new concepts for application systems that also care for transparency which data from which sources in which quality build the evidence base for individual decisions. These systems have to be able to take into account patient generated data, patient preferences, and environmental contexts for an individualized decision that really meets the patients' expectations, values and needs. Currently, these soft factors for medical decision support are not sufficiently understood and researched in all its dimensions.

Keywords

Medical informatics, health informatics education, data integration for biomedical research, systems medicine

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1 How I came to work in Health Informatics

The Medical Informatics program Heidelberg / Heilbronn was established in 1972 and successfully running for 14 years when I finished school in 1986. I looked intensively for a program which would combine my interests in mathematics and my fascination for medicine. There it was - the only one in Germany at that time. My internationally most recognized teachers were, in alphabetical order, Hartmut Dickhaus, Reinhold Haux and Franz-Josef Leven. Unfortunately, Jochen Möhr had just left when I started my studies. Although the Heidelberg / Heilbronn program proved also successful for working in fields outside medicine [1] – that was never an option for me. The fascination of medicine as area of application of informatics approaches is still alive and is continuously offering new exciting challenges.

2 The state of health informatics in Germany

In Germany, the emergence of medical informatics was strengthened by the awareness that structured medical

Health informatics in Sweden – a personal view

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Abstract

This paper summarizes my health informatics journey starting as an undergraduate student in medical informatics in 1988 until my current position at Karolinska Institutet in Stockholm where I was appointed as the first full professor in health informatics in 2008. Besides my own and my group's work in the fields of dental informatics, collaborative home care, clinical informatics and consumer informatics, this paper further gives an overview of health informatics research, education and implementation in Sweden. My personal view on the future of this exciting cross-disciplinary field concludes this paper.

Keywords

Clinical informatics, consumer informatics, dental informatics, ehealth, home care, Sweden

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1 How I entered into the field of health informatics

After finishing high school, I did an apprenticeship in information technology and economics. I then wanted to get more education in the field of informatics in combination with an application area. Economics would have been a choice, but I chose medical informatics because I saw a lot of potential in this field and I liked the combination of structure and humanity. I studied medical informatics at Heilbronn Technical University and Ruprecht-Karls University in Heidelberg, Germany and received my MSc degree in 1993. The Heilbronn/Heidelberg programme was one of the first in the world of its kind and although collaborations with other universities existed, there was no established exchange for doing a master thesis abroad when I decided to do so by the end of 1992. Communication was cumbersome. The World Wide Web had been released but Internet was not really accessible to undergraduate students at that time. We did for example not have access to email at our university. I am thus forever grateful to the research assistant whose email account I could "borrow". Thereby I got into contact with Professor Werner Schneider, head of the Center for Human-Computer Interaction at Uppsala University, Sweden who also was the head of UDAC (an University owned IT&T service organisation). This turned out to be my start into an academic career in this exciting field. I continued to live in Sweden after finishing my master thesis and Sweden became the country that I know best regarding its state of health informatics. My experiences of health informatics will thus describe the Swedish context.

2 The state of health informatics in Sweden

The Swedish context covers health informatics applications, research and education which are described here in different sub-sections.

Diversity in Health Informatics

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Abstract

Diversity is a goal, concern and challenge in health informatics. My story started as engagement as domain expert and lead to life long curiosity. Further achievements will require re-engaging end users; citizens and health providers. Digital health literacy and systematics professional recognition will be important to make the next stride.

Keywords

Diversity, nursing, health informatics, citizen services, digital health literacy

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Anne Moen

1 How I came to Health Informatics

My engagement and experiences in Health Informatics over time, ties to curiosity about new technology in health care and nursing, opportunities to participate, and others' trust in my abilities. Engaging with domain experts follows the Scandinavian approach to software development [1]. Acknowledging diversity, working with nurses, medical doctors and other health professionals to ensure informatics support for clinical practice was core premises for the development work in health informatics at that time. Therefore, I was recruited as a nurse domain expert, charged to work with transition of nursing documentation to digital form, and prepare for development and adoption of electronic health records (EHR). For me this also lead to graduate studies, and I defended my PhD in 2002 [2]. Today I teach graduate and postgraduate students, undertake research with patient facing apps and health informatics for self-management, and I am active in the health informatics community in Norway, Europe and internationally.

2 Health informatics in Norway

The health informatics activities in Norway can be grouped into 3 areas:

- Design and deployment of comprehensive electronic health records (EHR)
- Digital resources for collaboration, quality care and patient safety, as well as coordination of care within or across levels of care
- Informatics support for citizens

These areas of activity are similar to accomplishments within other European countries. Our most important

Health informatics – my way from medical technology to health informatics in Finland

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Abstract

This paper describes briefly my long journey with medical and health informatics research and development. I started as an information systems designer and analyst with medical technology projects in 1975 and finally became a university professor in health informatics. My activities have focused on the core topics around health information systems and their evaluation. I also have tried to synchronise my research activities with the national situation and research needs. I conclude this article with my personal thoughts on the future challenges of health informatics with the need to integrate health informatics with biomedical informatics, big data and precision medicine.

Keywords

Medical technology, health informatics, health IT infrastructure, health information systems, national research

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1 Introduction – The early years

I started my research and development work with medical technology in 1975 in the Technical Research Centre of Finland (VTT) Medical Engineering Laboratory as a senior systems designer. I had studied computer science, information systems science, statistics, mathematics and economics in the University of Tampere.

The early years (1975-1985) were medical technology-oriented, focused on health information systems design and programming, e.g. laboratory information system for virology, dose planning systems for computer-based radiotherapy, a Bayesian application for acute appendicitis, and simulation models of hospital information systems. With the growth of artificial intelligence in medicine (from 1985 onwards) we started many projects focused on expert systems and knowledge engineering with the purpose of improving health professionals' clinical work through the use of knowledge-based tools and decision support. We developed embedded expert systems for intensive care, clinical chemistry, and clinical microbiology. These knowledge engineering activities were shared in Nordic collaboration, and they also led us to EU research with European colleagues in projects where many very challenging and interesting research activities were carried out (1989-2003).

Biomedical technology-oriented research was widened with artificial intelligence towards medical or health informatics, to the emerging areas of telematics and advanced informatics in medicine. We focused our research especially on knowledge acquisition, integrated health system architectures, federated health care record architectures, evaluation and validation of health IT applications, medical expert systems, and the application of advanced information technology for optimization of clinical laboratory services [1, 2, 3, 4, 5]. I was very enthusiastic on decision support and expert systems and finalised my PhD-thesis on conceptualisation of medical decision support systems in 2000. After my PhD I worked for one year in the USA

Health Informatics in Israel: a focus on clinical decision support

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Abstract

The article summarizes the career highlights of Prof. Mor Peleg from Israel, whose research focuses on knowledge representation and decision support systems, and in particular on computer-interpretable clinical guidelines. In addition, it reviews the state of art in medical informatics in Israel and emerging future directions in the medical informatics field.

Keywords

Clinical decision support systems, computer- interpretable guidelines, Israel

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1 Introduction – How I came to work in health informatics and how the atmosphere was like

In the early 1990's, the human genome project started and I was swept with enthusiasm. Having been trained in biology and having worked as a programmer, I wanted to focus my studies and career on the use of information systems that would find order in the vast amounts of data that were coming out of this project, and translate it into knowledge that would impact human health. Back in Israel of 1994, as I was looking for a topic and advisor for my PhD dissertation, I couldn't quite find what I was looking for and decided to focus on real-time process analysis and design instead. Towards the end of my dissertation, I heard a fascinating talk by Yuval Shahar, who completed his dissertation at Stanford's Medical Informatics program. I decided that I wanted to be trained there as a post-doctoral student. With the help of Yuval and Mark Musen, I came to work with Ted Shortliffe, Samson Tu, Bob Greenes, Vimla Patel, and others on the InterMed project. Our goal was to develop in a consensus-based process that leverages methods and results that have already been achieved by the community, a computer-interpretable formalism for clinical guidelines. This formalism, called GLIF3, would enable us to specify any clinical guideline as a care process with formal semantics of decision criteria that would allow matching the formalized guideline knowledge with patient data to output patient-specific guideline-based recommendations. In this way, the computer-interpretable guidelines (CIGs) would serve as a decision-support system (DSS) for clinicians during patient encounters, at the point of care.

The decision to go to Stanford has shaped my life and career. I have worked with the best researchers and leaders in the field of biomedical informatics and they have shared with me their vision, their philosophies about science and communities. By setting an example and by explaining their strategies, they have taught me how to collaborate and work in teams and how to create communities of people, where everybody is invited to share and contribute, and where every person's opinion counts, whether he is a student, just starting his career, or an established professor.

A long and varied career in international Health Informatics

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Abstract

This paper outlines a personally rewarding career of over 45 years in various local and global health informatics initiatives. It tracks activity selectively within the context of policies and personal interests. Many developments across the domain have originated through operational requirements and some through scientific research and clinical progress, capitalising on wide-ranging technologies. The health informatics community has benefited greatly from international collaboration and cooperation addressing a wide range of applications which are only outlined here.

Keywords

Health informatics, global development, e-learning

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1 My Beginning and Career in Health Informatics

Little did I know that my degree course industrial placement (1969/1970) was a precursor for a lifelong career in health informatics. In year 3 of a 4-year first degree I took up an appointment with a local authority in Middlesbrough, Teesside. Then non-hospital community functions were coordinated by local government. After discussions of the processes involved, I wrote an operational childhood immunisation and vaccination appointment system. Challenges arose when monitoring the various pathways for rubella, mumps and pertussis protection. Some general practices did not appear to have improved their performance in vaccinations. On investigation, it was found that a well-meaning community nurse was routinely throwing away the computer-printed invitations for injections to children of a certain age because 'Doctor X does not believe in the schedule, so I did not want to bother him with the cards'. Lesson one in beta-testing, always cross-check functionality with all end-users!

After graduation and 2 years in industry, in 1972 I was in a university team helping the local hospital, using American university computer power on an overnight basis, deploying an early version of Statistical Processing for Social Sciences to analyse its Accident and Emergency Department activity profiles. For the far-sighted clinical leaders in the Royal Lancaster Infirmary I developed diverse applications such as hospital ward cross-infection monitoring, electromyography signal processing, intravenous feeding calculations and a wide-ranging on-site pathology system that produced a broad spectrum of tests including radiation lead analysis on blood samples from local power station staff and various tests on specimens for veterinary practices in the area. I have them to thank for encouraging me to write up these systems scientifically and get support to present them formally at International Medical Informatics Association (IMIA), European Federation of Medical Informatics (EFMI) and British Computer Society (Health) congresses from 1977 [1].

Over those first few years, I had the honour of becoming the first locally-funded Health District Computer Services Officer in England (the second one was also a

From Probability-Based Systems to Expert Systems and Guideline-Based Clinical Decision Support Systems:

Using Health Information Technology to Improve the Quality of Care

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Abstract

I entered the medical informatics domain through the door of decision support (DS). My aim was to contribute to the improvement of healthcare quality. With OncoDoc, I developed a document-based approach for the management of breast cancer. More recently, I proposed to use an ontological reasoning for the reconciliation of single-diseased clinical practice guidelines for the management of multimorbid patients. The next step of DS will undoubtedly be data-based.

Keywords

France, Decision support, Clinical practice guidelines, OncoDoc, Ontology

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1 Introduction

I was born in Tunis, Tunisia, and nothing predisposed me to research activities in health informatics. However, about fifty years later, thanks to a great dose of passion, some persistence, a lot of energy, and an unshakable motivation, I did it. As a woman in the health informatics domain, it was not easy every day to discuss, argue, negotiate, and even fight, but I am happy I won some important points in the game.

2 Entering the Field of Health Informatics

When my parents emigrated to France, I went to the French Public School, made very good studies, and was accepted in the very selective "Ecole Centrale Paris", an institute of research and higher education in engineering and science (top three of French "Grandes Ecoles"). Later, I got a Master in Computer Science at the University Paris 6 (with a major in Artificial Intelligence) and a PhD in Biomathematics at the University Paris 7.

Healthcare Informatics – a Wonderland

Lăcrămioara Stoicu-Tivadar[1]

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Abstract

The paper presents career highlights, my research focus and several achievements in relation with digital healthcare education and practice, ending with opinions for further development of the health informatics field. It is a sort of paper that brings one face to face with oneself, looking in the mirror and slide into the creative reality of healthcare informatics.

Keywords

Healthcare informatics, education, communication, national status

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1 Down the rabbit hole or how I joined the healthcare informatics community

It was 1980 and I had to choose a faculty domain – not from many alternatives at that time in Romania – law, medicine or computers! Law and medicine had too much material to store, Big Data and Cloud Computing were not in cards at the time. Medicine was great in healing people, but there was too much blood, dead bodies and again too much to memorise. So computers had it all, a lot of storage and processing possibilities, decisions, mathematics and English language, as an irresistible combination.

Graduating and becoming after several years assistant at the Faculty of Automation and Computers I started my PhD combining computers engineering and medicine, defending my thesis in 1999 with the title "Systemic aspects and integrated environments assisting cardiac diagnosis" and down the hole I went, in Healthcare Informatics wonderland, and still going.

I joined The Romanian Society of Medical Informatics in 1999, actively participating in all its conferences. Later, in 2003, all the roads leading to Rome, I joined the European Federation of Medical Informatics Council and family in Rome, Italy. Professionally and at human level EFMI was a special opportunity, meeting extraordinary people from all around the world, being part of a great community. My term as EFMI Vice-president ends in 2018.

Currently my activity is with the Department of Automation and Applied Informatics as university professor at the Faculty of Automation and Computers, University Politehnica Timisoara (UPT), in the beautiful student city of Timisoara situated in the western region of Romania.

2 The state of health informatics in Romania

Medical Informatics was fortunate in Romania to have visionaries and dedicated people supporting it from the

Digital health: Reflections on an organic career

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Abstract

Digital health has undergone a substantial journey over the past 40 years; my own experience of it has taken place only over a decade and a half. Of key importance during that time-period has been the shift towards putting the person at the centre. Despite this apparent commitment, it remains crucial to be alert to the challenges and threats implicit in approaches such as the quantified self and transhumanism.

Keywords

Digital health, digital society, eHealth, policy.

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1 Introduction

My career has been a journey through a landscape [1].[1] I have moved rather organically from topic to topic, subject to subject, and discipline to discipline. The benefit of a career grounded in the social sciences is that the field's disciplinary methods can be applied to many different domains – including those of health and the deployment of health-related services. Since the 1970s, my focus has always been on people's rights within a struggle for a good society: that is, not only a good information and communication technology (ICT) society [2], but overall a good and healthy society that benefits from the use of ICT [3].

I have spent only a relatively short period time in the field of digital health, and have worked largely on its policy-related elements over the past 16 years. Before that, for a decade, I concentrated on the uses of technologies to support people with impairments. Indeed, with today's societal focus often being on active health and ageing, these two fields – of health and ability – have moved much closer together. They share an interesting synergy – even though, nevertheless, it is absolutely necessary to remain aware that many barriers and difficulties remain societally and structurally created rather than being clinically or medically based.

Much of my background, whether academic or in applied research, prepared me for the digital society's contemporary orientation towards organisational change. This is a domain of activity that, in the past, I have lobbied to have included under the umbrella of digital health.

[1] I parallel a term used in the title of one of the first books on which I worked. This volume was the first, to my knowledge, to use the term 'landscape' as an analogy for developments in the information world. The original publisher resisted for some time the potential title out of a concern that the book might be housed in libraries under landscape gardening. The term, landscape, is today used commonly in its metaphoric sense.

Automated Microkeratomes in Laser in Situ Keratomileusis

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Background: Corneal refractive surgery has shown remarkable progress during the two last decades, with fast-growing updates in operative techniques, devices, and instrumentation. However, laser in situ keratomileusis (LASIK) remains the most common corneal refractive procedure. Flap creation is considered as the most critical step during LASIK eye surgery. **Objective:** This article is designed to review the evolution of microkeratomes in creation of the flap in laser in situ keratomileusis. **Methods:** This article was performed based on a literature review and Internet search through scientific databasis such as PubMed, Scopus, Web of Science and Google Scholar. **Results:** The literature on flap creation technology addresses the technical and physical aspects of mechanical microkeratomes including types, characteristics and comercially available products on the market. **Conclusion:** The conclusion on this forum aims to help understand the benefits of microkeratome evolution for the flap creation in LASIK, with focus on better patient counseling if microkeratome is chosen for the flap creation, choosing the right individual aproach for every patient.

Keywords: Cornea, refractive surgery, LASIK, mechanical microkeratome.

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1. INTRODUCTION

History

In 1963 at the Barraquer ophthalmologic clinic (Bogota, Columbia) Ignacio Barraquer developed a refractive surgery technique called keratomileusis (corneal reshaping), introducing the concept of corneal lamellar surgery for correction of refractive errors. In 1980 a scientist R.Srinivasan a was using the excimer laser to make microscopic cicruts in microchips for informatics equipment discovered that the excimer laser could also be used to cut organic tissues with high accuracy without significant thermal damage. Later, in 1983, Srinivasan in collaboration with stephen Trokel performed the first photorefractive keratectomy (PRK) or keratomileusis in situ in Germany. In 1989, the first patient for Laser in situ keratomileusis (LASIK) was granted (by the US patent office) to Gholam Ali. Peyman, MD, called Method for "Modifying Corneal curvature" describing the surgical procedure in which a flap is cut in the cornea and pulled back to expose the corneal bed. This exposed surface is then ablated to the desired shape with an excimer laser following which the flap is replaced (1). In 1990, Pllikaris et al. (2,3) and Buratto et al. (4) introduced the techniques combining lamellar procedures with excimer laser ablation. These advances led to the development of modern LASIK procedures. LASIK technique consists of basically three steps: 1.) creation of anterior lamellar flap, 2.) application of UV laser to ablate the posterior cornal stroma under the lifted flap and 3.) putting the flap right in the place. Considerable technological advancement has been made over the last 30 years in the first two steps, making LASIK the most popular refractive surgery precedure.

1.2. Lasik procedure

Corneal refractive surgery has shown remarkable progress during the two last decades, with fast-growing updates in operative techniques, devices, and instrumentation. However, laser in situ keratomileusis (LASIK) remains the most common corneal refractive procedure. More than 15 million patients have undergone the surgery, which has a low complication rate of approximately 1% (5). Flap creation is the most critical step during LASIK eye surgery, so the consistency and predictability of the corneal flap thickness are crucial for a successful LASIK outcome. There are two main methods for creating corneal flaps. The first involves using a mechanical microkeratome with an oscillating blade. Over the past decades, mechanical microkeratome has been performed in LASIK because of its reliability and safety. However, complications such as incomplete flap, free flap, and buttonhole continue to plague surgeons. Furthermore, because of the instability of mechanical microkeratome, corneas may be too steep, too flat, or too thin even after a successful operation (6).

The second utilizes a femtosecond laser with a focusable, infrared-spectrum photodisruptive laser, which forms cavitation bubbles that spread to produce a dis-

Application of Models and Modeling in Biomedicine

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Background: The roles of modelling, models, and simulations are undoubtedly essential in health care, as is medical informatics. Modelling and the simulation in clinical medicine are very important. The analysis of clinical decisions is a logical method based on the probability theory and theory of usefulness. **Objective:** The aim of this study was to describe application of the most important models in medical practice. **Methods:** Authors used descriptive method of explanation models in the praxis based on searching scientific literature deposited on online databases. **Results and Discussion:** Two factors that have influenced to the decision process: a) Degree of uncertainty about future events; b) Usefulness of outcomes in any particular case. The clinical decision problem analysis process demands: a) Explicit formalization of a decision making problem or the description of the medical problem decision with a registration of all possible actions which have to be undertaken and registration of all the possible so determined outcomes. B) Construction of the decision tree which presents all described actions and outcomes with predictions of the probabilities and the choice of the most optimal action based on the probability outcome and its use. **Conclusion:** Models must be recognised as a complex tool with many variables, and to produce a good model is to fully realise the structure and function of the real system in place, and once this is realised, only then can a health care system be totally revaluated and changed for large improvements.

Keywords: Models, Modelling, Simulation.

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1. INTRODUCTION

In the application of many information technologies, the principle of modeling and simulation using a computer has become inevitable (1). Modeling is a significant part of research, education and practice not only in biomedical informatics and health informatics but also for medicine and health care in general (2)

Application of models and modeling we face in the field of analysis of the health system, in clinical medicine in the form of different decision models, as well as in a very important field of research in medicine (3-10).

The concept of a model denotes any representation of a whole or parts of a system that directly reflects our knowledge of that system (11-15).

The model is a set of assumptions that relate to the behavior of the system. The assumptions are expressed in the mathematical, logical or symbolic relationships between the entities of the system. The model represents a mathematical, logical and symbolic representation of an idealized system.

For models it is characteristic that they are simpler than the reality they represent and cannot be presented in its entirety from the aspect of its multifariousness. In this sense, „models are an abstraction of the real world".

The process of creating a model is called modeling (, 2). Modeling is a process by which one system (original) is displayed (modeled) by another system called the model.

Modeling is one of the most common scientific-research methods in biomedical sciences and science in general. Models can serve to predict and present various phenomena with a high percentage of accuracy, provided that appropriate variables are used and that correct relationships are established between the variables. Models allow (1, 8):

- Better and more detailed understanding of the most important characteristics of the studied system;
- The examination of most relevant variables of the problem and the discovery of their essential interdependencies;
- Formal structured description of complex problem situations;
- Experimenting in the model, which is much faster and cheaper than an experiment in reality;
- Embedding variables that record rapidly changing circumstances and limitations for the purpose of more prompt and efficient response to changed conditions;
- Information for the action;

Sample Size Calculation for Comparative Trials

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Background: In order to find out truth about the target population size of the study sample has to be large enough to contain the characteristic (variable) we are seeking with variability sufficient to reliably reflect its variability in the population. **Objective**: The aim of this article was to explain logic of sample size calculation in comparative studies, and shed some light on key assumptions of the calculation. **Methods**: This article is a review of methodology used for estimating appropriate size of a study sample. **Results:** True difference in target parameter among the populations that are studied, and its variability (usually expressed as standard deviation from the mean) could not be changed according to our preferences; also maximum acceptable levels of probability if type one and type two errors cannot be further increased without compromising ability of the study to give us reliable information about the populations. What we can change is number of patients within the study groups, which if increased, will decrease variability of the results, and make distribution of the difference beteween the groups (if the study is hypothetically repeated many times) around true value of difference between the populations ***more narrow***. Through narrowing of the distributions we will decrease number of cases when the difference among the group (type one error) or lack of difference (type two error) happens by chance, i.e. put probabilities of these errors below limits of acceptability. **Conclusion**: Careful calculation of sample size is necessary to minimize probability of type one and type two errors and therefore obtain reliable answer to a research question.

Keywords: sample size; statistical power; type one error; type two error.

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1. INTRODUCTION

Any kind of quantitative research, whether pre-clinical or clinical, is performed on a sample withdrawn from the target population, whose characteristics are objective of the research. Whether we will find out truth about the target population depends on the size of the sample: it has to be large enough to contain the characteristic (variable) we are seeking with variability sufficient to reliably reflect its variability in the population (1). Only if size of the sample is sufficient, we can be sure that results of our study are not like this just by chance, if positive, and are not false, if negative. Therefore, one of key elements of appropriate study design is planning sample of sufficient size (2).

If one is planning comparative study, main outcome of the study could be either continuous or categorical variable. If continuous, necessary sample size will depend on extent of the difference between a measure of central tendency in both groups, and on variability of the variable in both groups (3). If categorical, the sample size will depend on difference between the proportions of „positive" patients in the study groups. Although there are numerous calculators for estimation of minimum sample size, researchers should understand basic principles of the calculation in order to use them properly.

2. OBJECTIVE

The aim of this article was to explain logic of sample size calculation in comparative studies, and shed some light on key assumptions of the calculation.

3. LOGIC BEHIND THE SAMPLE SIZE CALCULATION

It is always possible that certain result of a research study, which is the most often difference between two or more treatment groups, is reached only by a chance, and not because there is true difference between the populations that were sampled. Such result is actually an error, occured by a chance, designated in statistics as „type one error". When designing a research study, our aim is to minimize this error, i.e. to decrease its probability as much as possible. The highest probabilty of the type one error that is acceptable is 0.05. On the other hand, if a research study shows that there is no difference among the treatment groups, such result may also happen just by chance, although there is true difference among the population sampled. This type of error is called „type two error", and its highest probability that is still acceptable for us is 0.2 (4).

It is obvious that we cannot change true difference in target parameter among the populations that are studied,

Importance of the Use of Medical Technologies in the Biochemistry and Hematology

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Background: Laboratory tests and analyzes are an integral part of the overall diagnostic procedures for almost all human pathological conditions and diseases. Certain laboratory tests are a mandatory indicator of health status when hiring for certain jobs, or to perform certain activities. Doctors of medicine of almost all specialties prescribe certain laboratory tests for their patients every day. There is no "basic list" of laboratory tests ("basic biochemistry") and there is no "extended list" of laboratory tests ("extended biochemistry"). There are only targeted laboratory tests that the doctor prescribes for each patient, especially based on patient's anamnestic data, physical examination and previous laboratory analyzes. They can also represent forensic findings and evidence. **Objective:** The aim of this case study is to descibe several cases which present importance of use appropriate bichemical tests for making decisions in diagnostics and treatment of patients with specific medical requests. **Methods:** Author used descriptive model for analizing and interpretaion of several cases in the praxis as specific method of interpretation results of biochemical tests for doctor's decision making. **Results and Discussion:** For a long time, laboratory measurements in hematology were based on manual techniques, then on semi-automatic and automatic counters, so that the revolution and rapid development in automation, and new parameters in determining CS were brought by microprocessors and computers. As such, they have enabled the current hematology counters to grow into hematology analyzers that automatically manage and control the work process during CS analysis, correct analytical errors during measurements, and mathematically and statistically process the measured parameters. Computers and information technologies significantly improve the work in various laboratories (hematological, cytological, immunological, clinical-biochemical), because they automate tests and speed up the delivery of findings. With the help of computers, the whole process of laboratory tests can be integrated and automated, connecting instrumentation, resources and staff into a wide, unique network in order to increase productivity in laboratory work and achieve maximum accuracy and precision of measurement, without expanding resources, i.e., increasing laboratory costs. **Conclusion:** In a faster, simpler, easier, safer, more accurate, cheaper way than before, a relevant blood count is obtained. Automatically analyzed CS provides new hematological parameters that, if interpreted correctly, can quickly and cost-effectively lead us to a correct diagnosis and timely therapy.

Keywords: Hematology, Information technologies.

Case study, Received: Nov 15, 2018, Accepted: Dec 26, 2018, doi: 10.5455/ijbh.2018.6.75-89, Int J Biomed Healthc. 2018; 6(2): 75-89

1. INTRODUCTION

Laboratory tests and analyzes are an integral part of the overall diagnostic procedures for almost all human pathological conditions and diseases (1-5). They are also used in monitoring the development of a large number of diseases, monitoring the success of treatment and as a confirmation of cure. They are also used in the prevention of certain pathological conditions and diseases (6-10).

Certain laboratory tests are a mandatory indicator of health status when hiring for certain jobs, or to perform certain activities (police officers, soldiers, firefighters, athletes, drivers of all means of transport, etc.) (11-15). They can also represent forensic findings and evidence.

Doctors of medicine of almost all specialties prescribe certain laboratory tests for their patients every day. Based on the obtained results, they complete the overall diagnostic picture for their patients. Together with the results of other clinical trials, they diagnose the disease in their patients (16-25). Also, based on the obtained results of laboratory analyzes, the appropriate therapy is determined and the success of the applied, primarily drug therapy is monitored, as well as the monitoring of possible side effects of the applied therapy (1-3).

It is important to emphasize that there are no "routine laboratory tests" that should be prescribed to virtually every patient who calls a doctor (1, 3, 5). There is no "basic list" of laboratory tests ("basic biochemistry") and there is no "extended list" of laboratory tests ("extended biochem-

Sudden Cardiac Deaths

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Background: Cardiovascular diseases are the cause of 17 million deaths a year worldwide, of which 25% are sudden cardiac deaths (SCD). Sudden cardiac death is an unexpected death caused by a heart disorder, which occurs in a short period (usually within the first hour after the onset of symptoms) in a person with known or unknown heart disease, but the time and manner of death are unexpected. **Objective:** The main purpose of this article was to provide an integrated, synthesized overview of the current state of knowledge about SCD. **Methods:** This professional paper contains up to date description of the most im-portant aspects of SCD, epidemiology, definition, etiology, pathogenesis, clinical presentation, treatment, and prevention. **Results and discussion:** The hypothesis that most cases of SCD will seemingly occur at random in an apparently healthy or at least very low-risk population The risk of sudden cardiac death is higher for males and the elderly. The causes of sudden cardiac death can be divided into two large groups. The first group includes ischemic causes that lead to malignant arrhythmias, and consequently to sudden cardiac death. In younger people, non-ischemic causes often lead to sudden cardiac death. Inherited car-diac disorders comprise a substantial proportion of SCD cases aged 40 years and less. This includes the primary arrhythmogenic disorders such as long QT syndromes and inherited cardiomyopathies, and the less common causes are myocarditis and intoxication. These arrhythmogenic cardiomyopathies can be di-vided into two groups: structural cardio-myopathies (in which we find macroscopic changes in the heart) and ion channel disorders or channelopathy. **Conclusion:** The main cause of SCD in general population is coronary artery disease, in addition the causes of SCD in the young can be broadly classified into struc-tural heart disease (hypertrophic cardiomyopathy, dilated cardiomyopathy, anomalous coronary artery, arrhythmogenic right ventricular cardiomyopathy and myocarditis) or primary arrhythmogenic diseases (Brugada syndrome, Wolff-Parkinson White syndrome, long QT syndrome and catecholaminergic poly-morphic ventricular tachycardia). Patients were more likely to survive when the arrest happened in public places where the EMS has faster access. Effective primary prevention of ischemic heart disease would best prevent SCD, also the cardiac screening in young individuals with family history of SCD is highly recommended.

Keywords: Sudden Cardiac Death (SCD), Cardiovascular Diseases (CDV), Acute Coronary Syndrome (ACS), Implantable Cardioverter Defibrillator (ICD)

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Epidemiology

The epidemiological significance of SCD is extremely large given the size of the population it affects, but also given that it affects a younger, working active population. Studies have shown that the incidence of sudden cardiac death increases with age, the higher the age the higher the chances of sudden death, so in middle and old age it accounts for about 88% of all causes of death, but its share in total mortality is higher in younger age groups. When comparing the incidence by gender, it is significantly higher for the male population in all age groups even when we exclude ischemic causes of sudden cardiac death. But recent studies indicate an increasing incidence of SCD among women as well.

Since professional and recreational athletes are marked as a risk group, a group of French scientists conducted a study between 2005 and 2010 among age groups from 10 to 75 years. It has been shown that SCD related to sports activity in the general population is more frequent than previously thought, and given the research previously conducted among competitive athletes. More than 90% of SCD cases occurred during recreational sports and were more common in men between the ages of 35 and 65. In less than 25% of SCD cases, the exact cause was discovered. Among these discovered causes, acute coronary syndrome accounts for about 75% (1-5).

Definition

Sudden cardiac death (SCD) is any natural, unexpected, sudden death caused by cardiac pathology with previous symptoms that do not last longer than 1 hour. So, there are 3 basic elements that define sudden death: natural, unexpected and sudden. SCD is the cause of 25% of all deaths.

The definition of SCD should be distinguished from the definition of sudden cardiac arrest (SCA). The main differ-

The Utility and Effectiveness of M-health Application in Cancer Care. A Review of the Recent Randomized Control Trials

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Background: In an ongoing effort to promote physical and mental health within the cancer trajectory, several strategies are applied including mobile health (M-health) and mobile applications. According to WHO, M-health is defined as the exercise of personal and public health by mobile devices such as mobile phones, patient monitoring devices and other wireless devices. **Objective:** We conducted a systematic review on articles published from 2016 to 2019 in peer reviewed journals to identify randomized controlled trials in which the effectiveness of a mobile health intervention was tested. **Methods:** Search terms included a mix of terms such as cancer , cancer care, cancer management, m-health, Mobile apps. The search strategy lead to five randomized control trials, in which mobile applications were used to support cancer care. **Results and Discussion:** From the mentioned studies, two were referred to breast cancer patients and the remaining three included a variety of cancer types. M-health applications were found to be effective in QoL improvement, chemotherapy self-management in pain management, improved activities of daily living, knowledge, and self-management. Finally, mobile applications were found to be effective on smoking cessation among cancer survivors. **Conclusion:** M-health application usage in health care is associated with better outcomes and better QoL in cancer patients.

Keywords: cancer care, m-health application.

Review, Received: Sep 02, 2019, Accepted: Sep 28, 2019, doi: 10.5455/ijbh.2019.7.21-25, Int J Biomed Healthc. 2019 Jun; 7(1): 21-25

1. BACKGROUND

Cancer is a heterogeneous disease, which is affected by exposure to environmental factors, while genetic or epigenetic mechanisms play a role in the development and progression of the disease (1). Globally, both the incidence of the disease and the number of deaths due to it are increasing. According to the Global Cancer Report (GLOBOCAN) in 2018, 18.1 million new cancer cases were recorded (11.6% of total cancer cases) and 9.6 million cancer deaths. Cancer is considered to be an important cause of morbidity and mortality worldwide, in every world region, and irrespective of the level of human development (2).

The diagnosis of cancer has a significant impact on the quality of life of patients. Quality of life is a multidimensional concept, referring to the impact that traumatic events such as cancer have on aspects related to physical, functional, psychological, social and spiritual well-being (3, 4). In an ongoing effort to promote physical and mental health within the cancer trajectory, several strategies are applied (5-7) including mobile health (m-health) and mobile applications (8).

According to WHO, m-health is defined as the exercise of personal and public health by mobile devices such as mobile phones, patient monitoring devices and other wireless devices (9). M-health applications are said to be the "future" of care, as they allow the patient to remain active and responsible at the same time, but also to facilitate the work of the doctor, making it more effective. The main reasons why m-health is gaining such a great interest is the rapid development of the functions of mobile phones (smartphones), their widespread acceptance and use by the consumer public. This allows the use of the above applications in an exceptionally large part of the population (10). The m-health has a wide range of applications from the patient's perspectives. Those application include medication adherence, monitoring, counseling and lifestyle modifications (11). The user can easily "download" the applications of m-Health on their devices such as smartphones, tablets, etc, from the available electronic application stores. After that they are able to use the application, share and upload data from it (11).

The widespread of the application of m-health within the health care is promoting the quality of life and enhancing patient's participation in the health care. Thus, it should be tailored each time to face and meet patients need within the context of individualized health care (12).

2. OBJECTIVE

This study aims to provide valuable information regarding the application, utility and effectiveness of m-health applications in cancer patients care.

Early Cancer Detection in Germany – an Overview of the Implementations from 01/01/2020

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Background: With the diagnosis of cervical cancer at the age of 35, nothing changes until the age of 65. Despite changes in the strategy selected for cervical cancer screening, the screening for early cancer detection at regular intervals remains the same. Other countries such as the Netherlands and Australia have been documented exclusively by HPV screening, and these changes have been coordinated in Germany. **Methods:** We used descriptive method based on documents adopted by the Federal Ministry of Health of Germany. Guidelines and other strategic documents of the appropriate Committee. **Objective:** In this review we described how collaboration of gynecological and cytological experts in Germany with experts from other countries about HPV screening has been adopted and implemented. **Results and Discussion:** They do cytology by the system as before, and they use the memory of the number of invasive cancers from 1971. for a total of 75%, in the regular screening group as much as 90%. In order 2018 to be approved by the Federal Board for the Independent Management of Physicians and Health Insurance Physicians, by-law committee of the superior of the Federal Ministry of Health, guidelines for organizing an early screening program. Inside, also described groups for early detection of colon cancer. The remaining contents of the annual early detection screening for women remain untested.

Keywords: cervical cancer, eraly cancer detection in Germany, Federal program.

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1. NEW CHOICE STRATEGIES

From the age of 20, it is offered to all women an annual examination by taking swabs from the surface of the cervix and from the cervical canal (1-4). From the age of 35, HPV is offered as additional to cytology. This combining test is referred to as the Co-test. After this age, the screening interval is extended to three years. Until the upper limit exists. These guidelines have a normative character for all legally insured women. The beginning of changes to the guidelines is planned from 01.01.2020. The new screening strategy will be valid for 6 years, during which time the Institute for quality and transparency in health will continuously improve and grow (5-8).

In the coming months, health insurance associations will still advise on fees for the age of 20-34 years, or 35 years for certain specifications in the old and new segments, for necessary changes in the value stream and in these cases set new credit values. The invitation letter (scheduled for 01/01/2020) will be sent to women who are eligible for early detection of cervical cancer. The title carries '' early detection of cervical cancer ''. It will be a health insurance offer. To assist decision-making in women between 20 and 34 years of age and in women over 35 years of age. The brochure will be sent to women every 5 years to 65 years of age. The text can be found under Conclusion G-BA (1st Annex VI, p.18) (Table 1 and 2) (1, 9).

2. CYTOLOGY AND HPV-TEST

Cytology

Conventional cytology has proven itself in the past in various and multiple respects. Nevertheless, there is some thought that this method can be replaced completely or in thin-layer cytology segments.Thin layer cytology and conventional cytology are undeniably valid in diagnostic safety. The advantage of thin-layer cytology would only be that in the Ko-test, the cytological preparation and the HPV test can be made from a single drop. The disadvantage would be that, from the point of view of

Imaging Modalities of the Mandibular Canal and the Inferior Alveolar Nerve: an Overview

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Background: The mandibular canal, located within the mandible, carries the inferior alveolar nerve and the inferior alveolar vessels. This neurovascular bundle is at risk during mandibular surgical procedures. An adequate preoperatively visualization of the mandibular canal and its content could yield a more predictable treatment features with less postoperative complications. **Objective:** The aim of this study was to review the present visualization techniques of the mandibular canal and the inferior alveolar neurovascular bundle for better pre-operative planning in dentistry. **Methods:** Six different visualization methods (periapical, panoramic and three-dimensional radiographs, ultrasonography, endoscopy and magnetic resonance imaging), their advantages and disadvantages, are hereby reviewed with a stress on their clinical applicability in the dentist's everyday practice. **Discussion:** Panoramic radiography and cone-beam computed tomography technology are considered very useful in the assessment of the mandibular canal. However, in some advanced cases, where the inferior alveolar neurovascular bundle must be identified, ultrasonography, endoscopy and magnetic resonance imaging can be used. **Conclusion:** All techniques reviewed in this paper except the periapical radiography can be useful in the visualization of either the mandibular canal or the inferior alveolar nerve.

Keywords: mandibular canal, inferior alveolar nerve, panoramic radiograph, cone-beam computed tomography, ultrasonography, endoscopy, magnetic resonance imaging.

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1. BACKGROUND

The mandibular canal (MC), located within the mandible, carries the inferior alveolar nerve (IAN), which is a branch of the mandibular nerve the third division of the trigeminal nerve, and the inferior alveolar vessels (artery and vein) (1, 2). The IAN supplies sensation to the mandibular teeth and gingivae and gives off: a) the mental nerve which exits the MC through the mental foramen supplying sensory innervations to the chin and lower lip and b) the mylohyoid nerve providing motor innervations to the mylohyoid muscle (2, 3).

According to its location and path, the IAN is at risk during mandibular surgical procedures (4, 5). Any aggression to the nervous bundle or ramifications may lead to a temporary/permanent loss of tactile sensation of the lower lip and chin (4). In a study with shocking results performed in 2005, Robert et al. stated that 94.5% of surveyed California Oral and Maxillofacial Surgeons reported instances of injury to the IAN during mandibular surgeries in a 12-month period (4). Dimensions and courses of the MC are important parameters which decisively contribute to designing a correct treatment plan. Thus, an adequate preoperatively visualization of the MC/IAN, could yield a more predictable treatment features with less postoperative complications (6, 7).

In a study investigating the vertical positioning of the IAN in 39 edentulous human cadaveric mandibles, Kieser et al. found 30.7% (12 out of 39) of IAN located in the superior part of the body of the mandible, and 69.2% (27 out of 39) half-way or closer to the inferior border of the mandible (8).

On the other hand, Kane et al. who assessed the buccolingual position of the MC in 20 patients found that the IAN and accompanying vessels are situated more or less at 4.7mm from the buccal aspect and at 1.8mm from the lingual side at the level of the first mandibular molar (9).

The buccolingual position of the MC and the topography of the IAN and vessels were investigated using three-dimensional reconstruction by Kim et al. on sixty two mandible sides. The researchers conclude that 70% of the canals followed the lingual aspect at the ramus and the mandibular body, 15% were located at the middle of the ramus behind the second molar and lingually when passing through the second and first molars, and the last 15% followed the middle or the lingual third of the mandible from the ramus to the body. On the other side and

Importance of Adequate Research Design in Biomedicine

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Background: Recent studies have showed that large proportion of published research in biomedical journals suffer from methodological errors that question validity of the results. **Objective:** The aim of this article was to direct attention of potential researchers to key elements of adequate research design. **Methods:** This Editorial contains description of five most important steps and phases which are obligatory to use in process of making of the appropriate and qualitative research design for providing study investigation in biomedical research. **Results and Discussion:** Designing, i.e. planning a study in biomedicine has five essential stages that has to be completed if one wants to avoid methodological errors. The first stage is setting research question with three parts: independent variable, dependent variable (outcome) and study population. More detailed determination of the study population with inclusion and exclusion criteria is a second stage. The third stage is calculation of the study sample size and choice of sampling method. Closer description of the study variables with accent on methods of their measurement is the following step, and the final one, fifth stage, is deciding whether the study will be experimental, undertaking control of confounding variables, or observational, with just registering and following the confounders. **Conclusion:** If all five essential steps are completed avoiding introduction of any kind of bias, the study that was designed will be most likely free of critical methodological errors.

Keywords: Research design, Biomedicine, Bias, Research methodology.

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1. BACKGROUND

There are just a few human activities for which traditional saying „measure three times, and cut only once" could be applied more readily than for designing a research study in biomedicine. Research in biomedicine always requires substantial efforts and investment of significant resources (1), not to mention risks and inconveniences imposed to the research subjects. It is of prime importance to plan, i.e. design, studies properly, avoiding introduction of bias or methodological errors that would make the results invalid or untrustable, and therefore transform all that was invested in the research to wasted resources (2).

A number of authors was investigating phenomenon of inadequate research design and its concequences, as well as the most frequent design errors. The phenomenon is rather frequent, appearing in more than 50% of scientific publications, and even driving to conclusion that majority of published results of studies in bio-medicine could not be trusted (3, 4). The most frequent errors in research design are: clinical irrelevance, selection bias, inadequate sample size (3), inappropriate use of statistical tests, improperly addressing missing data (5), and inadequate accounting for confounding variables (6). It is important for researchers to be aware of these potential errors, because it would increase their chances to avoid them.

2. OBJECTIVE

The aim of this Editorial was to to direct attention of potential researchers to key elements of adequate research design.

3. METHODS

We used descriptive and analitical method for explanation of five most important steps and phases which are obligatory to use in process of making of appropriate and qualitative research design for providing study investigation in biomedical research.

4. RESULTS AND DISCUSSION

There are five essential steps (stages) when designing clinical research which, if completed properly, guarantee avoidance of methodological errors (7).

The first step is setting a research question which is adequate only with three clearly visible parts: independent variable (or cause), dependent variable (outcome) and study population. Precise definition of the study population with inclusion and exclusion criteria is the second

Ten Years of EASE guidelines

Sylwia Ufnalska

European Association of Science Editors (EASE), London, United Kingdom

This year we celebrate the 10th anniversary of EASE Guidelines for Authors and Translators of Scientific Articles to be Published in English, which were first released online on our website in May 2010. They provide simple, practical advice to help researchers understand the standards of scientific writing in English and, consequently, write better manuscripts. The document aims to make international scientific communication more efficient, but simultaneously draws attention to ethical issues, such as authorship criteria, plagiarism, and conflict of interests. Non-commercial printing of the guidelines is allowed, so they can be used as handouts for courses in scientific writing and publication ethics.The first edition was the fruit of long discussions on the EASE forum and at the EASE conference in Pisa in 2009, followed by consultations within the EASE Council. Since the very beginning, the document has explained that scientific publications should be COMPLETE, CONCISE, and CLEAR (3 x C for quick memorization), so the main part of EASE Guidelines was divided into three sections focused on these characteristics. It was supplemented by a list of contributors, references and further reading, as well as five appendices (Abstracts, Ambiguity, Cohesion, Plurals, and Spelling), which described the selected topics in greater detail. In June 2010, one more appendix was added (Simplicity) and seven translations were freely downloadable as PDFs: French, Spanish, Italian, Estonian, Chinese, Japanese, and Korean.

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The number of translations increased gradually and the document was revised every year. In 2011, we included two new appendices (Ethics and Text-tables) as well as basic information about EASE, increasing the number of pages 16. In 2012, practical tips for junior researchers were added (on page 5), and some copies of EASE Guidelines were printed and distributed at the anniversary EASE Conference in Tallinn. By the year 2014, the document had been translated into 20 languages, mostly by volunteers. In 2015, an abstract was added at the beginning, and appendix Ambiguity was complemented with a short note about the incorrect use of scientific terms. Starting from 2016, the document was not published online independently, but as an electronic-only article in European Science Editing (each language version with its own DOI). The latest edition, issued in 2018, is available in 29 languages: the English original approved by the EASE Council and 28 translations into Arabic, Bangla, Bosnian, Bulgarian, Chinese, Croatian, Czech, Dutch, Estonian, Finnish, French, German, Greek, Hungarian, Indonesian, Italian, Japanese, Korean, Persian, Polish, Portuguese, Romanian, Russian, Serbian, Slovenian, Spanish, Turkish, and Vietnamese. Because of the large number of language versions, we no longer update the document annually, but we will do it when it proves to be necessary.

This successful initiative was only possible thanks to the cooperation of many people, more than 20 of whom are named in the list of contributors (on page 5). Special thanks are due to Ed Hull, Marcin Kozak, Eric Lichtfouse, and Eva Baranyiová, who prepared appendices and practical tips. About 40 volunteers were involved in the translation of the document into their native languages (acknowledged on page 5, too). I am also very grateful to Waleria Młyniec, Arjan Polderman, Paola De Castro, Alison Clayson, Joan Marsh, Ana Marušić, and Pippa Smart, who continuously supported this initiative and actively promoted EASE Guidelines. Besides, I would like to acknowledge the work of production managers of European Science Editing – Margaret Cooter and Lynne Rowland – who formatted the English version and patiently introduced all the changes in its updates, as well as our web people – Silvia Maina, Elaine Seery, and Duncan Nicholas. Last but not least, I thank Professors Izet Mašić, Edward Towpik, and Hesam Abbasi, who reproduced EASE Guidelines in their journals, which aided their popularization. The guidelines, or their selected parts, were presented at many scientific conferences, eg at EuroScience Open Forum in Turin (2010), 3rd World Conference on Research Integrity in Montreal (2013), and REWARD/EQUATOR conference in Edinburgh (2016). Additionally, articles about this useful document were published in Wikipedia and many academic journals, such as Learned Publishing, European Science Editing, Journal of Tehran Heart Centre, and Science Editor.

EASE Guidelines are now additionally promoted by our new campaign, advocating the use of a universal framework for more user-friendly author instructions (with a "quick check" table at the beginning), as described briefly in the first issue of EASE Digest and in more detail in European Science Editing recently.

After these ten years, it appears that EASE Guidelines have truly helped scientists in many countries write more

First published in the May issue of EASE Digest https://ease.org.uk/publications/ease-digest/.

The History of Medical Informatics Development - an Overview

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Background: Medical informatics is regarded as a scientific discipline dealing with theory and practice of information processes in medicine, comprising data communication by information and communication technologies (ICT), with computers as an especially important ICT. It means Medical informatics history can be stated connected with the beginnings of computer usage in medicine. **Objective:** The aim of this reviewe was to describe most important facts about historical backgrounds of development of Health/Medical/Biomedical informatics based on facts searched through systematic scientific literature. **Methods:** Author used descriptive method for explanation history of medical informatics based on published facts in the scientific literature deposited in online databases. **Results and discussion:** The development of medical informatics began in the 1950's of 20th century, when the earliest reference to applications of electronic digital computers in medicine appeared. Historical facts in this article reflect on the development of the discipline of Medical informatics that is now part of all medical disciplines of all health professionals. Applications of computer and information technologies in all segments of society and knowledge of information technology is now part of general literacy. The classical way to present a "history" is to list major events in chronological order, with more or less detailed comments about the persons, ideas or events. A distinction between periods brings a systematization flavor, easing the comments. **Conclusion:** During last 70 years Biomedical informatics became one of the most prominent biomedical disciplines included in almost all other academic and scientific medical disciplines.

Keywords: Medical informatics, Biomedical informatics, IMIA, EFMI.

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1. WORLDWIDE MEDICAL INFORMATICS DEVELOPMENT

1.1. Medical Informatics as academic and scientific biomedical discipline

Medical/Health/Biomedical informatics is a multi-disciplinary area that involves multiple content areas. It is one of the fastest growing subject/content areas in the world (1, 2, 3). The use of informatics is expected to enhance research efforts in areas such as genomics and proteomics, for example, and also to change the way medicine is practiced in the 21st century (3, 4, 5, 6).

Research in Medical informatics ranges from the theoretical to applied efforts. The demand for more research in Medical informatics and for biomedical informatics to support other researchers escalates daily (2, 5).

The development of Medical informatics began in the 1950's of 20th century, when the earliest reference to applications of electronic digital computers in medicine appeared. Historical facts in this article reflect on the development of the discipline of Medical/Health informatics that is now part of all medical disciplines and part of the medical practice of all health professionals (2). Applications of computer and information technologies in all segments of society and knowledge of information technology is now part of general literacy (1).

The classical way to present a "history" is to list major events in chronological order, with more or less detailed comments about the persons, ideas or events. A distinction between periods brings a systematization flavor, easing the comments.

During that period, new terms were born: medical computer science, computer medicine, medical electronic data processing, medical automatic data processing, medical information processing, medical information science, medical software engineering and medical computer technology. Most of these terms were interchangeable, such as medical computer science for medical information science, etc.

George Mihalas at Prague Conference about History of Medical Informatics (MI) in April 2013 proposed the following stages in the development of Medical Informatics (7):

a) Early-stage Medical Informatics (MI): (up to ~1975): pioneering work of scientists, major work on signal anal-

Will COVID-19 Pandemic Produce Stronger Consequences than Spanish Flu Pandemic?

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Background: The Spanish flu of 1918 and 100 years later, the COVID 19 pandemic, paralyzed the entire world, causing numerous casualties and halting life flows. Although there is a hundred-year gap between them, the facts indicate that both pandemics are of viral origin, which primarily attack the respiratory system, but affect different age groups, have a similar course, different mortality. 20-50 million people died from the Spanish flu and 1.6 million from COVID-19. Prevention has remained almost the same after 100 years. **Objectives:** The aim of this article is to evaluate new findings on COVID-19 based on the Spanish flu paradigm, comparing these two pandemics. including scientific research in the field of virology and epidemiology related to this issue. **Methods:** The available literature was searched and facts analyzed using the keywords: Spanish flu, COVID-19, commenting on the results of scientific studies according to the EBM, regarding the prevention and treatment of the COVID-19 pandemic. **Results and discussion:** Numerous pieces of evidence unequivocally prove that these are viral pandemics caused by different viruses, Spanish flu with H1N1 virus and COVID-19 with SARS -CoV- 2 virus. Two waves of the epidemic COVID- 19 , the second, despite measures taken, surprises with intensity and speed of spread. With numerous human casualties and huge economic suspicions, there are still many unanswered questions regarding the clinical picture, the unpredictability of development of the disease, the rate of virus mutation, access to treatment and vaccination. **Conclusion :** Comparing the two pandemics, the one from 1918 (Spanish flu) and today's, COVID-19, a hundred years later it is clear that the former had a significantly higher number of victims, compared to today (20-50 million : 1.6 million). Economic losses are immeasurably greater during the COVID-19 pandemic, and the scale of the economic catastrophe will add up years later. The consequences of lockdown, the loss of loved ones, the consequences of illness, economic uncertainty, job loss, fear of an impending epidemic are numerous mental illnesses, depression, in short - life before and after COVID-19 will never be the same again.

Keywords: Spanish flu, COVID-19 pandemic.

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1. BACKGROUND

And as COVID-19 dances his „Danse Macabre", we notice with fear the scale of the catastrophe that has befallen the world. COVID-19 doesn't make choices, it spreads linearly, so whoever gets hooked, and it seems there are no rules. Personally, at the beginning of the pandemic, like a lot of colleagues I have contacted, we thought it was a seasonal infection that would go away on its own. However, shocking images from Italy, Spain, then from the U.S. and around the world revealed the scale of the pandemic and its deadly potential. And when COVID-19 rips family members out of our lives (even in my own family!) And people who were healthy and followed recommendations, then you realize that COVID-19 is a dangerous monster that devours human lives and is by no means a „funny virus" as it was named by one colleague. In COVID-19, there are certain legality: it does not attack children and younger age groups, although they are not completely spared. What is obvious is that most of the victims are those who have passed two thirds of their lives, especially those at the end of their lives, patients without immunity, patients with malignant diseases. To understand the current situation with COVID-19, we will recall the world's largest (viral) epidemic in 1919, popularly called Spanish flu.

2. SPANISH FLU PANDEMIC

The Spanish flu, also known as the 1918 flu pandemic, was an unusually deadly influenza pandemic caused by the H1N1 influenza A virus. Lasting from February 1918 to April 1920, it infected 500 million people – about a third of the world's population at the time – in four successive waves (1). It is useful to compare COVID-19 with the

The Role of 3D Power Doppler in Screening for Ovarian Cancer

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Background: It is clear that in developed countries more women die annually from ovarian cancer than from all other gynecologic malignancies combined. **Objective:** The aim of this article is to analyze current possibilities and propose adequate measures which can help the development of effective screening methods/assays for the early detection of epithelial ovarian cancer. **Results and Discussion:** This article updates the status of ovarian cancer screening and addresses most relevant studies published during the last five years. The developments that followed the review are best summarized in reference to the screening tests, target populations and newly published trials. The possible role of 3D ultrasound technology, especially 3D power Doppler imaging, in early and accurate detection of ovarian malignancy is discussed. We described our new ovarian cancer screening trial, which started in January 2001. Improvements in ultrasound technology such as 3D volume acquisition and 3D power Doppler imaging may have clinical utility in a more reliable identification of an abnormal ovarian vascularity and architecture. 3D volume acquisition allows for careful evaluation of the internal surfaces of cyst walls for excrescences otherwise not appreciated by 2D ultrasound. **Conclusion:** While the addition of 3D power Doppler provides a new tool for measuring the quality of ovarian tumor angiogenesis, improving accurate diagnosis of ovarian malignancies, its clinical value for the early detection of ovarian carcinoma has yet to be determined.

Keywords: Ovarian cancer screening, 3D and 3D power Doppler ultrasound, stage I ovarian cancer.

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1. INTRODUCTION

It is clear that in developed countries more women die annually from ovarian cancer than from all other gynecologic malignancies combined. For example, in the United States approximately 25 580 new cases are diagnosed each year, and 16 090 of these women will die of the disease (1). Symptoms usually do not become apparent until the tumor compresses or invades adjacent structures, ascites develops, or metastases becomes clinically evident. As a result, around 65% of women with ovarian cancer have advanced disease (stage III/IV) at diagnosis with 5-year survival rate of only 20-30%, compared with the 5-year survival of over 90% in patients with stage IA ovarian cancer, when disease is confined to the ovary (2). Given the burden of suffering associated with the development of ovarian cancer and the clear survival gradient related to the stage of disease at diagnosis (3), there is much enthusiasm for the development of effective screening methods/assays for the early detection of epithelial ovarian cancer.

2. DIFFICULTIES IN OVARIAN CANCER SCREENING

The ability to detect early-stage epithelial ovarian cancer by a simple test has long been desired yet never achieved. Several aspects of ovarian cancer have led to the frustrations that have been encountered in attempts to screen for the disease (4). First, the anatomic location of the ovaries is not amenable to any direct inspection. Additionally, in contrast to cervical neoplasia, epithelial

Epidemiology and Diagnostics of Prostate Cancer During COVID-19 Pandemic

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Background: Prostate cancer (PCa) is the second most common cancerin the male population and represents a major health problem, especially in developed countries, where older men are more prevalent in the general population. Analyzing recent data for European countries, the incidence is highest in Northern and Western Europe (>200 per 100,000), while the rate is lower in Eastern and Southern Europe, but shows a continuous increase. Globally, about 450,000 Europeans are diagnosed with prostate cancer each year, and prostate cancer was the second most common cause of cancer-related deaths in 2018, when it was the cause of death for 107,000 men in Europe. Global data for BiH indicate that PCa is the second most common cancer in the male population, or the third leading cause of death in men due to cancer. **Objective:** The aim of this study was to analyze (PCa) how PCa screening is the most controversial topic regarding statements described in the urological literature searching most important biomedical on-line databases. **Methods:** Authors used descriptive method for this systematic study based on the published literature, summarized through meta-analysis, to show that screening was associated with an increase in PCa diagnosis. **Results and Discussion:** Most of autghors written about this topic and concluded that the greater detection of localized and less advanced PCa disease, but without benefits in the field of PCa "specific survival" and "overall survival", "overdiagnosis" and "overtreatment", leading to recommendations against systematic population screening in all countries, including Europe. The main diagnostic tools for diagnosing PCa are digitorectal examination (DRE), serum specific antigen concentration (PSA), transrectal ultrasonography (TRUS) and mp MRI, and the definitive diagnosis is based on pathohistological verification of cancer in prostate biopsy specimens or operative specimen. The indication for biopsy should be determined based on PSA levels and/or suspected DRE, depending on age, potential comorbidities and therapeutic consequences, and the indication for repeated biopsy is an increase or persistently elevated PSA, suspected DRE, "atypical small acinar proliferation" (ASAP), extensive high grade "prostatic intraepithelial neoplasia" (PIN) and positive multiparametric MRI of the prostate (PI-RADS ≥3). **Conclusion:** PCa volume assessment is based on DRE and PSA with the addition of multiparametric MRI, bone scan and CT, although there are new imaging modalities, such as PET/CT scan and Diffusion-weighted whole-body MRI. However, the cost-effectiveness" of these new approaches needs to be further assessed. Given that COVID-19 has imposed other priorities on all health systems, we hope that the diagnosis of clinically significant prostate cancer and adequate treatment is not questionable at this time.

Keywords: prostate cancer, DRE, PSA, TRUS, prostate biopsy, CT, MRI, skeletal scintigraphy.

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Predatory in Scientific Publishing–a Burning Issue in Science

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Background: Predatory publishers and so-called hijacked or fraudulent journals, are threats to the quality of published articles and waste valuable research and manuscripts when scholars and authors submit and publish their works in these journals. **Objective:** The aim of the paper is to point out the problem, causes and consequences of predatory publishing, characteristics and features of predatory publishers and fraudulent or fake journals and how to prevent and avoid publishing in such journals. **Methods:** Exploring the web blog of Jeffrey Beall and debate about Beall's list of predatory publishers and journals and review of the relevant published literature, as well as personal experience and observations of the author. **Results:** Jeffrey Beall, an American librarian and library scientist from Denver, University of Colorado, has drawn attention to "predatory open access publishing" and created widely known Beall's lists of potentially predatory publishers and open-access predatory journals publishing submitted manuscripts promptly without the reviewing process and with a high rate of publication fee. The debate initiated by Jeffrey Beall is continuing in the scientific community with increased number of authors and published articles on this still unresolved issue in the last about 10 years. The features of fraudulent or fake journals, threats and consequences are discussed as well. **Conclusion:** Increasing awareness in the scientific community is essential how to differentiate trustworthy-reliable journals and predatory ones and to avoid predatory journals. Continuous education of authors about predatory publishers and journals, both the existing and the newly-emerging wave of scholars, must be the purpose and the imperative of the academic community. In order to protect the peer review process, the academic and scientific community must set the criteria for scientific advancement by not recognizing and valuing the articles published in the predatory journals.

Keywords: predatory publishers, fraudulent journals, hijacked journals, open access.

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1. BACKGROUND

The Predatory publishers and journals, so-called hijacked and fraudulent-fake or "pseudo" journals, are threats to the quality of published articles and waste valuable research and manuscripts when scholars and authors submit and publish their works in these journals. Predatory publishers exploit the open access and author-pays model damaging scholarly publishing and promoting unethical behavior by scientists. The most of scholars are oriented to submit and publish their papers in legitimate journals. But, the huge proliferation of journals, both legitimate and predatory, makes it often difficult to recognize and avoid predatory journals. (1, 2)

Predatory publishing is the publisher's practice of unethically taking advantage and exploiting the gold open access model for publishing journals without meeting scholarly publishing standards in order to gain financial profit via article processing charges (APC) without proper review, undermining the review process which is hallmark of traditional scholarly publishing. (1-3).

2. OBJECTIVE

The aim of the paper is to point out the problem, causes and consequences of predatory publishing, characteristics and features of predatory publishers and fraudulent or fake journals and to increase awareness and warn scholars, especially young researchers, how to recognize and how to prevent and avoid submission of their manuscripts for publishing in such journals.

3. THE BEALL'S LIST OF PREDATORY PUBLISHERS AND JOURNALS DEBATE

Jeffrey Beall is an American librarian and library scientist from Denver, University of Colorado, who drew attention to "predatory open access publishing" more than 10 years ago and created two widely known Beall's lists: a) Beall's list of "Potential, possible or probable predatory scholarly open-access publishers"–applying unprofessional practices, from undisclosed charges and poorly defined editorial hierarchy to poor English, and b) Beall's list of predatory open-access journals -publishing sub-

COVID-19 Pandemic and Psycho-social Tele-counselling

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Background: The mental health and wellbeing of whole societies have been severely impacted by this crisis. Psychological distress is at a high level due to fear of infections, death, isolation, deep uncertainty about the future, wellbeing and national economics. **Objective:** The aim of this paper is to analyze resources, human and technological for the installation of tele-health as a first step to minimize mental health consequences of the pandemic. **Methods:** In this paper we describe how experts from the Medical Informatics at two universities (in Sarajevo and Zagreb), worked on adapting psychological tele-counseling and its application during the COVID-19 and make the healthcare system faster and safer and better responding to the challenges. **Results and Discussion:** More than 90% of professionals included in the research use Viber or WhatsApp are using those applications in private relations, but only 15% of them for official communication healthcare-related. Less than 10% of mental health and social care institutions have proper ICT user support or monitoring tools and methodology in place. The research discovered that 85% of professionals in the institutions involved consider continuous training as a must for delivering proper tele-care. Conclusion: Providing psychological first aid is an essential care component for populations that have been victims of emergencies and disasters, before, during and after the event.

Keywords: e-health, telemedicine, tele-mental health, COVID-19.

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1. BACKGROUND

COVID-19 is the disease caused by an infection of the SARS-CoV-2 virus, first identified in the city of Wuhan, in China›s Hubei province in December 2019. COVID-19 was previously known as the 2019 Novel Coronavirus (2019-nCoV) respiratory disease before the World Health Organization (WHO) declared the official name COVID-19 in February 2020 (1). The COVID-19 pandemic is likely to have unprecedented and unforeseeable consequences, from those on a worldwide/global level to those at the local level - at the level of local communities and families, and individuals (and not just humans, but all other living beings), of which the future will testify in various ways. The consequences will be political, economic, social, but probably to the greatest degree, the consequences of a healthy nature - systemic and individual (2).

The global spread of the new coronavirus disease (COVID-19) outbreak poses a public health threat and has affected people in various unexpected ways, both personally and professionally. The COVID-19 pandemic has rapidly transformed health care systems worldwide, with significant variations and innovations in adaptation. The coronavirus disease is a challenge for the safety system in healthcare institutions, both patient and health care professionals' safety. Some of the authors have agreed that regulatory changes are essential to support the safe and wide adoption of these new approaches as telemedicine and telehealth (2).

The response strategy in this pandemic included an early diagnosis of coronavirus, patient isolation, monitoring of contacts as well as suspected and confirmed cases, and public health quarantine (1). On the other hand, other patients with serious non-communicable diseases have difficult access to healthcare and they are, due to their illness, at a higher risk for complication in corona infection than heath or young people. At the same time, persons are at a higher risk of developing other diseases including mental diseases (3).

The mental health and wellbeing of whole societies have been severely impacted by this crisis, and actions must be taken on time (3-8). Psychological distress is high due to fear of infections, death, physical isolation, unknown's situations, unexpected flow, deep uncertainty about the future and impact world crisis on the way of life, wellbeing and national economics at all. Domestic violence hotlines prepared for an increase in demand for services as states enforced these mandates, but many organizations experienced the opposite. Experts in the field knew that rates of IPV had not decreased, but rather that victims were unable to safely connect with services (4, 9).

The Internet as a Source of Historiographical Documentation About Development of Pharmacy in the World - Cross-Sectional Study

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Background: Pharmacy and medicine were inseparable sciences for long time, so everything that was done in the field of medicine, i.e., treatment, can be connected with pharmacy. The history of pharmacy therefore includes the history of medicine, at least until the 13th century, when pharmacy was officially separated from medicine. **Objective:** The purpose of this article was to describe all organizations dealing with the history of pharmacy, books available on the Internet dealing with the history of pharmacy, and museums of the history of pharmacy located in different parts of the world. **Methods:** The study was retrospective based on collection of facts published and deposited mostly on web sites on internet and on-line databases. **Results and Discussion:** Today there are a large number of Societies, Academies, Associations and Foundations dealing with the history of pharmacy. The goal of each organization is to study historical facts in the field of pharmacy that will be shared with professionals, but also people who are not from the profession (doctors, librarians, archaeologists, archivists). There are also a large number of books dealing with the history of pharmacy, both in Bosnian and in foreign languages. One of the most popular books is definitely *Kremer's and Urdang's History of pharmacy*, and from our areas „From Old Slavic Heresy to Modern Medicine". **Conclusion:** A large number of museums for the history of pharmacy have also been opened and almost every country that has developed has this type of museum. Such museums represent a national treasure, because the artefacts from pharmacy from the area of our state, but also from the world, are kept.

Keywords: history, pharmacy, Internet, museums.

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1. BACKGROUND

Under the influence of Arabic medicine, where pharmacies first appeared as independent shops completely separate from medical practice, pharmacies began to appear in Europe as independent shops at the beginning of the 11th century. That is why Frederick II of Hohenstaufen, who was the king of Sicily and the ruler of Germany, legally enabled the further development of pharmacy as an independent science. In 1231, at the Royal Palace in Palermo, Frederick II enacted the first edict that clearly delineated the field of interest and activity of pharmacists and physicians (1).

The *"Constitutiones Regum regni utriusque Siciliae"* as the constitutions of Frederick II are called, possess theses that strictly relate to the distinction between pharmacy and medicine, and these are theses 44 to 47. Since these theses were compiled by the Board of the Salerno Medical School, these theses are much better known as the Edict of Salerno. In the beginning, this law was applied only in the area of Southern Italy and Sicily, however, over time, the scope of this law has spread throughout Europe and the rest of the world. At the time of Friedrich's constitutions, and long after the separation of medicine from pharmacy, medicines were not only made in pharmacies. An unwritten, but generally accepted rule, was that doctors had the right to make and dispense to patients the medicines that were needed during the examination and treatment. At that time, doctors were much more oriented towards the treatment of wealthy people, while the lower class was left to healers and barbers. During the great epidemics (cholera and plague), medicine was prepared by the ranchers, to whom the patients were left, and many prominent citizens, including doctors and

Sanctity of the Human Genome as Foundation of Life

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In times before ethics and laws were formalised, it was commonly held that human life is sacred since it is divinely ordained and because of this divine intervention human life must be protected by implication due to it being holy. As a result, people often assume that this meant that human life is completely inviolable. This view of life is more prominent in western religious philosophies and had been raised in many legal debates about human life such as abortion and euthanasia. To ensure survival and peaceful coexistence the uniqueness of human life was emphasized so that people would respect the worth of human life. This respect entailed values such as equality and autonomy and incorporated both reciprocal rights and obligations to one another. History, in the form of wars and pandemics, has proven that when legal systems ignore these basic human rights, it will lead to tyranny and anarchy. The atrocities committed during the Second World War prompted nation states to collect the values of human life into a single concept termed 'human dignity'. This term was then adopted as a new form of legal humanism deriving its basis from the concept of sanctity of human life. The recognition of this concept enables an entire set of human rights and obligations to find practical application on a universal basis setting apart from the diverse religious and other philosophical views on human life.

Keywords: human genome, human dignity, human rights, sanctity of human life, sanctity of human genome.

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1. INTRODUCTION

The significance of human life was debated amongst the greatest philosophers since the beginning of time. Bertrand Russell, prominent British scholar, opined that man instinctively encapsulates himself within his private interests, but should man desire a life of greatness and freedom, he needs to escape this private capsule filled with individual interests. Russell's prescribed solution is knowledge, because he views the acquisition of all knowledge to be an enlargement of man himself (1). An inquiry into the meaning, nature and value of human life, as captured in the human genome, may allow us to understanding ourselves as well as our relation with other humans, including our rights and obligations to each other as well as future generations, especially when gene editing is involved.

2. SANCTITY OF HUMAN LIFE AS A UNIVERSALLY ACCEPTED DOCTRINE

The government signatories to the Atlantic Charter in which the international organisation known as the United Nations was founded, have subscribed to a common program of purposes and principles, being convinced that victory over their World War II enemies is essential to defend life, liberty, independence and religious freedom and to preserve human rights and justice in their own lands as well as in other lands (2). During World War II a general need existed to concretely shape the concept which could be treated as a common standard and enforced in a common forum, irrespective of differences in religion, race and language which applies to all human beings unlimited by geographical boundaries. Subsequently, the inherent worth of human life was recognised and the word dignity was used in place of sanctity to describe the recognition of this unique value or status of man. This recognition was not only practical, but also ensured peaceful coexistence that overcame religious, political and ideological differences. After World War II the United Nations General Assembly formalised and embedded the concept of human dignity in articles 1 and 2 of The Universal Declaration of Human Rights on 10 December 1948 (3). This declaration further served as the foundation for the International Covenant on Civil and Political Rights (4) and the International Covenant on Economic, Social and Cultural Rights (5) which both protect human dignity, amongst others. The concept of human dignity can also be found in other international treaties such as the International Convention on the Elimination of All Forms of Racial Dis-

Metabolic Syndrome and its Predictors in an Urban Population in the Gambia: a Cross Sectional Study

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Background: Metabolic syndrome is a clustering of interrelated risk factors which doubles the risk of cardiovascular disease and increases the risk of type 2 diabetes five folds. The characterization of the risk factors and identification of predictors of MetS is necessary in order to identify individuals who may benefit from early interventions. **Objective:** The aim of this study was to determine the prevalence of metabolic syndrome as defined by the harmonized criteria and its predictors in an urban population in The Gambia. **Methods:** It was a cross-sectional study conducted at Kanifing General Hospital, Kanifing Municipality. Data obtained from each participants included anthropometric indices, blood pressure, fasting plasma glucose, triglyceride and high-density lipoprotein levels, and clinical information. **Results:** A total of 136 participants were included in the analysis. The overall prevalence of metabolic syndrome was 64.0%. The most predominant component among the study population was central obesity (72.8%), followed by elevated FPG (69.9%). Hypertriglyceridemia was the strongest predictor of MetS among our participants (OR: 369.6; 95% CI: 45.85-2979.20; p <0.001). **Conclusion:** Our study discloses a very high prevalence of metabolic syndrome among the participants, with hypertriglyceridemia as the strongest predictor of metabolic syndrome in our study participants.

Keywords: Metabolic syndrome, Prevalence, Predictor, The Gambia.

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1. BACKGROUND

Metabolic syndrome (MetS) is clustering of interrelated risk factors which include dysglycemia (raised fasting glucose (FG)), raised blood pressure (BP), dyslipidemia (raised triglycerides (TG) and lowered high-density lipoprotein (HDL) cholesterol), and obesity (particularly central adiposity) (1). MetS is a strong predictor of cardiovascular disease (CVD), diabetes, stroke, and all-cause mortality, and has become a major public-health challenge worldwide (2-5). It triples the risk of stroke and heart attack and doubles the risk of dying from these conditions. Furthermore, it confers a fivefold greater risk of developing diabetes mellitus compared to adults without the syndrome (1). Central obesity has been identified as the cardinal feature of the MetS; and precedes the development of other MetS components (6-8). Excess accumulation of adipose tissue, particularly visceral fat, contributes to the development of insulin resistance, resulting in type 2 diabetes, dyslipidemia and hypertension (9, 10).

In The Gambia, not much is known about MetS - its prevalence and risk factors remained unappreciated. Until our original study (11), the last time any study was done on it was two decades prior (12). The identification and characterization of MetS, and its risk factors; and the determination of its predictors is necessary in order to identify individuals who may benefit from early interventions.

2. OBJECTIVE

The aim of this study was to evaluate the prevalence of MetS and its associated risk factors using the harmonized criterion for diagnosing MetS (1), and to determine the ability of its components to predict the presence of MetS.

3. MATERIAL AND METHODS

Ethics

This study was approved by The Gambia Government/Medical Research Council, The Gambia Joints Ethics Committee (R019011v1.1).

Psychological Distress in End-stage Renal Disease Patients: Prevalence and Associated Factors. a Literature Review

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Background: Mental disorders such as depression, anxiety, stress, and mental pain are well known to affect adults with end-stage chronic kidney disease and those undergoing dialysis. Patients undergoing dialysis also face several other problems related to their daily lives, changes in their financial and professional duties and many challenges that increase the likelihood of developing mental disorders such as depression and anxiety. **Objective:** The aim of the present study is to investigate the mental strain in CKD as it is reflected in the studies of modern literature as well as to highlight the factors related to it. **Mehods:** A review of the recent literature was performed. We employed the framework of Whittemore and Knaff according to which there are five stages for the review: problem identification, Literature Search, Data Evaluation, Data Analysis, and presentation. A systematic search was conducted on the following databases: Medline, Scopus, PsychInfo. We reviewed both qualitative and quantitative studies, peer-reviewed, published in the English language in the years 2015-2020. **Results and Discussion:** The prevalence of mental stress in ESRD varies widely in different studies, ranging from 10% to 29%. Also, according to studies about 30% of patients with CKD experience mental stress. A number of factors, including female gender, low educational attainment, advanced age, retirement, low financial status, comorbidities, family functioning, general well-being, and exercise were noted to be associated with psychological distress. The prevalence of depression varies, with this variation may be affected by both cultural differences in the individual populations under study and different methodological approaches. **Conclusion:** The effect of gender on mental health has been much debated in recent years, with most researchers agreeing that women undergoing dialysis experience higher levels of stress than men. Comorbidities have also been significantly associated with the presence of psychiatric symptoms, with those who reported suffering from a disease other than CKD to be more affected than those who had CKD alone.

Keywords: Anxiety, Depression, End Stage Renal Disease, Hemodialysis, Peritoneal Dialysis, Psychological Distress.

Professional paper, Received: Jun 25, 2021, Accepted: Jul 28, 2021, doi: 10.5455/ijbh.2021.9.81-86, Int J Biomed Healthc. 2021; 9(2): 81-86

1. BACKGROUND

Chronic renal failure is a progressive, irreversible decrease in renal function, which is caused by kidney damage for a variety of reasons. Chronic renal failure begins mildly and can progress to end-stage renal disease, a process that can take 2 to 10 years. In the final stage of the disease, the patient needs immediate support of renal function, with hemodialysis or peritoneal dialysis (1).

CKD, according to a 2010 Global Burden of Disease study, ranks 27th in the list of causes of the total number of deaths worldwide in 1990 (annual death rate 15.7 per 100,000) but rose to 18th place in 2010 (annual number of deaths 16.3 per 100,000) (2).

An analysis of data on the cause of death in the US and Australia by Rao et al., in 2012 showed that a significant proportion of people had died of diabetes or kidney failure, but the cause of death was coded as uncomplicated diabetes. The reported number of CKD mortality due to diabetes is estimated at four to nine times less than the actual value (1).

It is clear that the population undergoing dialysis is different from country to country. In Taiwan, for example, there are 3,170 patients per million of population, 2,620 pmp in Japan, and 2,080 pmp in the United States. In the European Union, about 1,090

Depresion and Covid Status - Analitical Study in Mumbai City, India

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Background: "Depression represents an important health "outcomes of interest" (HOI). It is a leading source of disability, accounting for approximately one-third of healthy life years lost to disability for people aged 15 years and older." **Objective:** This study aims to evaluate the prevalence and clinical correlates of depressive symptoms to COVID 19 Suspect and COVID 19 patients which may lead to depression, in which the population showing symptoms of COVID 19 and has contact history during the COVID-19 outbreak in Mumbai. **Methods:** An online questionnaire-based cross-sectional analytical study was conducted by using google forms with DSM 5 scale. From 24 wards in Mumbai City, one ward was selected using convenience sampling as per the convenience of the investigator. Out of the total containment zones in the ward as of 12th September 2020, one containment zone i.e, Pimpripada was selected using simple random sampling by using a table of random numbers. The total cases of COVID-19 reported in the containment zone to date were 78 then it was decided to choose 78 individuals having had COVID-19 and 78 of those not detected negative for COVID-19 as a part of the study with a sample size of 156. **Results:** The study showed that the prevalence of COVID-19 Negative people affected during the COVID-19 pandemic was 46.15% with depression and in COVID-19 Positive depression prevalence was 55.12%. Due to the COVID-19 pandemic employment of most people affected, interacting with people, friends, family members are less and fear-related COVID-19 which leads to increased depression prevalence. **Conclusion:** The study showed a high prevalence of depression in the COVID-19 Pandemic and indicates that there is an urgent need for taking actions aiming at increasing the effectiveness of enforcing consoling clinics and increasing healthy lifestyles and diets.

Keywords: Depression, anxiety, COVID-19, containment zone, employment.

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1. BACKGROUND

The COVID-19 outbreak has brought tremendous psychological pressure to the population.COVID-19 pandemic spread worldwide with affecting many things such as financial crisis, Educational changes, health-related issues and many more, which is affected dominantly to people mental health (1-10), Coronaviruses belong to the Coronaviridae family in the Nidovirales order. The new coronavirus has spread rapidly in many parts of the world. On March 11th, 2020, the WHO declared COVID-19 a pandemic. (11, 12). The recent outbreak began in Wuhan, acityinthe Hubei province of China. Reports of the first COVID-19 cases started in December 2019 (12) and World Health Organization (WHO) declared the COVID-19 emergency to be the sixth public Health emergency of international concern (PHEIC) on 30th January 2020 (13). Since the start of the COVID-19 pandemic, there has been a dramatic increase in depression, anxiety, suicidality and psychosis, new research shows (14-19).

COVID-19 pandemic includes many things like social isolation, medical treatments protocol, death of loved ones. Financial burden, change in educations pattern during lockdown (20). More than 300 million people worldwide suffer from depression, an increase of more than 18% between 2005 and 2015. Meanwhile, 260 million people suffer from anxiety disorders. Many live with both conditions.

2. OBJECTIVE

Therefore, this study aims to evaluate the prevalence and clinical correlates of depressive symptoms to COVID 19 Suspect and COVID 19 patients which may lead to depression, in which the population showing symptoms of COVID 19 and having contact

Pandemic COVID-19: What We Know and What We Expect in 2022?

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Background: The The COVID-19 pandemic, as a catastrophic global event, has significantly changed the life of every human being with a negative impact on all health components: social, physical and mental. Pharmacotherapy did not provide the expected results, as well as WHO recommendations with measures of isolation, wearing masks and maintaining physical distance. Vaccination has not yet led to collective immunity, so every aspect of human health is still endangered. **Objective:** The aim of this study is to point out the problem of COVID-19 pandemic. Another aim is to analyze why there were so many variants in virus mutation distributed worldwide in spite of 50% of the population having been vaccinated. We also presented a Medicus A educational and practical model for prevention, early detection and treatment of Covid-19 patients. **Methods:** Authors used a descriptive method of valuation of all variants of corona virus in the world, and also evaluated efficacy and efficient of used treatments in the past, including efficacy of vaccination in prevention of COVID-19 infection. **Results and Discussion:** Experiences of the Medicus A project in addressing COVID-19 infection and has an educational and practical model aspect which is ready for the prevention, early detection and treatment of COVID-19 patients. In the Medicus A model, priority is given to educating patients using ICT technologies, namely: telemedicine, online communication with patients, intensive communication with relatives and all necessary consultants in the health system. **Conclusion:** Due to the frequent mutations of SARS-CoV-2 virus, the COVID-19 pandemic has an unpredictable course. Despite the intensive use of the vaccine over the past two years, the number of infected persons is reaching record results worldwide. It is necessary to continue the application of all non-pharmacological measures, but also to strengthen the health system through better organization of public health and primary health care. Family medicine with the use of the „tele-health care" module can play a key role in the prevention, early detection and treatment of COVID-19 disease.

Keywords: COVID-19 pandemic, SARS-CoV-2 virus mutations, vaccination. Medicus A.

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1. BACKGROUND

Coronavirus disease 2019 (COVID-19) is a severe acute respiratory syndrome that is caused by a novel coronavirus 2 (SARS-CoV-2). It originated in China in late December 2019 and was declared "a public health emergency of international concern" by the World Health Organization (WHO) on January 30, 2020, and "a global pandemic" on March 12, 2020 (1). The virus is mainly spread through the respiratory droplet (2-7), or sometimes through fomites used by or used on the infected individual (3, 7, 8). The infected people can have no symptoms (5, 9-16).

Symptomatic patients may present with cough, myalgias, headache, diarrhea, sore throat, and smell or taste abnormalities (17-19). Furthermore, the infection is generally more fatal for the elderly and those with a history of comorbidity such as hypertension, obesity, renal disease and diabetes (20-21).

The number of cases continues to increase: by November 2021, approximately 251,788,329 confirmed cases have been reported worldwide, with more than 222 countries affected globally (20-39).

The World Health Organization (WHO) has named the new variant of the Omicron mutation as B.1.1. 529 or VOC, and was detected in samples from patients in South Africa in November 2021. The main feature of this variant of the virus are numerous mutations, with 30 mutations registered on spike protein alone, which are responsible for changes in the clinical picture, rate of spread and mode of entry into the

Computer Modelling and Simulation

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Background: Computer simulations can be briefly described as the use of computers to represent the dynamic responses of a tested system, by observing the behavior of another, artificial, system modeled on basis of the test system. Physical modeling has been practiced unconsciously since the beginning of the human species, that is, from the moment when the human mind began to understand all the complexity of phenomena and things that surrounded it in nature. **Objective**: The aim of this paper is to analyze the implementation of computer's simulation and modeling for educational agenda. **Methods**: This article is a review of the entire to use models, modeling and simulation by using compiters and ICT for teaching system in undergraduate, postgraduate and continuing education using published information, as well as professional papers and publications about this topic. The simulation methodology is based on computer science, statistics, numerical mathematics, operational research and artificial intelligence, but today it is sufficiently coherent and developed that it can rightly be called a separate scientific discipline. The system model represents a simplified and idealized (abstract) image of a real system. In other words, a model is a description of a real system with all its characteristics that are relevant from our point of view. **Results and Discussion:** Application of computer simulations in science: Different simulations are used to meet specific requirements of the scientific field and the problem such as: Numerical simulation of a differential equation, which cannot be solved analytically. This category includes theories dealing with continuous systems, such as phenomena in physical cosmology, fluid dynamics ; Stochastic simulation, used for discrete systems, where changes occur on the basis of probability, and cannot be explained by equations. These include genetic changes, and biochemical and genetic regulatory processes; Modeling of molecules and their behavior for the purpose of creating drugs; CFD – Computational Fluid Dynamics. – computers are used to perform calculations, which describe the behavior of liquids and gases; Blue Brain project; Cognitive architecture and Movement of parasites in the human body. **Conclusion:** This paper presents explanations and examples of the application of computer simulations in order to solve everyday problems encountered, both in medicine and all other branches of science. **Conclusion:** Computer simulations are an invaluable blend of nature and technology, and are one of the main sources of hope for understanding and improving the world we live in.

Keywords: Computer simultions, model, moddeling, science, medicine.

Professional paper, Received: Sep 25, 2021, Accepted: Oct 26, 2021, doi: 10.5455/ijbh.2021.9.173-182, Int J Biomed Healthc. 2021; 9(3): 173-182

1. BACKGROUND

Computer simulations can be briefly described as the use of computers to represent the dynamic responses of a tested system, by observing the behavior of another, artificial, system modeled on basis of the test system (1, 2).

"Computer Modelling and Simulation refers to the process of constructing and manipulating computer-based mathematical, graphical or algorithmic representations of real life systems or phenomena, for the purpose of conducting computer-based simulations to study, predict or optimise the behaviour of the system(s)". (3)

Mathematical models of the tested system in the form of a computer program are used. When the program is run, the mathematical equations incorporated in it behave analogously to the tested system. Simulations can also take the form of computer graphics, which will present the tested process in the form of an animated sequence.

- Simulation is an imitation of a set of operations, processes or behaviors of a system that take place over a period of time.
- The simulation describes significant aspects of the system as a series of equations standard included in a computer program.
- Simulation is the excitation of a model with appropriate inputs and the observation of appropriate outputs.
- Simulation is a numerical technique for per-

Bibliometric Indices and its Role for the Quality Assessment of the Author's Published Content in the Scientific Journals

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Background: Scientific research is the best way and method for the proliferation of true knowledge in all spheres of science, but also in academic institutions. The ability to study a scientific problem is the highest level of knowledge. Evaluating the quality and relevance of published scientific papers, after the acceptance in some of indexed journals, which should be the result of serious scientific work, relied mainly on members within the academic community. Citation analysis, which involves examining an item's referring documents, is used in searching for materials and analyzing their merit. Scientometric and bibliometric analyzes of scientific articles and their citation are one of most important methods for quality assessment of the published articles in the scientific journals. Bibliometrics marks quantitative research on communication processes by applying appropriate mathematical and statistical methods to published publications. **Objective:** The aim of this article is to present the current tools available in scientometry for the evaluation of scientific validity of published articles and explain the purpose. **Methods:** Author searched the most influential on-line databases and analyzed deposited papers within the topic scientometrics and used descriptive method of reviewing important facts about experiences with scientometrics in the scientific and academic practice. **Results:** The most important satisfaction for any scientist should be the realization of their results of research in a certain way in the future within the society, which should be fundamental to the realization of research in practice. The format of scientific articles can vary greatly from journal to journal. Nevertheless, many of them follow the IMRAD scheme, recommended by the International Committee of Medical Journal Editors (ICMJE) or BOMRAD form, recommended by author of this article. Citation of published articles provides guidelines for scientific work, because it stimulates scientists to deal with the most current areas of research, and organizes scientific article at the world level. Citation is influenced by: article quality, understanding of the article, language in which the article is written, article type, etc. **Conclusion:** Some of the indicators used in the evaluation of scientific work are: Impact factor (IF), Citation of the article, Journal citations, Number and order of authors, etc. H-Index presents one of a set of valuable measures to determine scientific excellence, and h-Index is a better measure than a citation impact factor (IF), it is still based on the opinions of other authors.

Keywords: Scientometry, validity, citation, IF, h-Index, Google Scholar Index.

Editorial, Received: Dec 07, 2021, Accepted: Dec 28, 2021, doi: 10.5455/ijbh.2021.9.244-253, Int J Biomed Healthc. 2021 Dec; 9(4): 244-253

1. BACKGROUND

Science is a massively parallel human endeavor to explain and predict the nature of the physical world. In science, knowledge is acquired cumulatively and collaboratively - and the principal mode for sharing this knowledge is the institution of scholarly publishing (1-5).

In science, ideas are built upon ideas, models upon models, verifications upon prior verifications. This cumulative process of construction leaves behind it a latticework of citations, from which the geography of scientific thought can be reconstructed and the paths along which intellectual activity has proceeded can be retraced.

True knowledge is gained through scientific research (6-15). The highest level of knowledge is the ability to investigate scientific problems. Fundamental components of scientific writing are accuracy, integrity, clarity, conciseness and honesty (1, 4).

Good scientific writing must be characterized by clear expression, conciseness, accuracy of what is being reported, and perhaps most importantly, honesty (1, 2). Academic honesty means that the work scientist submits, in whatever form, is original.

Data from citation indexes can be analyzed to determine the popularity and impact of specific articles, authors, and publications. Using citation anal-

Influence of Scientometry on Academic Promotion and Ranking of Universities

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Background: The scientific contribution made by a researcher is often approximated in terms of the impact of his/her scholarly publications. The product of scientific research is principally information published in scientific journals and they are cornerstone of knowledge dissemination. Also, this has become an important parameter for appointment in academic positions, research collaboration, receipt of research grants, etc. Objective: The aim of this article is to provide information about impact of scientometric indexes on academic progression and ranking of universities. Methods: Papers published of influence of the scientometric indexes on academic progression and ranking of universities were searched and analyzed. Results: The impact of the scholarly publications of a researcher is related to the citations of his/her publications quantified in terms of different scientometric indexes. The cumulative citations provide the total number of citations received by all of the scholarly publications of a researcher. However, as these indexes do not adjust their values for multiauthored publications, sometimes they may put forward a misleading picture. Also, significant financial resources are being invested in the formation of various international university ranking lists. The most prestigious ranking lists of universities in the world publish their results once or twice a year. Relevant university ranking lists consider various parameters, but for most universities (with the partial exception of the first 100) the number of publications and the impact that these publications achieve through citation are of the greatest importance in ranking. Universities and faculties in Bosnia and Herzegovina are more educational and less scientific institutions, and symbolize the 'mix' of secondary and higher education, without becoming either one in the original sense of the word. Conclusions: The fact is that investments in scientific research work affect the improvement of scientific production. However, without the introduction of internationally recognized scientific criteria in the evaluation of scientific research, and the coordination of academic progress in accordance with the criteria, even the current miserable investment in science is essentially a useless waste of taxpayers' money.

Keywords: internationally recognized criteria, academic community, education, ranking of universities.

Review, Received: Nov 25, 2021, Accepted: Dec 26, 2021, doi: 10.5455/ijbh.2021.9.264-268, Int J Biomed Healthc. 2021; 9(4): 264-268

1. BACKGROUND

Societal and scientific importance and the quality of scientific research highly depend on the usefulness of the research results. The scarcity of scientific research funds and the tendency to direct the funds towards high-quality research accentuates the importance of measuring and assessing the quality of research and knowledge valorization. However, it is very difficult to apply the right measures and scientific criteria which can objectively assess scientific research (1-6). The impact of the scholarly publications of a researcher is related to the citations of authors publications quantified in terms of different scientometric indexes. Also, significant financial resources are being invested in the formation of various international university ranking lists. The most prestigious ranking lists of universities in the world publish their results once or twice a year. Relevant university ranking lists consider various parameters, but for most universities (with the partial exception of the first 100) the number of publications and the impact that these publications achieve through citation are of the greatest importance in ranking. The competition to take a prestigious place on the world ranking list of top universities is increasingly heating up and taking on the characteristics of a battle for status and various kinds of domination of the most developed countries in the world (7-10). The fact is

Predatory Publishing and Predators - Almost Unsolvable Problem of Today in Biomedical Sciences

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Background. Scientific communication is seriously compromised and the quality of published articles is threatened when scientists and authors submit and publish their manuscripts in predatory journals. Predatory publishing can harm scientific practise and undermine scientific integrity, quality and credibility, especially when predatory journals penetrate reputable databases. Objective: To highlight the problem of predatory publishing and the means and approaches to prevent it and help authors avoid publishing in such journals. Methods: To explore Beall and Cabell's lists of predatory publishers and journals and review the relevant published literature, as well as the author's personal experience and observations. Results: There is no single, universally accepted definition of predatory publishers and fraudulent journals in the literature, nor is there an effective strategy for preventing, controlling, and solving the problem of predatory publishing. Jeffrey Beall, a librarian and library scientist from Denver, Colorado, attracted attention in 2010 and initiated a broad discussion in the scientific community about predatory open access (OA) publishing. He created and maintained the widely known Beall's Lists, which in 2017-18 were transformed into the Cabell's Black Lists of potentially predatory publishers and predatory OA journals. The threats and consequences of counterfeit journals are numerous and multi-faceted. The debate on predatory publishing continues in the scientific community, and the number of authors and published articles on this burning and unresolved issue is increasing. Conclusion: Predatory publishing and fake journals pose a global threat to the scientific community as they deviate from best editorial and publishing practices. Raising awareness among the scientific community and continuously educating authors about predatory publishers and journals, as well as avoiding predatory journals, remains central to the strategy for addressing the problem of predatory publishing. In addition to academic institutions and researchers in scientific societies, an active contribution to combating predatory publishing is needed from publishing associations, research funders, policy makers, libraries and other interested parties and stakeholders at local, national and international levels.

Keywords: predatory publishing, Beall lists, fraudulent, hijacked journals, Gold Open Access, pseudoscience.

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1. BACKGROUND

The results of biomedical research are translated into clinical practice and public health and published in scientific articles in peer-reviewed journals, all for the benefit of patients through Evidence Based Medicine (EBM). Funding for medical research from donors, funds and government comes in the form of grants for research projects and for publication of results in peer-reviewed journals. The Gold Open Access (OA) model, where authors pay to publish, has led to the creation of thousands of predatory journals since the early 2000s in place of the earlier subscriptions to peer-reviewed journals, which make easy money by robbing authors (1). The number of predatory publishers and so-called hijacked or fraudulent journals has steadily increased over the past two decades (2, 3), highlighting the phenomenon of the iceberg of predatory publishing. Predatory publishers can harm scientific practise and undermine scientific integrity, quality and credibility, especially when those journals penetrate reputable databases (4-6) on which EBM is based. Scientific communication is seriously compromised and the quality of published articles threatened when scientists and authors submit and publish their manuscripts in predatory journals.

Impact of the COVID-19 Pandemic on Education and Scientific Research in the Biomedical Sciences

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Background: The COVID-19 pandemic has had significant different consequences for everyday life of every human being, as well as on the functioning of health, educational and scientific institutions. Objective: The aim of this article is to provide information on impact of the COVID-19 pandemic on scientific research in the biomedical sciences, and publications, as wll as impact on education in medcine and clinical training. Methods: Papers published of influence of the COVID-19 pandemic on the main aim were searched and analyzed. Results: Many basic research labs quickly tuned their priorities and continud to study different aspects of SARS-CoV-2 infection and COVID-19. Biomedical sciences have become an important area in the fight against the SARS-CoV-2 virus, due to the unique challenges posed by the pandemic, including epidemiological aspects, immune mechanisms of the disease, clinical parameters of this essentially multisystem disease, virus properties, infection mechanisms, and later work on finding vaccines and everything that is needed. There are several studies that point to the negative impact of the pandemic on biomedical education, especially in the acquisition of practical clinical skills among medical students. The negative impact, both on basic education in medicine, and also on the acquisition of practical knowledge within various clinical disciplines, especially surgery, unfortunately continues. The COVID-19 pandemic has mobilised researchers worldwide on a scale and timeframe that have never been seen before for one specific disease. The number of COVID-19 manuscripts being submitted for peer review has also greatly increased. Unfortunately, research and publications on COVID-19 has so far often not been of high quality and many unprinted preprints have been rushed to spread without sufficient oversight. The time between submission and publication of articles on COVID-19 has decreased on average by around 50%. This analysis also showed that the time to publication for research not related to COVID-19 has remained unaffected, and that the number of research articles unrelated to COVID-19 has dropped considerably, with COVID-19 predominating in receipt of funding and attention from the research community. Conclusion: Impact of the COVID-19 pandemic on education and scientific research in biomedical sciences are negative. Almost all aspects of medical education were affected by the COVID-19 pandemic. The negative impact, both on basic education in medicine, and also on the acquisition of practical knowledge within various clinical disciplines, especially surgery, unfortunately continues. There has been no disease in the history of medicine about which several professional and scientific articles have been written in a relatively short time. Research and publications on COVID-19 has often not been of high quality. Research articles from many medical field unrelated to COVID-19 were less published. A pandemic with a "paperdemic" will be even more complicated to manage if it progresses in an uncontrolled manner and is not properly scrutinized.

Keywords: COVID-19 pandemic Impact, Medical education, Scientific research, Biomedical sciences.

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1. BACKGROUND

IInfection with the new coronavirus (SARS-CoV-2) was first registered in December 2019 in China, and then later spread rapidly to the rest of the world. On December 31, 2019, the World Health Organization (WHO) informed the public for the first time about causes of pneumonia of unknown origin, in the city of Wuhan (Hubei Province, China), in people who were epidemiologically linked to a seafood and wet animal wholesale local market in Wuhan. Coronavirus

Relationship Between Education and Family Medicine Practice. What Did we Learn in Covid-19 Pandemic?

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Background: Family medicine is implemented as an independent, academic and scientific discipline with specific educational and research content. **Objective:** The aim of this paper is to analyze the implementation of family medicine in Bosnia and Herzegovina according to EURACT educational agenda. **Methods:** This article is a review of the entire teaching system in undergraduate, postgraduate and continuing education in the Department of Family Medicine at Faculty of Medicine, University of Tuzla, Bosnia and Herzegovina was evaluated through the department reports and published information, as well as professional papers and publications. **Results:** For the successful application of "patient-oriented clinical practice" in their practical work, Family medicine teams met the criteria for full accreditation. In the last 6 years, delays and obstacles in practical work have been registered, and the main factors of obstruction are at the level of politics, law and economy. The COVID-19 pandemic led to almost complete collapse of family medicine practice mostly because telemedicine principles were not applied. **Conclusion:** During the pandemic, the teaching process was significantly changed due to the difficulty of applying all the practical skills described in the definition of Family medicine. Telemedicine educational modules have not been introduced. A pandemic significantly changes the content and methods of learning.

Keywords: medical education, family medicine praxis, COVID-19 pandemic.

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1. BACKGROUND

"The doctor who knows the principles of medical science, but is incompetent in his art due to insufficient knowledge of the practice, as well as an experienced doctor in his art and with insufficient knowledge of Ayurveda, is like a bird with one wing that has no ability to fly sky high"

– Shushruta Samhita 300-400 BC

Education, practice and research are extremely connected (1). A successful health care system depends on closed relationship between good practice, research and education. Unknown problems in practice need theoretical answer from research process which finally interplays with education. Education, medical, practice and research should be implemented together in academic department of family medicine (2, 3). Figure 1 shows relationship between education, medical, practice and research.

Opinion of students plays an important role in measuring the quality of education (4, 5). Masic et al realized investigation about quality assessment of two models of medical education - to compare the results of measuring the quality of the teaching process students who study according to the Bologna system and students who are studying according to the old system. They used a questionnaire containing variables relevant to test the success of the teaching process at the Faculty of Medicine of Sarajevo University. The study included 132 students of the sixth year of the Medical faculty Sarajevo, of which 84 students who are studying according to the Bologna system and 53 students who are studying according the old system. The results showed that the students of both groups assessed similarly basic elements of the teaching process. A statistically significant difference is in the evaluation of the relationship of teachers, assistants and the number of students, as well as the evaluation of space for teaching, practice and studying. It is necessary to carry out many of the changes in our universities through the Bologna process.

The quality of teaching at the universities in Bosnia and Herzegovina as well as abroad depends on many factors, among which are: adequate space for teaching, teaching staff, equipment and technical aids to assist in the teaching process. Fulfilling these standards and norms is essential in order to successfully follow the curriculum of sixth year by the Bologna process (1-3).

Without improving the quality of medical education the progress of health care is impossible (6). To

Development of Cardiac Services in Bosnia and Herzegovina - Resource Utilization and Quality Assurance: a Perspective

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Background: Introduction of Cardiac surgery as a treatment alternative for patients with cardiac pathology was realized at University Clinical Center Tuzla (UKCT) in 1998 by a hybrid team from the USA and Bosnia and Herzegovina (BiH). Education of personnel was performed in Buffalo, NY and on site in Tuzla. Objective: This article gives an overview of development of Cardiac surgery in Bosnia and Herzegovina and proposes concrete proposals for improving health care services for patients in need of these services, Also, author outlined major issues facing medicine in BIH, focusing on cardiac surgery. Methods: Author used descriptive method for write an overview of development of Cardiac surgery in Bosnia and Herzegovina based on personal facts and experiences in the war time 1992-1995 in Bosnia and Herzegovina and in postwar period. Results and Discussion: Before the war of 1992-1995 Bosnia and Herzegovina did not have Cardiac surgery or Invasive cardiology. Patients from BIH were operated in other centers in former Yugoslavia at significant financial expense to the republic and personal inconvenience for patients. During the war and in the post-war period such arrangements became unrealistic. With assistance from USA and Norway a Center for Invasive Cardiology (CIC) and Cardiac Surgery (CS) was established in University Clinical Center in Tuzla (UCCT/UKCT). At present 5 Cardiac surgery centers are functioning in Federation of BIH (FBIH) and one center has been established in Republic of Srpska (RS). Conclusion: Author hopes and believes that the new generation growing up, will throw away the evil forces still preventing BIH from reaching its potential in Cardiac surgery and in the society as a whole.

Keywords: Cardiac surgery, health care, Bosnia and Herzegovina.

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1. BACKGROUND

Introduction of cardiac surgery as a treatment alternative for patients with cardiac pathology was realized at University Clinical Center Tuzla (UKCT) in 1998 by a hybrid team from the USA and Bosnia and Herzegovina (BIH). Education of personnel was performed in Buffalo, NY and on site in Tuzla. Cardiac catheterization was started in UKCT in 1997. Cardiac Surgery had previously only been offered by hospitals in Belgrade, Zagreb, Ljubljana and Novi Sad, inconvenient to citizens and expensive for the health insurance fund in BIH. As I observed during my stay in Tuzla in 1994 UKCT had a large number of competent specialists, but lacked staff for Cardiac surgery and Invasive cardiology. In this article I will outline major issues facing medicine in BIH, focusing on cardiac surgery.

1.1. Population, need for services

The need and access to advanced cardiac services varies widely in the world with USA having about 1000 heart operations pr million citizens pr year, while in low and middle income countries, the number of cases may be 400 pr million (1). The size of population considered necessary for the establishment of a cardiac surgery center varies. Europe on average has one center pr million population, In Asia/Australia there is a center pr 16 million (1). Given a population of 3.2 million, a total of three Cardiac surgery centers would be a realistic number for BIH. The total number of patients being operated upon in BIH is probably less than 1000. According to EU-statistics there is no official cardiac surgery number from BIH, but Serbia had more than 800 pr million and Croatia more than 700 in 2018 (2).

Influence of the Pandemic on Case Fatality Rate of Non-COVID-19 Patints in a Tertiary Health Institution

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Background: The Covid19 pandemic significantly disrupted the treatment of hospital patients with other diseases due to the priority engagement of human and material resources in the treatment of COVID-19 patients. The extent to which this disorder affected the case fatality rate of non-COVID-19 patients has not yet been investigated in detail. **Objective:** The aim of this study was to compare the in-hospital lethality of non-COVID-19 patients before and during the COVID-19 pandemic, as well as to identify factors with a possible impact on lethality. **Methods:** Case fatality rates (total and in the first 48 hours) were collected from the Information system of the University Clinical Center Kragujevac, Serbia, for the period from 2017 to 2021, both for the institution as a whole and for internal medicine, surgery, gynecology and pediatrics. The trends are presented graphically, and their significance was examined by Mann-Kendall's trend test. **Results:** There was no significant trend in case fatality rate at the level of the entire institution, but with the onset of the pandemic, there was a significant shortening of hospital stays (from 6.26 to 4.48 days on average). Case fatality rate in the first 48 hours increased significantly in patients of surgical disciplines with the onset of a pandemic, while the case fatality rate in the first 48 hours and overall case fatality rate decreased significantly in patients of internal medicine disciplines. In pediatric patients, there was an increase in the case fatality rate with the onset of the pandemic, both in total and calculated for the first 48 hours of hospitalization. There were no changes in case fatality rate in gynecological patients. **Conclusion:** Due to the burden caused by the COVID19 pandemic in tertiary health care institutions, non-COVID-19 patients from vulnerable groups–surgical and pediatric–have adverse consequences. For such patient groups administrative restrictions of access to hospital care during pandemics should be avoided, since delayed diagnostics and treatment increase mortality.

Keywords: non-COVID-19 inpatients, case fatality rate, emergency surgery.

Original paper, Received: Feb 15, 2022, Accepted: Mar 20, 2022, doi: 10.5455/ijbh.2022.10.10-13, Int J Biomed Healthc. 2022; 10(1): 10-13

1. BACKGROUND

The COVID-19 pandemic, in addition to caring for patients with this viral disease, has brought major changes in the treatment of patients with other diseases. Due to the mobilization of all resources, priority care of patients with COVID-19 and conversion of hospital capacities from treatment of non-COVID-19 patients to treatment of those infected with SARS-CoV-2 virus, a significant proportion of patients with chronic noncommunicable diseases had reduced access to health care. Waiting times for diagnostic procedures have been significantly extended (1), which led to the delay in making a definitive diagnosis and starting treatment. The number of patients who reported to the emergency centers also dropped significantly during the pandemic, so that adequate treatment was lacking for a number of patients with trauma and acute illnesses (2). Patients with epilepsy were in a particularly bad situation when it comes to access to health care during COVID-19 pandemic: 29.2% of them could not get the medication they needed, as many as 94.2% had canceled examinations due to the pandemic, and as a result of reduced access to health care, in 28.4% of patients there was a loss of control of epileptic seizures (3).

How Bosnia and Herzegovina Can Benefit from Heatlh Technology Asessment

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Background: Health technology assessment and pharmacoeconomic (PE) principles in health care policy and decision making is well recognized and established in developed countries. In Bosnia and Herzegovina (BH), as middle-income country in transition these principles are recognized by law but not implemented in practice. A last decade was marked by rising awareness on this topic and its importance for better resource allocation. Considering current trends in health care expenditure, challenges of health care systems and trends in Europe, it is expected to implement HTA in Bosnia and Herzegovina. **Objective:** The aim of this article was to assess current status of HTA and pharmacoeconomics use in Bosnia and Herzegovina and propose future directions. **Methods:** Review and analyse available publications in PubMed, media and legislation in BH on HTA and pharmacoeconomics trends and opportunities. **Results:** Only 11 papers are indetified in PubMed. Published papers are mainly dealing with issues facing reimbursement and access to medicines and lack of transparency in decision making. Some papers present PE analysis and impact on health care budgets. Review of legislation on reimbursement of medicines show that PE principles are recognized in both entities of BH, while HTA is only recognized in Federation of BH. **Conclusion:** HTA and PE principles even suggested by law are not implemented in practice. Future challenges of financing health care and improving patient access to innovative pharmaceuticals will require serious consideration of using these tools in decision making.

Keywords: Health Technology Assessment, Pharmacoeconomics, Reimbursement, Access.

Review, Received:Feb 02 2022, Accepted: Mar 14 2022, doi: 10.5455/ijbh.2022.10.57-61, Int J Biomed Healthc. 2022; 10(1): 57-61

1. BACKGROUND

More than seventy years pharmacoeconomic (PE) principles in decision making on pharmaceutical policies has been introduced (1). As a part of health economics, pharmacoeconomic focuses on evaluating pharmaceuticals and providing economic evidence of their value to payers and healthcare policy makers when deciding about their reimbursement. In the earlier days of health economics, until perhaps the mid-1980s, health economics approach was identical as for any other goods, informing government policies largely dealing with reimbursement for health care services or drugs, and other policy issues. As evidence base medicine (EBM) start to evolve from eighties drugs and other therapies have been increasingly required to "prove themselves" both therapeutically and economically.

Pharmacoeconomic analysis is the comparison of costs and consequences of alternative drug therapies so as to maximize therapeutic outcomes when resources are limited (2). In high-income countries PE analysis is widely used to guide priority-setting decisions for pharmaceuticals, and Australia was the first country introducing this in 1993 as obligatory part of reimbursement dossier (3). Now days many countries across the world implemented this approach and issued guidelines as a standard for preparation of studies to be included in application for reimbursement (4). Beside resource allocation, PE has found its application also in research and development of new pharmaceuticals in order to assure as early as possible acceptable price and access once when product is marketed (5).

Technology assessment (TA) arose in the mid-1960s from an appreciation of the critical role of technology in modern society and its potential for unintended, and sometimes harmful, consequences. Technology assessment (TA) is a category of policy studies, intended to provide decision makers with information about the possible impacts and consequences of a new technology or a significant change in an old technology. Health care technologies were

A Case Study of the Health Information System in Family Medicine Practice in Canton Sarajevo

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Background: Family medicine is defined as continuous, comprehensive medical care of the patient in the context of the family and the community. Continuous patient care includes prevention, diagnosis and treatment of acute and chronic diseases and palliative care. Caring for individuals during different diseases and stages in the life cycle, understanding the role of the family in disease and using community resources makes family medicine unique among medical disciplines. With the development of new technologies, there was a need for changes in the work and introduction of the Health Information System, in all areas of medicine, including family medicine. **Objective:** The objectives of this study are to analyze CHIS functions in family medicine, analyze CHIS data reports, complaints, and suggestions for improvement, and then, based on the results of these analyses, to offer recommendations for future development of the CHIS family medicine module. **Methods:** This article represents a qualitative, interpretative case study of the implementation of the CHIS in family medicine in Public Institution Health Centre of Sarajevo Canton conducted by a group of physicians using three primary data sources: medical experts' analysis of the CHIS content, reports available in the CHIS about the number and type of services, analysis of written medical doctor and nurse complaints, and suggestions for improving the CHIS. Although qualitative data analysis predominated, quantitative data analysis was also employed. **Results and Discussion:** It is crucial that healthcare professionals who utilize HIS have the opportunity to provide feedback on the system and suggest modifications. The main results show that CHI is widely used in family medicine and that employees in this department provide purposeful suggestions to improve CHI, as well as that a good cooperation between the software company and the user exist. Experts in software should view these suggestions as useful information and adopt them to enhance the system so as to increase customer satisfaction and enhance the quality of health care. Health informatics as a separate scientific discipline began to be effective in academic institutions at the end of the 70's by the presentation of actual accomplishments in this area in under and postgraduate education at biomedical faculties. The Central Health Information System (CHIS) in Sarajevo Canton was implemented in 2014 but was not fully integrated and was incompletely used at certain levels of health care. **Conclusion:** Thanks to the agility of the company rapid implementation of new software modules enabled the organizational transformation of the Sarajevo Canton health network.

Keywords: Family medicine, Health Information Systems, Health care, Medical Informatics.

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1. BACKGROUND

Family medicine (FM) is most often defined as continuous, comprehensive medical care of the patient in the context of the family and the community. Continuous patient care includes prevention, diagnosis and treatment of acute and chronic diseases and palliative care (1).

Caring for individuals through different diseases and stages in the life cycle, understanding the role of the family in disease and using community resources makes family medicine unique among medical disciplines. In addition, family medicine is a scientific discipline, with patient- centered approach, a holistic perspective, continuity of care, orientation to family and community and integrative methodology. All this makes this area unique (2).

FM in Bosnia and Herzegovina (B&H) has gone through several attempts to revive this clinical dis-

Community Health Protection - a One Forgotten Idea of PHC in Bosnia and Herzegovina

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1. HISTORY OF SOCIAL MEDICINE, PUBLIC HEALTH AND COMMUNITY MEDICINE

As young phisician during 1981/1982 I spent a time of studying at Department of Community Medicine of the London School of Hygiene and Tropical Medicine (LHTM), chaired by Professor Robert Logan (Figure) (1). It was one of the best organized deparment at LHTM, because multidisciplinary team of public health workers teached and realized very important segment of Public Health - Community Medicine (1). And when I returned back to Sarajevo I tried to involve my experience about Community medicine to the Health Care System in Bosnia and Herzegovina (B&H) with a few colleagues at Institute of Social Medicine and Organization of Health Care and Health Economics, chaired by Professor Arif Smajkic. Our model ***"Contents of work physician's team in Family and Community"*** *(one Family practitione's team covered 1500 citizans/patients in community region, contained of one family practioner, one nurse who worked a half time in ambulace and a half time in family -as "passive and active" health care protection - and one patronage nurse who worked full time in the family), and it* was one kind of copy of English System of organization of health care protection, modified for our conditions in B&H (Figure 2). Experimetal units were established in cities Sarajevo, Mostar and Banja Luka. Model was used until 1991 and stopped because of wartime in B&H (1992-1995).

Social medicine as academic and scientific discipline has been developed that it was segmented into ten different subdisciplines while each became a separate science and the field. Former Yugoslavia had one of the best model, thanks to Academician Andrija Stampar, one of founders of WHO and the First President of General Assembly of WHO (3). Also, important scientist from the period when Stampar started with promoting and realization his ideas in the practice were Max von Pettenkoffer, who dogged resistance to the theories of Pasteur and Koch that bacterium was necessary and sufficient and Alfred Grotjahn, who rescued insistence on social factors other than hygiene from developing into solely a movement for sanitary reform, as it had in UK. Grotjahn's published book "Social Pathology" (in 1911) talked about: a) the significance of a disease is determined by the frequency in which it occurs. Medical statistics are therefore the basis for any investigation of social pathology; b) the etiology of disease is biological and social; c) not only are the origins of disease determined by social factors, but these diseases may in turn exert an influence on social conditions; d) it must be established whether medical treatment can exert an appreciable influence on its prevalence, if this is negligible we must attempt to prevent diseases or influence their course by social measures. This requires attention to the social and economic environment of the patient.

Social medicine spread throughout continental Europe in late 1880s, and incorporated into medical education and practice in Czechoslovakia, France, Belgium and later USSR. The first professors in Social medicine were: 1918, Johan Marcus Baart de la Faille, at Utrecht University, The Netherlands; 1920, Jacques Parisot, at Nancy University, France; 1920, Alfred Grothjahn, at Berlin University, Germany; 1921, Nikolai Aleksandrovich Semashko, at Moskow University, Soviet Union; 1939, Andrija Stampar, at Zagreb University, Yugoslavia; 1943, John Ryle, at Oxford University, UK; 1944, Thomas McKeown, at Birmingham University, UK; 1944, FAE Crew, at Edinburgh University, Scotland; 1945 (1936), René Sand, at Brussels University, Belgium; 1947, AC Stevenson, at Belfast University, Ireland; 1947, Milos Aranicki, at Sarajevo University, Bosnia and Herzegovina; 1949, W Hobson, at Sheffield University, UK. In 1924 by a private practitioner in Stockholm (Waldemar Gårdlund) promoted ideas of Social medicine in Sweden: ... the intention is to report information regarding Social medicine both to physicians and lay people, and treat all sorts of social questions where medical knowledge is of great importance, e.g. social insurance, building of hospitals, the position of private practitioners, the Red Cross activities etc. "Besides what already have been said there is another subject field which could be called medical sociology or community medicine. Included here is e.g. the organization of our health care as hospitals, sanatoria, asylums, tuberculosis clinics, child welfare centers, social welfare offices, population and health care statistics and medical law." Teachers' staff at Karolinska institute in 1933 involved Social medicine as official academic discipline: (2)

Social medicine as a concept was promoted and realized in a ages of Enlightenment - the insight that death and diseases were non-random phenomena, from one side and in time of Cameralism/mercantilism, when decision makers thought about how to increase the population. Socialism or Communism, whose ideas were already on the horizon of the eastern world (block) has opened broad prospects for the working class and progress

The Use of Expert Systems and Information and Communicaton Tchnologies (ICT) in Laboratory Practice–an Economical Aspects

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Background: Biochemistry is the science of the chemical composition of living things and of chemical changes in living things. Biochemical–laboratory diagnostics occupy a prominent place in medicine. Today's knowledge in the field of laboratory diagnostics enables reliable diagnostic verification of the physiological and pathological condition of the subject and monitoring of the patient's therapy. **Objective**: The aim of this article is to look at the economic and communication aspect of laboratory diagnostics in family medicine and present some statistically relevant data related to the already mentioned topic. **Methods:** Author used a few important sost analysis to assess every diagnostic and therapeutic procedure which should be analyzed from the aspect of its profitability, i.e. To determine their effectiveness and safety of application as stated in the Accreditation Standards for Health Centers. **Results:** A total of 5333 laboratory tests are represented in 1000 requests. The percentage representation of the most frequent individual laboratory tests in the requests of all teams of doctors involved in the health care system was in order; GUK (14%), BS (14%), urine (13.9%), SE (10.3%), total cholesterol (8.5%), triglycerides (8.4%), aminotransferases (6.7 %), creatinine (6.7%), urea (4.8%), bilirubin (0.9%), fibrinogen (0.9%), CRP (0.8%), AF (0.8%), HDL cholesterol (0.7%), calcium in serum (0.6%), phosphorus in serum (0.5%), acidum uricum (0.5%). Of the general practitioners, the largest number of patients referred to the biochemical and hematology laboratory were diagnosed with diabetes, followed by diseases of the urinary system and hypertension. The same is the case with family medicine doctors, while from specialist doctors, the largest number of patients are sent to the biochemical and hematology laboratory with diseases of the urinary tract, followed by diseases of the respiratory tract, endocrinological system and anemia. **Conclusion:** An economic analysis of the number of required laboratory tests by disease indicates a different number of points per required test and by disease. The highest costs are related to diabetes, followed by the costs of respiratory diseases, urinary diseases and finally hypertension.

Keywords: Biochemistry, Laboratory tests, ICT, Expert systems in hematology.

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1. BACKGROUND

Diagnostics means a process whose goal is to establish the localization, type and cause of a malfunction in a system. As is known, a system can be a living being, when the diagnosis should establish the place and type of disease or tissue or organ injury. Diagnostics in medicine specifically represents a very important area of application of ES, which have proven to be very successful there, as evidenced by the successful implementation of ES – MYCIN, ONCOCYN and others. The task of diagnostics is partially based on the task of interpreting data that may represent, for example, symptoms of diseases or disorders.

Biochemistry is the science of the chemical composition of living things and of chemical changes in living things. Biochemical–laboratory diagnostics occupy a prominent place in medicine. Today's knowledge in the field of laboratory diagnostics enables reliable diagnostic verification of the physiological and pathological condition of the subject and monitoring of the patient's therapy. There is a high level of knowledge about the metabolism of individual constituents in the body, and their monitoring is technically very accessible. Therefore, with modern laboratory diagnostics, using different systems and reactions, the doctor can obtain very useful data about different flows of normal, pathological or metabolism under the influence of drugs.

Laboratory diagnostics is a very important activity in health care. Laboratory diagnostics in primary health care is software that provides short and useful information as an aid in understanding, choosing and interpreting laboratory tests. Today's

The Multivariate Statistical Analysis – Multiple Linear Regression

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Background. When processing the results of observational studies we ave to usemultivariate statistical methods that will examine the simultaneous influence of both independent and confounding variables on the outcome, **Objective:** The aim of this paper is to further explain how a researcher could decide whether multiple linear regression is suitable statistical option for processing his (her) data, and then how to implement it properly. **Methods:** This article is a narrative review of literature about logic, assumptions, quality check and interpretation of multiple linear regression. **Results:** Multiple linear regression is a complex linear equation (model) in which on one side of the equal sign is the absolute value of the dependent variable (i.e., the outcome), and on the other is a sum of additions, of which only one is a constant, and all others are the product of an independent or confounding variable and their coefficients. After checking assumptions and quality of the model, we may decide whether a predictor has significant influence on outcome, or not, and calculate size of this influence. **Conclusions:** Multiple linear regression is an extremely useful statistical model for explaining the influence of multiple predictors simultaneously on a continuous type dependent variable, but it requires the fulfillment of fairly strict assumptions in order to be used. That's why multiple linear regression should be used only when the conditions are met, otherwise other types of linear and non-linear models whose assumptions are far more lenient should be resorted to. .

Keywords: multiple linear regression; assumptions; heteroscedascity; collinearity.

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1. BACKGROUND

Research in clinical medicine can be experimental or observational by design. In observational studies, which are conducted much more often because they are cheaper and more feasible, we are not in a position to equate the groups exposed or not exposed to the independent variable by confounding variables, because we cannot choose which patient will be exposed to the independent variable and which will not. Therefore, in processing the results of observational studies, we must take into account the influence of both independent and confounding variables on the dependent variable (outcome), i.e., we have to use the so-called multivariate statistical analyzes that will examine the simultaneous influence of all the mentioned variables on the outcome, adjusting the influence of each variable for the influence of the others, and evaluate which of the examined variables have a statistically significant influence and which ones do not (1).

Among the multivariate analyzes available, two are most often used in research practice: multiple linear regression, if the dependent variable (i.e. the outcome) is a continuous quantity (e.g. arterial blood pressure), and binary logistic regression, if the dependent variable is of a categorical nature (e.g. the patient survived or died) (2).

2. OBJECTIVE

The aim of this paper is to further explain how a researcher could decide whether multiple linear regression is suitable statistical option for processing his (her) data, and then how to implement it properly.

3. LOGIC OF MULTIPLEE LINEAR REGRESSION

Multiple linear regression is a complex linear equation in which on one side of the equal sign is the absolute value of the dependent variable (i.e., the outcome), e.g., of systolic arterial pressure, and on the other is a sum of additions, of which only one is a constant, and all others are the product of an independent or confounding variable and their coefficients (3). If we take for example a hypothetical study, where we examine the effect of drug A on systolic blood pressure, where the confounding variables are patient age, gender, and the presence or

Academician Professor Emeritus Izet Masic, for Whom Medicine is Destiny and Writing is Greatest Passion

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Medicine is the adventure of academician Mašić, his actually way of life, which is impressive and spectacular at the same time. Intellectual curiosity of academician Mašić is a great and fascinating. Academician Mašić is a renaissance type of the scientist and creator whose features are encyclopedic erudition and great spiritual curiosity. With stylistically recognizable expression, which successfully has connected one versatile, not only medical, but universal education and intellectual playfulness, academician Mašić realized his whole creative opus. The certain writing in the whole scientific opus of the academician Mašić has a specific position. The thought of one of the greatest European lyrists, Rainer Maria Rilke (1926-1975), could refer to academician Mašić: "Would I have to die, if writing were denied me?"

Scientific and creative way of academician Mašić is more than impressive. Representative of that scientific way, creator of these creative ideas and the interpreter of new attitudes in modern medical science, Mašić can only do Bosnian-Herzegovinian medicine honor and respect. Nowadays, we can speak about "phenomenon Mašić", his influence, popularity and readibility. Academician Mašić permanently finds new readers even in our "scarce time" which is lacking in spirit and passion.

In short, academician Mašić succeeded to create so grandiose opus, thanks to his great medical erudition, excellent knowledge of different segments of medicine, extraordinary knowledge of informatics and his critical attitude. But, not to forget, academician Mašić has medicine as the only passion and vocation. Mašić organized his all the life to be a medical doctor and he found his homeland in medicine as the "only way of his life".

Academician Mašić realized very early, that maybe, medicine is the most complete science and at the same time, the mirror of life. It's not necessary to say that medicine is the art created by man and with the roots of creativity, as in the action, either in all the relations. Medicine is more and more related to technology and many people experienced that incredible technological breakthrough in medicine as dehumanization of medicine. That's indisputably that technology contributed very much to expected lasting of life. It is made longer and significantly improved quality of life of patients. Technology makes weaker relations between medical doctors and patients, which is fundamental thing for final recovery and return to normal life. But still, academician Mašić has put a patient who needs help in the centre of his life, patient with the whole his suffering, pain and despair. Therein lies the greatness of medical doctor Mašić. But medicine is universal and if many things separate us on national, religious, political, economic and social level, it's medicine that brings us together and reunite us. And academician Mašić was aware of all of these things when he was enrolled in the studies of medicine.

But, do not forget that profession of medical doctor is the most humane profession. Academician Mašić approached medicine as patient also, with a lot of love, empathy and understanding. Because of that, it's possible to apply to academician Mašić three wonderful thoughts of the giants of medicine as they are Theoprastus von Hohenheim Paracelzus, Hermann Nothnagel and Karl Jaspers.

Great Theoprastus von Hohenheim Paracelsus (1493-1541) said: "Love is the deepest basis of medicine". That feeling of love and empathy towards patient, academician Mašić expressed in a miraculous way. Famous German internist, Hermann Nothnagel (1841-1905) said: "Only a good man can be a good medical doctor". If this famous thought of great internist Nothnagel, whose bust is in the hall of the University of Vienna and on which are the words that can be applied on to someone – then it's without a doubt, academician Mašić. According to great and famous psychiatrist Karl Jaspers (1883-1969), medical activity is on the two pillars: on natural-scientific cognitions and knowledge and on the ethos of humanity.

Ethos of humanity is dominant in the opus of academician Mašić, because Mašić is a humanist, altruist and scientist in Renaissance concept of scientist who

An Impossible Decision–the Life Interrupted by Uncertainty

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The **play** tries to describe making important–life & death–medical decisions under uncertainty. While the overarching goal is to arrive at the most optimal, rational solution, the process of decision-making inherently involves human interactions – here between the patient, her husband, the doctor- fraught with emotions and navigated within immediate familiar and larger social and medical settings in the attempt to provide best possible and compassionate help to a human being afflicted with a life-threatening disease. The play revolves around the optimal choice of treatment for metastatic pancreatic cancer that a young 45-year-old woman and her family face: from not being treated to standard treatment to enrollment in various experimental studies. By covering most scientific concepts using dialogues between the real-life protagonists, the play attempts to show–and educate the broader public–how scientific progress is inevitably made because individuals ("made of flesh and blood") have consented to participate in medical research while searching for the best solution for them as individuals. It uses a real-life example to answer an elusive ethical "triple aim"- arriving at a decision that respects the right of a person to decide as an autonomous human being, has the best possible chances to personally benefit from the treatments under consideration while contributing to knowledge that can help others in the future.

Act 1: uncertainty about the diagnosis. Act 1, Scene 2: uncertainty about treatment (doctor's office, after biopsy). Act 2,1: uncertainty about treatment (discussion at home). Act2, 2: decision. The annotations (endnotes) provide further explanations of the theoretical and philosophical concepts that were converted into the real-life drama of a patient facing a life-threatening disease. It attempts to demonstrate the central role of uncertainty that shape these decisions calling on science to help address them. The main goal of the play is to illustrate the **applicability** of many theoretical concepts of the **science of uncertainty to real-life decision-making** to show **that they do matter** to all of us individually and collectively. The author hopes that by converting the scientific, philosophical, and technical writings into this play, the public would benefit more from this text than hundreds of other scientific articles he has written on the topic.

Keywords: Life Interrupted by Uncertainty, real-life decision making, play/drama.

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Real-life medical uncertainties facing a young patient with life-threatening pancreatic cancer presented as a play

Protagonists:

Wife (**Lisa**, age 45, a computer scientist)

Husband (**John**, age 45, a journalist/philosopher)

Children, **Bill** (age 12) and **Jenny** (age 8)

Harley, An adult black cat

Honda, A golden retriever puppy

Doctor, a man with gray hair, experienced looking, in his 60ties

Act 1; Scene 1, house (Setting the scene.)

(**John** and **Lisa** are celebrating their 25th anniversary together with the children and their pets. They have just paid off their home and are planning their dream family vacation next year. They have out cruise brochures and online videos about vacation hot spots they are sifting through)

John (talking in an upbeat, enthusiastic voice): it feels great to be able to plan our vacation; there are no people I would rather be with than you guys... (**Honda**, the puppy, tugs at his pants leg as if asking if we will be coming too?)

Jenny (daughter) (as if sensing what **Honda** may have on her mind): can we take Hurley and **Honda** with us?

Lisa (is remembering her mom who died the year she planned the family vacation with them): I have been thinking of my mom...(Turning to the kids): I still miss grandma... but I know that she would be

The False Science in the Biomedicine - a Dilemma

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Background: Today we live in a "scientific age" and that most people believe all the information that is presented to them through the media, through the tricks of various industries, especially the pharmaceutical industry, and all because of a misunderstanding of statistical data and a bad interpretation of evidence, which ordinary people actually cannot understand, because of the way it is presented to them. **Objective:** The aims of this study were:: to present false science through homeopathy, placebo effect, nutrition and antioxidants and explain the use and abuse of drugs through false science, the bad side of pharmacy and show the roles of the pharmaceutical industry on the important examples in the past. **Methods:** Author used a descriptive method of analysis from the appropriate scientific literature. **Results and Discussion:** The meta-analysis of the use of adequate sources about facts described in the article helped the author to recognize nonsense and intellectual fraud. The analysis is based on exposing pharmaceutical companies, nutritionists, various statisticians, but also the media that publish scientific articles about non-existent experiments and abuse science and present false facts. Pharmaceutical companies, like all other commercial enterprises, are profit-driven in their practice. Therefore, they do not produce unprofitable medications, but expensive and chargeable ones, even if they are useless, at the current level of expansion, further growth in profits requires the maintenance of existing medications and the creation of new diseases. A naïve view of science opposes any opinion about science that comes from outside science without ever asking what science is, how it differs from other forms of cognitive and spiritual questioning, what foundations it is built on, what is a scientific revolution, what is truth and what are the standards of truth in science, is there progress in scientific knowledge, what are the possibilities and limits of science in explaining and understanding reality, what is its ultimate meaning, and finally what are real information and what are misinformation. **Conclusion:** Regardless of all the arguments there will still be both paths along which human knowledge moves; in addition to the scientific, its adherents will also have an esoteric understanding of the world. Science is something like "never ending story" (by Masic) and will not stop from advancing - it will continue to bear fruit that will be used and abused.

Keywords: science, pseudoscience, bad science, pharmacy, COVID-19 vaccines, misinformation.

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1. BACKGROUND

True knowledge is gained through scientific research. The highest degree of knowledge is the ability to investigate scientific problems (1). The best way to get to the truth is the knowledge on scientific methods (2, 3). Well-defined rules in all stages of research consist of ethical code in good scientific practice (GSP) (1). Finding truth in science is not only ensured by consistent application of the scientific methods. Honesty of scientist who searches for truth is of crucial importance (2). The modern science is multidisciplinary and multi-professional, so that the work resulting from this cooperation is usually signed by several authors. Among the first examples of the evaluation process as such is its initiator, Henry Oldenburg, who in 1665, founded and edited the journal "Philosophical Transaction of the Royal Society" in London, as the earliest scientific publication of its kind in English. In the early 9th century, it is possible on the basis of available data to discover the practice of certain authors, the Arab philosopher Al-Gazaly used reviewing method for quality assessment of written text. Yusuf al-Kindi (cca. 800-870), for example, shared his written work with his colleagues to give him their critical opinion on the work. On the other hand, in our time, according to the Association of American Historians, professional review is described as: a) Verification means that the book, monograph or paper, or research proposal, is read and evaluated in the field of the topic, and the language and documents of the author, by experts in a certain period of time. As prominent experts in the field of knowledge that the author deals with, reviewers prepare an analysis for a committee made up of experts of scientific importance for the article with questions; b) Does the author demonstrate knowledge of current developments in this field? c) Are the research procedures, processes, and methodologies, in accordance with professional standards? d) Does the author offer original arguments and provide valid facts that support his work? If the relevant claims are weak or not in the presented article, the reviewers suggest a revision that will correct the article and re-evaluate

Evaluation of Hematological Parameters After ESWL and Ureterorenoscopy for the Treatment of Kidney Stones

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Background: Bleeding and hematuria can be a consequence of both ESWL and URS treatment.Changes in hematological parameters may be indicative of bleeding events.**Objective:** The aim of the present study was to explore the hematological parameters after ESWL and ureterorenoscopy for the treatment of kidney stones. **Methods:** A prospective study included patients (120) with verified ureterolithiasis <10 mm in the upper half of the proximal third of the ureter. Patients were divided into two groups using the random sample method for the application of active stone removal methods ESWL or URS with contact disintegration.Patients were evaluated with routine hematological, biochemical blood parameters, and non-contrast enhanced computed abdominal tomography (CT) before the procedure.Routine laboratory analyzes were performed using standard methods and included determination of the number of erythrocytes, platelets, hemoglobin, hematocrit, glucose, INR, APTTwhich were measured preintervention, the first postoperative day and six months after the intervention. **Results:** The preintervention hemoglobin value in patients with urolithiasis treated with URS treatment was 140 g/L (136.2–155.7), and was statistically significantly higher compared to the measurement on the first post-intervention day [137.5 g/L (127, 2–156.7) (p<0,05)], as well as in relation to the measurement after six months [139 g/L (134.2–151.7), (p<0,05).The pre-interventional hematocrit value in patients with urolithiasis treated with URS treatment was 0.42 (0.41–0.47), but it dropped statistically significantly on the measurement on the first post-intervention day to a value of 0.41 (0.38–0, 47) (p=0.003). The hematocrit value after six months was 0.44 (0.41–0.47) and was statistically significantly higher compared to the pre-intervention measurement (p=0.002), as well as compared to the measurement on the first post-intervention day (p< 0.001). The pre-intervention INR value in patients with urolithiasis treated with URS treatment was 0.90 (0.86–1.1), and on the first post-intervention day, it increased statistically significantly to a value of 0.99 (0.89–1.1), (p=0.005).The INR value after six months continued to grow to a value of 1.02 (0.96–1.2), which was statistically significantly higher compared to the INR value measured on the first post-intervention day (p<0.001), as and in relation to the INR value measured before the intervention (p=0.007).**Conclusion:** The results of this study, in terms of hematological parameters, showed more favorable outcomes in patients treated with ESWL compared to URS lithotripsy. Significantly lower hemoglobin values six months after URS treatment, as well as a decrease in the number of platelets on the first postoperative day, lead to the conclusion that URS lithotripsy, which represents a more aggressive method compared to ESWL, may have less favorable consequences for patients.

Keywords: ESWL, Ureterorenoscopy, Kidney Stones.

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1. BACKGROUND

Kidney stone disease is a common, harmful condition that has a significant financial cost. Surgery is frequently necessary, and procedures like ureteroscopy and extracorporeal shock wave lithotripsy are used (1). By directing a shock wave from outside the body on the area of the stone, extracorporeal shock wave lithotripsy (ESWL), a non-surgical procedure, can be used to break stones in the urinary tract or kidney stones. By using the principles of medical physics to locate kidney stones and the concepts of biophysics to carry out the therapeutic process, ESWL is categorized as theranostics in its ap-

Application of Ultrasound in the Clinical Practice of Primary Health Care. Will Ultrasound Replace the Stethoscope?

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The letter to the editor was created in response to an article published in The New Yorker magazine entitled "Could Ultrasound Replace the Stethoscope?" (1). In clinical practice, ultrasound is widespread in almost all medical specialities. After numerous studies on the benefits of ultrasound diagnostics (US), the indications for ultrasound were expanded, and intensive training of doctors of all specialities was started. At the beginning of this year, the book "Atlas of abdominal ultrasound diagnostics" was published by prof Slavica Beneš-Mirič, which can be very useful to all specialists, especially doctors in primary health care. The improved technical capabilities of US and research from practice have shown that ultrasonography can have significant advantages, but only in combination with all physical methods of patient examination.

There were controversies about the value of ultrasound at the primary health care level since, initially, ultrasonography was reserved for secondary and tertiary levels of health care. Research, practice and education are tightly connected, so there is evidence of the great advantage of the simultaneous application of all methods of physical examination and US.

The use of US in medicine began during World War II. Although there are data on the use of the US in medicine in an earlier period (USA and Japan), Professor Ian Donald from Glasgow (1956) is considered to pioneer the practical use of US in medical practice.

From the middle of the 50s, continuous and vigorous technical training began, along with equipment and intensive application of this imaging method in practice with appropriate educational courses.

Postgraduate courses in ultrasound diagnostics in Bosnia and Herzegovina began in 1998. Most of the participants of this course were primary health care physicians.

Up to 2016, 40 courses were held with 479 participants. The participants were doctors of various specialities, of which there were 16 paediatricians and 40 emergency physicians. The participants were from 35 cities throughout Bosnia and Herzegovina. In addition to abdominal US courses, 20 breast, small organ and echocardiography courses were held with 153 participants.

The importance of ultrasonography was quickly realized in emergency medicine. The term emergency US was introduced in 1997 by the American college of emergency physicians (ACEP).

An emergency physician performs ultrasonography at the patient's bedside to answer clinically focused ques-

Figure 1. Participants of the first diagnostic sonographycourse in Bosnia and Herzegovina

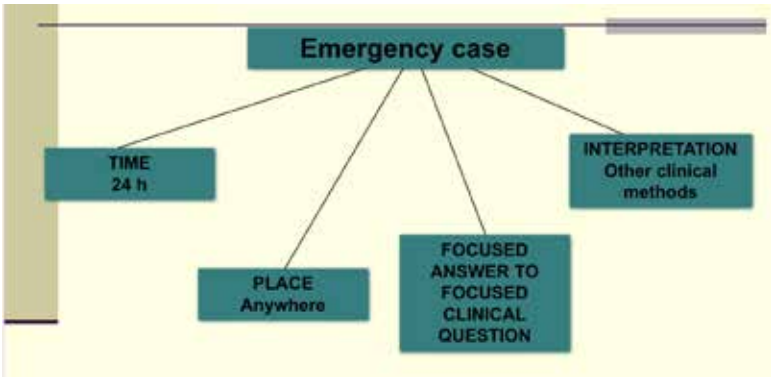

Figure 2. Emergency ultrasonography in primary healthcare