ABSTRACT BOOK

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Editorial

This supplement issue of Applied Medical Informatics is dedicated to the 37th Conference of the Romanian Society of Medical Informatics (SRIM – Societatea Română de Informatică Medicală) organized in association with the West University of Timişoara, Politehnica University of Timişoara and "Victor Babeş" University of Medicine and Pharmacy. The RoMedINF 2023 conference is a hybrid conference (Timişoara and online) held on 14 and 15 September 2023.

The RoMedINF 2023 conference covers various topics, including but not limited to healthcare ecosystems; telemedicine, tele-assistance, and telemonitoring; mHealth; eHealth; virtual reality; digital/virtual twins; computational models; statistical modeling; artificial intelligence; virtual clinical trials; decision support systems; nursing health informatics; medical engineering; healthcare monitoring; algorithms evaluation; wearables; sensors; medical devices; data security; data sharing; ethics; medical informatics training; continuing education etc.

Scientific contributions and technical solutions are presented in an interdisciplinary program that gathers experts and researchers from medicine, computer science, engineering, nursing, mathematics, dentistry, pharmacy, and other disciplines.

"Healthcare Green Digital Ecosystems: From Data Analysis to Digital Twin" put healthcare in the context of reducing the human effects on the environment and maximizing the use of computers in medical care. Integrating personal data in medical decisions by developing, validating, and using digital twins is expected to revolutionize diagnosis, treatment, and healthcare.

A healthcare green digital ecosystem integrates the power of data analytics, artificial intelligence, and digital technologies to optimize patient care delivery. Data analysis plays a pivotal role in this ecosystem by allowing healthcare providers to gain insights into patient health trends, treatment efficacy and effectiveness, and healthcare efficiencies. The actionable insights derived from vast individual (health) data enable informed decision-making and personalized patient care. The integration of all individual data in a digital twin, a virtual replica of a physical subject, will allow us to virtually test the efficiency of a specific diagnostic method or treatment and to identify those diagnostic and therapeutical methods that better fit the individual. Virtual twin models are expected to enable healthcare professionals to simulate and optimize processes, predict patient outcomes, and test innovative treatments in a risk-free environment. By tuning healthcare operations and treatment plans through digital twins based on individual data-driven, unnecessary procedures will be reduced, possible ineffective therapeutic interventions will be avoided, administrative overhead can be minimized, and healthcare costs can be reduced.

This special issue presents several methods, technical solutions, validations, and applicability towards new emerging technologies in healthcare as examples of good practice in healthcare digitalization.

Sorana D. BOLBOACĂ, Prof. Dr., M.Sc., M.D.
RoMedINF 2023, Scientific Program Chair
Applied Medical Informatics, Executive Editor

How to Make European BMHI Education F.A.I.R.

Alfred WINTER *

Leipzig University, Institute of Medical Informatics, Statistics and Epidemiology, Leipzig, Germany
E-mail: alfred.winter@imise.uni-leipzig.de

* Author to whom correspondence should be addressed; Tel.: +49 341 9716107

Abstract
Experts in biomedical and health informatics (BMHI) are desperately sought throughout Europe. In Germany, for example, the shortage of young professionals is currently being drastically exacerbated by major government projects (Medical Informatics Initiative) and funding for the digitalization of medicine. To train the next generation, there are numerous study programs in Europe at bachelor, master and doctoral level, some of which have been compiled in a database by the European Federation for Medical Informatics (EFMI); four new BMHI study programs in Austria, Montenegro, Portugal and the UK have been accredited by the EFMI[1]. In principle, the EU's Bologna regulations support the mobility of students across the EU, both to gain experience abroad and to take advantage of educational opportunities that are useful and necessary to achieve one's career goals. However, it is a challenge to find the programs that match the individual career and learning goals of (prospective) students in the Europe-wide offer of study programs and courses. Similar to the FAIR principles for data sharing, it is also necessary that educational offers are (F) findable, but also (A) accessible, (I) interoperable and (R) reusable. Own projects that use ontologies to ensure clear terminology in BMHI (SNIK[2], HITO[3]) and can provide catalogues of learning objectives (HI-LONa[4]), activities of professional societies such as the German GMDS to define catalogues of learning objectives in all areas of BMHI[5], international and Romanian projects for a Medical Informatics and Digital Health Multilingual Ontology (MIMO)[6], the EU project HosmartAI[7] in which EFMI promotes education and FAIRness, and the EFMI Accreditation and Certification Committee contribute in different ways to FAIRness in educational offerings. However, further efforts are needed to achieve real FAIRness in BMHI training provision, which EFMI is well placed to coordinate.

Keywords: Education; Biomedical and health informatics; FAIR principles; Learning objectives

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International Recommendations on Education in Biomedical and Health Informatics – An Overview

John MANTAS*

Health Informatics Lab, National and Kapodistian University of Athens, Papadiamantopoulou 123, Athens, Greece
E-mail: jmantas@nurs.uoa.gr

* Author to whom correspondence should be addressed

Abstract
The educational recommendations aim is to provide a tool for academic program evaluators to compare and accredit the quality of delivered programs; support educators in developing BMHI (Biomedical and Health Informatics) curricula at various educational levels; identify essential skills and competencies for healthcare professionals and those working in the field of BMHI certification; and encourage institutions, organizations, and health authorities to recognize the need for establishing and further developing BMHI educational programs.
A brief presentation outlining the most recent updated version of the recommendations—which are offered for courses and course tracks in BMHI as part of educational programs in biomedical and health sciences, health information management, and informatics/computer science, as well as for dedicated programs in BMHI (leading to bachelor's, master's, or doctoral degrees)—follows a brief history of the IMIA Educational activities and its support in developing the recommendations.
The six domain areas of BMHI fundamental principles, health sciences and services, computer, data, and information sciences, social and behavioral sciences, management science, and BMHI specialization are used to characterize the educational requirements for the roles of BMHI user, BMHI generalist, and BMHI specialist. Additionally, suggestions are made for doctorate, master's, and bachelor's degree-level BMHI-focused educational programs. These are the BMHI's main academic offerings.
Furthermore, suggestions for protocols related to certification, accreditation, and continuing education are given. The IMIA recommendations center on the educational needs for the healthcare workforce, computer scientists, and decision makers to acquire BMHI knowledge and skills at various levels. These recommendations reflect societal changes related to globalization, digitalization, and digital transformation in general and in healthcare specifically. Finally, a brief explanation of the accrediting quality control procedure will be provided.

Keywords: Biomedical informatics; Education; Health informatics; Medical informatics; Recommendations; Training

European Federation of Medical Informatics Participation in European Projects – HosmartAI Project as an Experience

Lăcrămioara STOICU-TIVADAR*, John MANTAS, Mihaela CRIŞAN-VIDA, Patrick WEBER, Thomas DESERNO, Jaime DELGADO, Carlos PARRA-CALDERON, Alfred WINTER, and Arriel BENIS

EFMI-European Federation for Medical Informatics, Le Mont-sur-Lausanne, Lausanne, Switzerland
E-mail: (*) lacrist.efmi@gmail.com

* Author to whom correspondence should be addressed;

Abstract
The European Federation for Medical Informatics Association (EFMI) is the leading organisation in medical informatics in Europe and represents 29 countries, RSMI being an active and valuable member. EFMI is organized as a nonprofit organisation concerned with the theory and practice of Information Science and Technology within Health and Health Science in a European context. The objectives when founded in 1976 were: to advance international cooperation and dissemination of information in Medical Informatics on a European basis; to promote high standards in the application of medical informatics; to promote research and development in medical informatics; to encourage high standards in education in medical informatics; to function as the autonomous European Regional Council of IMIA. Since 2018 EFMI participates actively in European financed projects contributing with its members' expertise in dissemination, education, data processing, user experience, and several other domains. HosmartAI (2020-2024) is a H2020 project with 24 partners, 12 EU countries, 10 mil Euros funding. In the HosmartAI project – AI for the Smart Hospital of the future - EFMI is leading in WP6 the T6.3 task - Standardization and Legislation, T6.4 task - Certification, Staff training & education and alignment with existing practice and had a consistent contribution in WP2 with EFMI MIMO tool. The EFMI team will present the solutions developed during the project and invite audience to give feedback.

Keywords: European Union (EU) projects; eHealth; Artificial Intelligence (AI); User experience

Artificial Intelligence Governance in the Age of Generative AI

Florin MANAILA *

IBM Deutschland GmbH, Germany
E-mail: florin.manaila@de.ibm.com

* Author to whom correspondence should be addressed;

Abstract
In session, we will discuss several obstacles that must be tackled to guarantee the responsible and ethical utilization of Generative AI (Artificial Intelligence). It is vital to confront biases present in both input data and model responses to achieve fair and ethical results. As Large Language Models (LLMs) become increasingly integrated into our society, it becomes imperative to thoroughly examine and comprehend their wider effects on aspects such as employment, education, and human creativity. During the session we will provide a live DEMO with related implications in Governance AI.

Keywords: Generative; Artificial Intelligence (AI); Large Language Models (LLMs); Governance; Responsible

Meaning by Courtesy: LLM-Generated Texts and the Illusion of Content

Gary OSTERTAG*

Department of Medical Education, Icahn School of Medicine at Mount Sinai, New York, NY, USA
Department of Philosophy, Graduate Center, CUNY, New York, NY, USA
E-mail: gary.ostertag@mssm.edu

* Author to whom correspondence should be addressed;

Abstract
Recently, Mann et al.[1] proposed the use of "personalized" Large Language Models (LLMs) to create professional-grade academic writing. Their model, AUTOGEN, is first trained on a standard corpus and then "fine-tuned" by further training on the academic writings of a small cohort of authors. The resulting LLMs outperform the GPT-3 base model, producing text that rivals expert-written text in readability and coherence. With judicious prompting, such LLMs have the capacity to generate academic papers. Mann et al. even go so far as to claim that these LLMs can "enhance" academic prose and be useful in "idea generation"[1]. I argue that these bold claims cannot be correct. While we can grant that the sample texts appear coherent and may seem to contain "new ideas", any appearance of coherence or novelty is solely "in the eye of the beholder" (Bender et al.[2]). Since the generated text is not produced by an agent with communicative intentions (Grice 1957[3]) our ordinary notions of interpretation – and, derivatively, of such notions as coherence – break down. As readers, we proceed with the default assumption that a text has been produced in good faith, naturally trusting what it says to be true (absent indications to the contrary) and expecting these truths to form a coherent whole. But this default assumption is misplaced in generated texts and, if unchecked, will allow both falsehoods and inconsistencies to pass under our radar. Whatever one thinks of the use of LLMs to help create content for commercial publications, their use in generating articles for publication in scientific journals should raise alarms.

Keywords: Personalized large language model (PLLM); Machine learning (ML); Communicative intention; Encapsulation

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Wearable Technology for the Validation of Surgical Systems and Surgical Assistance

Juan A. SÁNCHEZ-MARGALLO[a,*] and Francisco M. SÁNCHEZ-MARGALLO[b]

[a] Bioengineering and Health Technologies Unit, Jesús Usón Minimally Invasive Surgery Centre and Address, Carretera N-521, km. 41,8. 10071, Cáceres, Spain
[b] Scientific Direction, Jesús Usón Minimally Invasive Surgery Centre and Address, Carretera N-521, km. 41,8. 10071, Cáceres, Spain
E-mails: jasanchez@ccmijesususon.com; msanchez@ccmijesususon.com

* Author to whom correspondence should be addressed; Tel.: (+34) 699 505 095

Abstract
Advances in sensors, internet of things and artificial intelligence are allowing wearable technology to constantly evolve, making it possible to have increasingly compact and versatile devices with clinically relevant and promising functionalities in the field of surgery. In this sense, wearable technology has been used in various fields of clinical and preclinical application such as the evaluation of the surgeon's ergonomic conditions, the interaction with the patient or the quality of the intervention, as well as surgical planning and assistance during the intervention. In this work we will present different types of wearable technologies for their application in the validation of surgical devices in minimally invasive surgery, and their application in assisting the surgical process. Within these technologies we will show electrodermal activity and electrocardiography devices to monitor the surgeon's physiological state, and electromyography and motion analysis systems to study his/her ergonomics during the surgical practice. Apart from these systems, the introduction of extended reality technology (virtual, augmented, and mixed reality) has fostered the emergence of new immersive and interactive tools to assist in the planning of complex surgical procedures, surgical support and telementoring. As we can see, the application of wearable technology has a high impact on the validation of surgical systems in minimally invasive surgery, including laparoscopic surgery, microsurgery, and surgical robotics, as well as in the assistance of the surgical process, with the consequent benefit in the quality of patient care.

Keywords: Wearable; Minimally Invasive Surgery; Ergonomics; Surgical Assistance; Augmented Reality

Patient-Centric Decentralized Applications for Secure Personalized Medicine

Ana BALAN

RomSoft SRL, Chimiei 2 bis, Iaşi, Romania
E-mail: bam@rms.ro

* Author to whom correspondence should be addressed; Tel.: +40 799 881 171

Abstract
The evolution of technology research has yielded solutions that resolve the longstanding challenge of sharing sensitive medical data while ensuring data security and privacy. Blockchain-based technologies, particularly openDSU, play a pivotal role by enhancing transparency and security in transmitting confidential information. These innovations transcend traditional data-sharing barriers, achieving a harmonious balance between secure transmission and privacy. A noteworthy manifestation of this evolution is the PL project—a groundbreaking initiative that harnesses openDSU to develop a suite of decentralized applications (DApps). These DApps prove instrumental in simplifying the management of patient consent within clinical trials and facilitating the seamless exchange of medical data for diverse research endeavors. By streamlining consent processes and securely orchestrating data sharing, these applications underscore the potential of blockchain to revolutionize medical research methodologies.
The integration of Internet of Things (IoT)-type devices further amplifies the transformative impact of these advancements. These interconnected devices bring forth an era of personalized medicine automation, where real-time patient data can be harnessed to inform tailored treatment strategies. This convergence heralds an era of precision medicine, where patient care is optimized through data-driven insights and interventions. A salient aspect of these novel solutions lies in their universal applicability. The systems and methodologies developed through the PL project can seamlessly integrate into any medical framework, offering a versatile blueprint for secure medical data sharing. The implications of this research are far-reaching, fostering collaborative research ecosystems, improving patient outcomes, and catalyzing advancements in medical science.

Keywords: Personalized medicine; Real-time electronic consenting; Advanced medicine; Confidential data; Secure sharing

3D Neuron Cluster Organoid – Artificial Intelligence using High-Speed Organic Neural Network

Cristian-Horia CONSTANTIN* and Marieta FURDUI

OncoGen - Genetical and Cellular Therapy for Cancer Treatments Research Center, Liviu Rebreanu Boulevard, no. 156, 300723 Timişoara, Romania
E-mails: crstian.constantin@oncogen.ro; marieta.furdui@oncogen.ro

* Author to whom correspondence should be addressed; Tel.: +40 724 589 122; +40 770 868 639

Abstract
Since the beginning of time, Humanity has relied on the careful analysis of nature to better understand the world around us. The same can be said of our current Bio-Technical Research Environment and our feeble Artificial Intelligence endeavors. We have always closely studied the biological world in order to find the best solutions and further develop technologies to help push the boundaries of medicine. In this regard, our Quantum Medicine department proposes the creation of a 3D human neuron cluster organoid that can be connected to and controlled using outside stimuli that rely on the visible light spectrum to encode and decode information directly. This process would imply the development of technologies for photonic encryption and decryption as well as low-current transformers to aid in neuron signal decoding and recoding. The scope of the project is to start using the neuron organoid as a biological neural net and observe the speed at which it learns and outputs solutions compared to traditional software Neural Networks. Our goal is to try and figure out the possibility of creating faster learning models and testing the actual speed of their learning capability, which would bring us closer to understanding the way information is structured and shared between different parts of the brain. In turn, this has the potential to yield a new type of artificial intelligence biohardware based on low power consumption that could aid in the future development of smart biotech and nano-biorobotics with fast AI systems. In conclusion, the aim of this project is to prove the programmability and learning capabilities of a 3-dimensional bio-neural-network organoid by using different data transmission mediums and new algorithms. Our common goal is the advancement of biomedical research to aid in humanity's medical and otherworldly endeavors and be the perfect launch platform for generations to come.

Keywords: Machine Learning; Deep Learning; Neural Analysis; Neurons; Organoid

Artificial Intelligence for Interpreting Medical Tests

Marina-Claudia-Cătălina MIRON

Center for Gene and Cellular Therapies in the Treatment of Cancer Timişoara-OncoGen, Liviu Rebreanu Bvd., no. 156, 300723 Timişoara, Romania
E-mail: marina.miron1309@gmail.com

* Author to whom correspondence should be addressed; Tel.: +40 747 855 931

Abstract
With the rapid development of technology, artificial intelligence (AI) has evolved over the past few years and has become increasingly present in the medical field. Recently, AI technology has been used for appointment scheduling, patient monitoring, and medical chatbots. We intend to develop software that will help people and doctors understand medical test results, such as blood tests and biopsies, more quickly and easily. By using optical character recognition (OCR) and a specially trained neural network, the software will be able to extract data from a document or image of the medical test results and predict a possible diagnosis. Our goal is to create an AI interpreter that uses easy-to-understand language. The interpreting software is intended to work as a telemedicine tool by connecting the patient and the doctor. We aim to create a digital method by which patients can upload results and communicate with their family doctor or specialists without the need to travel to the doctor's office. We will assure the patient's confidentiality by not sending their personal data along with the interpretation; instead, the doctor will receive only the patient's ID. In conclusion, the AI software we will develop will make medical test result interpretation simpler and more accessible for people without a family doctor in their area.

Keywords: Diagnostic test; Doctor; Software; AI (Artificial Intelligence)

Personalized Rehabilitation Programs: Tailoring Recovery Through Artificial Intelligence

Raul-Mihai RĂDULESCU

OncoGen - Genetical and Cellular Therapy for Cancer Treatments Research Center, Liviu Rebreanu Blvd, no. 156, 300723 Timişoara, Romania
E-mail: radraul22@yahoo.com

* Author to whom correspondence should be addressed; Tel.: +40 768 737 531

Abstract
In the healthcare sector, the rehabilitation landscape is undergoing a shift towards personalisation, driven by the integration of artificial intelligence (AI). Traditional rehabilitation methods often use a one-size-fits-all approach that does not best meet the individual needs and progress of each patient. This synthesis explores personalised rehabilitation programmes, in which AI plays a key role in creating personalised recovery pathways for patients. The role of AI in personalised rehabilitation revolves around analysing patient data, including medical history, physical assessments, and real-time progress monitoring. Based on this data, AI algorithms can design personalised rehabilitation plans, tailoring exercise routines and intensity levels to each patient's individual physical condition and recovery rate. The concept goes beyond simple algorithmic calculations. Using AI-based virtual rehabilitation assistants, patients receive real-time guidance and feedback during exercise sessions. The virtual assistants not only ensure the correct execution of exercises but also adapt treatments to the patient's immediate progress. The result is a dynamic and adaptive rehabilitation experience that minimises the risk of fatigue and increases engagement. The benefits of personalised rehabilitation programmes are manifold. Patients recover faster and reduce the likelihood of injury. The synthesis also illustrates real-life cases where artificial intelligence-assisted platforms have achieved remarkable success, highlighting the potential of this approach. Looking into the future, real-time wearable monitoring devices and the prospect of telerehabilitation offer exciting possibilities. However, ethical considerations of privacy and consent remain paramount and require transparency in the use of patient data. In conclusion, using artificial intelligence in personalised rehabilitation represents an innovative approach to recovery. By harnessing the analytical capabilities of AI, healthcare professionals can design rehabilitation programmes that can accelerate recovery and also prioritise patient wellbeing through personalised interventions. This synthesis invites exploration of the transformative process of personalised rehabilitation programmes and paves the way for a patient-centred approach to rehabilitation.

Keywords: Personalised rehabilitation; Artificial Intelligence; Tailored recovery; Dynamic adaptation

Artificial Intelligent Model for Parkinson's Disease Management

Radu - Constantin FLEŞAR[a,*], Sebastian - Aurelian ŞTEFĂNIGĂ[a], Paul FARAGO[b], and Robert Radu ILEŞAN[c,d]

[a] Computer Science Department, West University of Timişoara, Timişoara, 300223, Romania
[b] Bases of Electronics Department, Faculty of Electronics, Telecommunications and Information Technology, Technical University of Cluj-Napoca, 400114 Cluj-Napoca, Romania
[c] Department of Neurology and Pediatric Neurology, Faculty of Medicine, University of Medicine and Pharmacy "Iuliu Haţtieganu" Cluj-Napoca, 400012 Cluj-Napoca, Romania
[d] Clinic of Oral and Cranio-Maxillofacial Surgery, University Hospital Basel, CH-4031 Basel, Switzerland
E-mails: radu.flesar02@e-uvt.ro; sebastian.stefaniga@e-uvt.ro; paul.farago@bel.utcluj.ro; robert.ilesan@unibas.ch

* Author to whom correspondence should be addressed; Tel.: +40 737 552 825

Abstract
Parkinson's disease (PD) is a chronic, progressive neurodegenerative disease characterized by both motor and non-motor features. The disease has a significant clinical impact on patients, families, and caregivers through its progressive degenerative effects on mobility and muscle control. Therefore, it is important to discuss the early diagnosis of PD to control the disease of PD patients and prolong their life. The primary objective of our research work was the early diagnosis of patients using Artificial Intelligence (AI). To accomplish that, we developed an Artificial Intelligence Model (model) that diagnoses PD using data collected from patient's walks. This model is represented by a CNN (Convolutional Neural Network) that finds patterns of Parkinson's disease in the collected data. The data is represented by multiple images (correlation plots) that are generated from raw data collected using a physiograph created by our team. For the model training, we used data from twelve patients and three healthy people that proved the accuracy of our model. To achieve better results from our AI model, we decided to augment our data by using a Generative Adversarial Network (GAN) that we modeled to generate images containing biomechanical information that represents healthy and patient patterns of Parkinson's disease. After many hours of training and a series of changes applied to the model architecture, the GAN model demonstrated remarkable advancements in its ability to generate high-quality images that are very similar to the real data collected by us from our study group and generates real patterns of Parkinson's disease represented in the images. The faithful replication of the correlations matrices by our GAN model helps our classification model to learn the Parkinson's disease symptoms and patterns represented in the correlation matrices we generated. In the future, we want to increase the complexity of the GAN model and train it to generate specific patterns of Parkinson's disease based on different inputs, to have a more complex generated dataset that will help us to develop future models.

Keywords: Convolutional Neural Network; Parkinson's disease; Generative Adversarial Networks; Artificial Intelligence; Anomaly Detection; Biomedical monitoring

X-Ray Image Classification Methods using Artificial Intelligence Techniques

Beatrice-Mihaela ZÎMPĂU-VALAH[a,*], Sebastian-Aurelian ŞTEFĂNIGĂ[a], Todor IVAŞCU[a], and Raluca DĂNCIULESCU[b]

[a] Computer Science Department, West University of Timişoara, 300223 Timişoara, Romania
[b] Doctoral School, University of Medicine and Pharmacy Craiova, 200349 Craiova, Romania
E-mails: beatrice.zimpau01@e-uvt.ro; sebastian.stefaniga@e-uvt.ro; todor.ivascu@e-uvt.ro; ralucadanciulescu@yahoo.com

* Author to whom correspondence should be addressed; Tel.: +40 720 125 700

Abstract
This paper aims at providing a possible solution to the problem posed by the lack of automation in classifying X-Ray images taken in hospitals. Daily, all over the world, a tremendous number of digital X-Ray images are taken. Currently, there is a need for specialized medical staff to classify various such images. This process takes time, and some situations need immediate intervention, making it crucial that this procedure takes as little as possible. Besides the need for a prompt intervention, the accuracy of the diagnosis is paramount. Several hospital X-Ray datasets pose a major problem, consisting of inaccurately populated datasets. This happens when a patient has multiple scans scheduled in the same day, each focusing on a different body area. In numerous cases, they are classified as a single entry, resulting in datasets being populated with images of wrong body parts or containing several empty files. A tremendous amount of time and effort would be needed to get the datasets to a usable state for high-level studies, with specialized staff having to reorganize them manually. For this exact reason, the introduction of such a classification algorithm could possibly create a major breakthrough in the domain of medical imaging with the use of artificial intelligence and machine learning in the medical field.

Keywords: X-Ray body part classification; Machine learning; Neural networks; Medical imaging

Health Information Safety and Security: Threats and Solutions

Samson Olusola ADEGOKE[a,*], Success OSHODIN[b], Muyiwa Raphael AGBAJE MCTHOMNAS[a], and Agboola Alade AKINTOLA[b]

[a] Sodun Hospital, 12 Odinjo 9V7J+QJC, 200273, Ibadan, 110115, Nigeria
[b] Bisi Medical Hospital, 65RQ+H5M Odole Street Akure, 340106, Nigeria
E-mails: Medical.director@sodun-hospital.com.ng, office@bisi-medclinic.com.ng, agbaje@sodun-hospital.com.ng, manager@bis-medclinic.com.ng

* Author to whom correspondence should be addressed; Tel.: +2349075706229

Abstract
Patient safety is a subset of healthcare and is defined as the avoidance, prevention, and amelioration of adverse outcomes or injuries stemming from the process of health care. There is a vital role of Information communication technology (ICT) in Healthcare providers. Health information technology presents numerous opportunities, including reducing human errors, improving clinical outcomes, facilitating care coordination, improving practice efficiencies, and tracking data over time. This research was conducted to identify the threats in Healthcare Information Systems (HIS). The study was conducted in three different departments namely, Information Technology Department (ITD), Medical Record Department (MRD) and X-Ray Department, in two of the leading government-supported hospitals in Nigeria. The data were collected using in-depth structured interviews. The study identified 5 types of major threat. The result shows the most critical threat is data security (data theft). Another threat is human/user error. Hackers and the rise of "Hacketivism" is another challenge facing the Healthcare Information System across the globe. More so, outdated technology in hospitals is also a challenge that needs to be addressed. Another threat is the disclosure of patient's information or private data. Power failure is also a threat as well. There are solutions to curb the threats posed against Healthcare Information Systems. Developing models, methods, and tools to enable risk assessment is very important. Developing standard user interface design features and functions and ensuring software safety in an interfaced, network-enabled clinical environment. Developing real-time methods to enable automated surveillance and monitoring of system performance and safety. Establishing the cultural and legal framework/safe harbor to allow sharing of information about amongst others.

Keywords: Patient safety; Healthcare provider; Healthcare information technology; Privacy

Efficiency of Mobile Applications for Diet Monitoring in Weight Loss: A Cross-Sectional Study

Darius DÎRPEŞ*, Sergiu URSACHE, and Mirela FRANDEŞ

"Victor Babeş" University of Medicine and Pharmacy, Timişoara, 2 Eftimie Murgu, 300041 Timişoara, Romania
E-mails: dariusdirpes@gmail.com; ursachesergiu@gmail.com; mirela.frandes@umft.ro

* Author to whom correspondence should be addressed

Abstract

Background and Aim: The increasingly advanced evolution of technology has allowed research that aims to observe very carefully the level of satisfaction of people who use mobile applications for monitoring the consumed calories. Certain people were tracked to see the evolution of weight loss and weight gain using their smartphones. The aim of this study was to present how artificial intelligence can help people with basic medical advice. *Materials and Methods:* The study was conducted online in 2023. To achieve the results, the questionnaire technique was used, being one of the most important tools used in market research, having several advantages compared to other types of similar studies. A sample of 100 people, 50 men and 50 women, aged between 18 and 50 years old, agreed to participate to the study. *Results:* The mobile applications serve as a diet and exercise tracker with the objective of helping to set weight gain or loss goals, counting calories, keeping a food diary. It also tracks carbohydrates, proteins, fats, vitamins and minerals, being able to establish specific diets, such as keto or vegan. It has the role of serving as a mini personal trainer that a person can have at any time of the day. It provides nutritional information of the products consumed that can appear with a simple scan of the barcodes. The applications were predominantly used by adults up to 35 years old, with a higher educational level. People usually spend around 10 minutes a day with it. BMI values have a tendency to be normal or increased. The desired weekly caloric deficit varies between 2000-4000 calories and up to 96% from the participants see a full or partial correlation regarding caloric deficit and intended weight. These applications are easy to use and free or very cheap in the case of certain premium features, it provides daily access to calories consumed, constant notifications to achieve goals and keep motivation. Otherwise, the intervention of a specialized nutritionist may be necessary in special situations to assure if a person has set the goals properly for his state of health. As well, the elderly tends not to be able to use technology so easily. *Conclusions:* The results showed that mobile applications help people to have more balanced diets by monitoring their ingested calories. It helps to maintain motivation and preserve progress and there is a certain tendency to be used especially by people who want to lose weight compared to those who want to gain weight, although it can also be used to increase muscle mass. The questioned people were found to be more confident by improving their self-esteem.

Keywords: mHealth; Self-monitoring; Diet; Nutrition; Obesity; Questionnaire; Cross-sectional study

Digital Technology Supporting Children's Speech Therapy

Mihaela CRIŞAN-VIDA[a,*], Lăcrămioara STOICU-TIVADAR[a], Bogdana VIRAG[b], and Tiberiu DUGHI[b]

[a] Faculty of Automation and Computers, Politehnica University Timişoara, Vasile Parvan Blvd., no. 2, 300223 Timişoara, Romania
[b] Faculty of Educational Sciences, Psychology and Social Work, Aurel Vlaicu University of Arad, Elena Drăgoi Str., no. 2-4, 310330 Arad, Romania
E-mails: mihaela.vida@upt.ro; lacramioara.stoicu-tivadar@upt.ro; alevirag@gmail.com; tibi_dughi@yahoo.com

* Author to whom correspondence should be addressed;

Abstract
Considering that all children are attracted to technology and spend a lot of time using digital technology, it would be advisable to use IT support for education and/or therapy. The advantage is that the speech therapist may start with face-to-face therapy sessions and ensure continuity remotely from home in a familiar and comfortable environment. Language gives the child autonomy and the possibility to socialize better. Acquiring from the preschool age the ability to communicate with persons around her/him, to express thoughts, ideas, and impressions, the child forms a basis for school activity and for later social life. In the instructional-educational process, language represents a fundamental mean of communication, but also an important mean of facilitating knowledge. Through knowledge, the children's horizons are broadened with new representations. This work presents the professional evaluation of 10 speech therapists and the perception from 60 parents with children participating in speech therapy using an application to improve the language behavior of children with speech disorder. The results of the interviews show that speech therapists are open to use digital applications as a tool in speech therapy. Using this type of tool in speech therapy engages the children more in the activity. The interview results show that 88.3% of parents agree to use digital apps at home, between face to face speech therapy sessions coordinated by speech therapist, and 75% of parents agree to use them several days a week. 68.3% of parents believe that digital applications would increase children's motivation and commitment to speech therapy. Almost forty-seven parents take into consideration interactive apps, instructional videos, educational games and digital books as useful digital resources: 21.7% prefer educational games, 16.7% interactive apps, 8.3% instructional videos and 6.7% digital books. Using these types of applications may provide multiple benefits for children and speech therapists, having a high degree of customization to children's specific needs.

Keywords: Digital technology; Children; Education; Application; Speech disorder

Natural Language Processing Techniques and FAIR Principles for Assisting Drug Prescription

Oana Sorina CHIRILĂ* and Lăcrămioara STOICU-TIVADAR

Faculty of Automation and Computers, University Politehnica Timişoara, Vasile Parvan Blvd., no. 2, 300223 Timişoara, Romania
E-mails: oana.chirila@aut.upt.ro; lacramioara.stoicu-tivadar@aut.upt.ro

* Author to whom correspondence should be addressed

Abstract
Prescribing medicines for certain illnesses as correctly as possible is a challenge for all doctors and healthcare providers worldwide, and a big problem for the inexperienced ones. In this age of technology, we are confronted with a great deal of medical information from different sources. For physicians to have access to this ocean of information, structuring and compaction is needed. Many papers in the scientific literature propose the structuring and use of medical information from clinical texts or other sources. We want to develop a medical information system that extracts specific drug information from Romanian pill leaflets. We intend to create a structured database and raise the interoperability degree for the system to communicate with other medical applications. First, we collect as much information as possible about Romanian drugs from different free online sources, from the leaflets of medicines in Romanian from ANMDMR - Nomenclature of medicines for human use and from scientific publications. We clean and structure the collected data by using machine learning techniques, especially natural language processing techniques. Next, we create ontologies and a complex database with the drug information's and relationships between the information extracted about drugs (indications, contraindications, dosage according to age, side effects, etc.), and finally, we develop an application respecting the FAIR (Findability, Accessibility, Interoperability, and Reusability) principles that have as inputs the profile of a patient, and as outputs the drugs indicated for certain diseases, an explainable module for the drugs selected for physicians and an adverse drug reaction adding module. From the clinical perspective, this application will help improve the quality of prescriptions and provide a better knowledge database that can help physicians avoid prescription errors.

Keywords: Prescriptions; Natural language processing (NLP); Machine learning; Leaflets

Hand Gesture Interaction in Medicine

Stelian NICOLA* and Lăcrămioara STOICU-TIVADAR

Faculty of Automation and Computers, Politehnica University Timişoara, Vasile Parvan Blvd., no. 2, 300223 Timişoara, Romania
E-mails: stelian.nicola@aut.upt.ro; lacramioara.stoicu-tivadar@aut.upt.ro

* Author to whom correspondence should be addressed;

Abstract
Nowadays, fields that employ gestures in the execution of certain procedures or actions include the medical field (surgical procedures, recovery, training) and engineering (IT, mechanics, robotics – controlling a robotic arm). Research has been conducted in the medical field (surgeons) to observe their main actions during a procedure. It is vital in this domain to implement gestures in the execution of specific procedures to ease the workload of surgeons. Certain actions that can be replaced by gestures lend themselves to be addressed. An example of interaction between a surgeon and a computer is the selection of an area in an image. The most commonly used device for capturing/processing gestures is the Leap Motion sensor. With its help, dynamic gestures can be created and then used in controlling interfaces or rehabilitating hand mobility. Among the most commonly used gestures in hand mobility rehabilitation are pronation and supination gestures, hand/finger flexion and extension gestures, and hand rotation gestures. Accurately and precisely capturing gestures created for this device is a challenge. Gesture processing can be done either through mathematical formulas, such as distance calculations between fingers and the palm center, hand rotation angles, finger surfaces, and directions. Another method involves the use of neural networks in classifying created gestures. Among the most commonly used classifiers for dynamic gestures are K-neighbors Classifier, Linear Discriminant Analysis, and Decision Tree Classifier. This paper will emphasize the importance of using gestures in the medical field and capturing them with high precision for the Leap Motion device.

Keywords: Gesture; Leap Motion; Hand Recovery; Neural Network

Mobile Application for Inflammatory Bowel Disease Monitoring: A Romanian Perspective

Mircea-Sebastian ŞERBĂNESCU[a,*], Dan-Ionuţ GHEONEA[b], Costin-Teodor STREBA[b], Carmen-Nicoleta OANCEA[b], Mihai Victor SACERDOTIANU[b], and Răzvan-Cristian STATIE[b]

[a] Department of Medical Informatics and Biostatistics, University of Medicine and Pharmacy of Craiova, Petru Rareş Str., no. 2, 200349 Craiova, Romania
[b] Center for Inflammatory Bowel Disease, University of Medicine and Pharmacy of Craiova, 1 Mai Bvd., no. 66, 200349 Craiova, Romania
E-mail(*): mircea_serbanescu@yahoo.com

* Author to whom correspondence should be addressed; Tel.: +40 745 766 610

Abstract
Inflammatory Bowel Disease (IBD) encompasses a cluster of chronic inflammatory disorders affecting the gastrointestinal tract. The primary objective of IBD treatment is the management of inflammation, symptom control, and the induction and sustenance of remission. Therapeutic interventions commonly encompass medications, dietary modifications, and, in certain instances, surgical procedures; however, a definitive cure remains elusive. While several nations have established national IBD registries, Romania has not. The responsibility of the implementation of such a registry was assumed by a non-profit organization, the "Clubul Român de Boală Crohn şi Colită Ulcerativă", resulting in the creation of the registrul-ibd.ro platform. Given the absence of a curative remedy for IBD, it falls within the realm of personalized medicine. In light of this, the University of Medicine and Pharmacy of Craiova has developed a mobile application, IBDMonitor, intricately linked with the IBD registry. This innovative application empowers patients to meticulously record critical data, encompassing medication administration, symptomatology, lifestyle habits, as well as physiological, pathological, and daily occurrences. Medical professionals are granted real-time access to these patient-generated reports, enabling them to make prompt treatment adjustments. Following a successful pilot phase, various insights have emerged, notably revealing a relatively low long-term adherence rate to the application. Consequently, advocating for the widespread adoption of both the application and the registry on a national scale holds the potential to significantly enhance the utilization of these invaluable tools in the management of IBD.

Keywords: Mobile application; Inflammatory bowel disease (IBD); National registry; Personalized medicine

The Future of Critical Care: Innovations in Patient-Centered Technology

Corina VERNIC[a], Balázs CSUTAK[b], Ovidiu Horea BEDREAG[c], Sebastian-Aurelian ŞTEFĂNIGĂ[d], and Călin MUNTEAN[a,*]

[a] Department of Medical Informatics and Biostatistics, "Victor Babeş" University of Medicine and Pharmacy, Timişoara, Square Eftimie Murgu, no. 2, 300041 Timişoara, Romania
[b] Department of Anesthesia and Intensive Care, Emergency County Clinical Hospital "Pius Brînzeu" Timişoara, Liviu Rebreanu Blvd, no. 156, 300723 Timişoara, Romania
[c] Department of Anesthesia and Intensive Care, "Victor Babeş" University of Medicine and Pharmacy, Timişoara, Square Eftimie Murgu, no. 2, 300041 Timişoara, Romania
[d] Department of Computer Science, West University of Timişoara, 300223 Timişoara, Romania
E-mails: cvernic@umft.ro; csutakbalazs@yahoo.com; bedreag.ovidiu@umft.ro; sebastian.stefaniga@e-uvt.ro; cmuntean@umft.ro

* Author to whom correspondence should be addressed; Tel.: +40 726 707 113

Abstract
In the landscape of modern healthcare, the evolution of critical care has been marked by the integration of innovative technologies and the emergence of patient-centered approaches. This study aimed to explore the potential of Artificial Intelligence (AI) in shaping the future of critical care, using data collected from Centricity High Acuity data warehouse from the Anesthesia and Intensive Care Clinic and the operating theater from Emergency County Clinical Hospital "Pius Brînzeu" Timişoara. The existing healthcare landscape is characterized by the complex balance between technological advances and patient-centered care. The advent of AI presents an opportunity to revolutionize critical care, offering real-time insights and personalized interventions. This research seeks to harness the capabilities of AI to enhance patient outcomes in critical care scenarios. The study was conducted at a tertiary care hospital, using a mixed-methods approach that involved retrospective analysis of patient data from Centricity. The AI algorithms were trained on historical data to predict patient deterioration patterns, enabling timely interventions and proactive management. Results demonstrated that the integration of AI-driven insights from Centricity High Acuity data warehouse significantly improves patient outcomes. AI-assisted interventions led to reduced instances of adverse events, shorter lengths of stay, and improved resource utilization. The AI algorithms demonstrated high accuracy in predicting patient deterioration, enabling early interventions and preventing complications. In conclusion, the integration of AI technology using data from Centricity High Acuity data warehouse holds immense promise for the future of patient-centered critical care. The results indicate that AI-driven interventions can enhance patient outcomes, reduce healthcare costs, and improve resource utilization. As healthcare continues to embrace AI, the potential for transformative advancements in critical care is evident, paving the way for a new era of innovative and personalized patient-centered care.

Keywords: Centricity; Artificial Intelligence (AI); AI-driven intervention

The use of Mobile Applications in the Perioperative Management of Patients with Colorectal Cancer

Andra CIOCAN[a], Ariana-Anamaria CORDOŞ[b,*], Răzvan-Alexandru CIOCAN[c]

[a] Department of Surgery - Surgery III, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca, Croitorilor Str., no. 19–21, 400162 Cluj-Napoca, Romania
[b] Romanian Society of Medical Informatics, 300041 Timişoara, Romania
[c] Department of Surgery - Practical Abilities, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca, Marinescu Str., no. 23, 400337 Cluj-Napoca, Romania
E-mails: Andra.Ciocan@umfcluj.ro; Ariana.cordos@gmail.com; Razvan.Ciocan@umfcluj.ro

* Author to whom correspondence should be addressed; Tel.: +40 745 438 078

Abstract

Background and Aim: Colorectal cancer is the third most common cancer worldwide both in men and women. The scope of this systematic review was to investigate if mobile applications exists and what are the benefits in the screening, diagnostic, pre-operative preparation, or post-operative follow-ups on the patients with colorectal cancer. *Materials and Methods*: We used the frame of PRISMA guideline. On September 1th, 2023, we systematically searched PubMed using the MeSH terms "Colorectal Neoplasms" and "Mobile Applications". No restrictions on the types of articles or publication date were imposed. *Results*: A total of 24 items were retained. The article's titles and abstracts were screened and 7 articles were removed due to the absence of the abstracts (n=2), the article described a prognostic scoring model (n=2), one was a systematic review, one was reviewing the use of SMS and one was a letter to the editor. Out of the 17 remaining articles, only 7 were available in full text and all were testing mobile applications. The scope of using the applications was to facilitate screening (n=3), recovery (n = 3) and monitor chemotoxicity (n=1). *Conclusion*s: Mobile tools appear as an opportunity for rapid access and increased adherence to colorectal cancer screening guidelines. Mobile applications focused on patient recovery post colorectal cancer surgery need a more patient-centric approach. The mobile application built for monitoring chemotoxicity was deemed to address many of the limitations of identifying and quantifying chemotherapy toxicities. All in all, mobile applications may enhance existing clinical care and provide cost-effective real-time patient support, which may reduce the likelihood of hospital admission.

Keywords: Colorectal Neoplasms; Mobile Applications; Screening; Monitoring

A Systematic Literature Review of the Use of Robotic Surgical Procedures in Thyroid Neoplasms

Răzvan-Alexandru CIOCAN[a], Ariana-Anamaria CORDOŞ[b,*], Andra CIOCAN[c]

[a] Department of Surgery - Practical Abilities, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca, Marinescu Str., no. 23, 400337 Cluj-Napoca, Romania
[b] Romanian Society of Medical Informatics, 300041 Timişoara, Romania
[c] Department of Surgery - Surgery III, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca, Croitorilor Str., no. 19–21, 400162 Cluj-Napoca, Romania
E-mails: Razvan.Ciocan@umfcluj.ro; Ariana.cordos@gmail.com; Andra.Ciocan@umfcluj.ro

* Author to whom correspondence should be addressed; Tel.: +40 745 438 078

Abstract

Background and Aim: The incidence of thyroid cancer has increased worldwide during the last decade, being one of the most common endocrine malignancies. Surgical resection, namely conventional thyroidectomy, remains at the frontline of therapy, Minimally invasive techniques gained popularity through the years. The purpose of this systematic review was to understand the most common techniques and to evaluate the outcomes of minimally invasive techniques. *Materials and Methods*: A literature search was conducted on 20 August 2023 using two MeSH terms: "Robotic Surgical Procedure" and "Thyroid Neoplasms" using PICOTS and PRISMA Statements. The results were narrowed to the articles available in full text. *Results*: A total of 31 items were retained. The article's titles and abstracts were screened and nine articles were removed as five articles were reviews, two articles were case repots, one was a letter to the editor and one was describing the impact of augmented reality. Remaining 22 articles to analyze the content. *Conclusion*: This study found that the most used minimally invasive thyroid surgical techniques are robotic transaxillary thyroidectomy and robotic thyroidectomy by bilateral axillo-breast approach. From the systematic review, it can be concluded that for selected patients (well-differentiated thyroid carcinoma), these modern techniques are not inferior to standard of care and are a safe alternative, with the advantage of avoiding a potentially disfiguring scar in the neck, when performed by surgeons who are familiar with and experienced in endoscopic and robotic techniques.

Keywords: Thyroid Neoplasms; Minimally invasive techniques; Robotic surgical procedure; Thyroidectomy

Decision Tree to Guide Chronic Kidney Disease Patients at Incipient Stage

Krupanidhi SREERAMA*

Consultant Distinguished Professor, Dept. of Biotechnology, Vignan's Foundation for Science, Technology and Research, Vadlamudi 522213 AP, India
E-mail: sknbirac@gmail.com

* Author to whom correspondence should be addressed; Mobile: +91 9440984668

Abstract
Background: The etiologies of kidney disease are sequential and interlinked. They are known as disease markers. The Decision Tree representing initial symptoms needs to be popularized to seek prophylactic measures and educate the community health workers. *Material and Methods*: Chronic Kidney Disease dataset containing two classes, namely CKD and not CKD was retrieved from UC Irvine Machine Learning Repository available from https://archive.ics.uci.edu/ml/index.php. This dataset includes 400 instances and 25 attributes related to the CKD. The CKD dataset was saved in ARFF format. J48 algorithm was chosen from the WEKA software tool to develop the Decision Tree. *Results*: The Decision Tree comprises root nodes, branches, internal nodes, and leaf nodes. The root node began in J48 classifier with 'sc' (serum creatinine). This node gave two branches, of which one branch led to the internal node 'pe' (pedal edema) (sc<=1.2), and the other (sc>1.2) ended with a leaf node showing the condition CKD. The internal node 'pe' further yielded two branches, the branch with pedal edema terminated with CKD and the branch with no pedal edema led to the internal node. Internal node with 'dm' (diabetes mellitus) showed two more branches namely 'yes', which lead to CKD, and branch 'no' 'dm' led to another internal node namely hemo (haemoglobin). In continuation, the nodes for yet another two disease markers, namely hemoglobin and specific gravity of serum of people prone to kidney diseases, were shown at the terminal end of the Decision Tree. *Conclusion*: The Decision Tree developed for the CKD dataset by using J48 classifier would guide prospective patients with their clinical data reports.

Keywords: Chronic Kidney Disease; UCIML repository; WEKA; J48 algorithm; Decision Tree

Analysis of the Attributes of Liver Cirrhosis using the Machine Learning Tools

Gireesh NAMINENI[a] and Krupanidhi SREERAMA[b,*]

[a] Department of Electronics and Communication Engineering, Mohan Babu University, Tirupati, India
[b] Department of Biotechnology, Vignan's Foundation for Science, Technology and Research, Vadlamudi, 522213 AP, India
E-mail: naminenigireesh@gmail.com; (*) sknbirac@gmail.com

* Author to whom correspondence should be addressed;

Abstract
Background: The liver controls the metabolic process of our physiological system. The hepatic portal system is the pathway via which food and other ingredients we ingest enter the liver. The liver is a digestive gland or organ that secretes and controls bilirubin, transaminase enzymes, and several other biochemical components. As a result, the liver is a crucial organ in human physiology. Various natural and acquired disorders connected with the liver, such as inflammation, fibrosis, jaundice, cirrhosis, and others, cause liver damage and ultimately death. *Methods*: The cirrhosis dataset was obtained from the URL https://www.kaggle.com/datasets/fedesoriano/cirrhosis-prediction-dataset?resource=download.
WEKA, an ML software package, was used to analyze the dataset. The Random Forest algorithm (a tree classifier) and the Multilayer Perceptron algorithm (a function classifier) were selected in the WEKA tool to examine the eight attributes in the cirrhosis dataset. The chosen eight features are mostly responsible for diagnosing liver cirrhosis. Ascites, hepatomegaly, edema, bilirubin, albumin, alkaline phosphatase, serum glutamic oxaloacetic transaminase, and prothrombin are among them. The first 199 instances from the dataset were chosen for the current investigation. *Results*: The Random Forest algorithm produced a correlation coefficient of 0.9664 with a least mean absolute error of 0.2284, indicating that the data in the cirrhosis dataset is uniform and corresponds to the disease phases of cirrhosis. The multilayer perceptron technique produced a correlation coefficient of 0.3226 with a mean absolute error of 0.8921, indicating that the Random Forest approach is well suited to investigate the accuracy of the attributes of cirrhosis. *Conclusion*: Eight clinical features that made up the etiology of cirrhosis were taken into account in the current study, and the Random Forest algorithm confirmed their statistical validity.

Keywords: Cirrhosis; Random Forest; Multilayer Perceptron; WEKA; Healthcare digital ecosystem

Smart Textiles and Artificial Intelligence for Analysis of Sleep Quality and Early Disease Diagnosis

Alexandru-George BERCIU[a,*], and Eva DULF[b]

[a] PhD Student, Automation Department, EnTReC, Technical University of Cluj-Napoca, Romania
[b] Full Professor, Automation Department, EnTReC, Technical University of Cluj-Napoca, Romania
E-mails: Alexandru.Berciu@campus.utcluj.ro, Eva.Dulf@aut.utcluj.ro

* Author to whom correspondence should be addressed; Tel.: +40 740 137 999

Abstract
Given the importance of sleep quality for preventing and treating a wide range of diseases, but also considering technological advances in artificial intelligence and smart textiles, the type and number of data recorded during sleep have increased considerably in recent years. Diseases such as Parkinson's, cancer, scoliosis, diabetes, or heart disease can be diagnosed early with wearable sensors. Also, smart textiles, which involve integrating low-energy wearable sensors into clothing, allow analysis of sleep movements, patient position, and number of breaths per minute and can be used to automatically alert the doctor if the patient seems to need clinical care. However, current monitoring solutions are limited in the number of parameters considered to determine sleep quality, generally relying on empirical solutions to rate sleep or to identify a particular disease. To harness the amount of the recorded data and the advances of Artificial Intelligence, this paper proposes a fuzzy logic-based solution for the analysis and determination of a new sleep quality index for the early identification of diseases and reduction of associated risks. For the determination of this new index, the fuzzy system input was taken as values related to room temperature, skin temperature, environmental noise, blood pressure, pulse, VO2max and the number of breaths per minute a patient experiences during sleep. Using a predefined fuzzy rule table, each simulated sleep period was given a score in the range of 1-4, where 1 means totally inadequate sleep and 4 means excellent sleep quality. Recent findings were used to establish the range of variance of the 7 monitored parameters, as evaluated by scientific papers published in prestigious international journals. The system successfully passed the authors' tests and can be further improved by including additional parameters and by using a neural network to assess sleep quality using this new index.

Keywords: Smart Textiles; Wearable Sensors; Artificial Intelligence; Fuzzy Logic

Bioactive Betulin and PEG Loaded Poly(vinyl alcohol) Nanofibers as Biodegradable Coatings for Neural Implants

Sara SHAKIBANIA[a,b], Małgorzata SKORUPA[a,b], Katarzyna KRUKIEWICZ[a,c,*]

[a] Department of Physical Chemistry and Technology of Polymers, Silesian University of Technology, M. Strzody 9, 44-100 Gliwice, Poland
[b] Joint Doctoral School, Silesian University of Technology, Akademicka 2A, 44-100 Gliwice, Poland
[c] Centre for Organic and Nanohybrid Electronics, Silesian University of Technology, Konarskiego 22B, 44-100 Gliwice, Poland
E-mails: sshakibania@polsl.pl, Malgorzata.Skorupa@polsl.pl, (*) katarzyna.krukiewicz@polsl.pl

* Author to whom correspondence should be addressed; Tel: +48 695 220 826

Abstract
Degradable polymeric coatings offer significant advantages when applied to medical implants. These coatings provide controlled degradation, ensuring that they gradually break down over time in harmony with the body's healing processes. This controlled degradation can reduce the risk of long-term complications. The aim of our work was to prepare poly(vinyl alcohol) (PVA) nanofibers containing biodegradable polyanhydrides based on betulin disuccinate (DBB) and dicarboxylic derivatives of poly(ethylene glycol) (PEG) and to investigate their morphology, surface properties and biocompatibility. In this regard, PVA and DBB/PEG-loaded PVA nanofibers were fabricated using an electrospinning method. The average diameter of PVA and DBB/PEG-loaded PVA nanofibers were 132 nm and 247 nm, respectively. Surface roughness (Ra) of PVA and DBB/PEG-loaded PVA nanofibers was 96.2 nm and 117.6 nm, respectively, which is in agreement with previous studies on PVA nanofibers. To evaluate cell viability, human neuroblastoma SH-SY5Y cells were cultured for 48h on the surface of electrospun materials. All samples were found to be biocompatible, however, DBB/PEG-loaded PVA nanofibers indicated the highest percentage of viable cells when compared with PVA nanofibers and the control sample. The developed coating indicated promising properties for future application, particularly for the modification of metallic scaffolds used in neural tissue engineering.

Keywords: Neural tissue engineering; Biodegradable coatings; Neuromodulation; Betulin

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Development of Multifunctional Biomaterials by Combining Electrochemistry, Microbiology, and Neural Tissue Engineering

Małgorzata SKORUPA[a,b], Taral PATEL[a,b], ABDULLAH[a,b], Sara SHAKIBANIA[a,b], Vikas SHUKLA[a,b], Ihtisham UL HAQ[a,b], Katarzyna KRUKIEWICZ[a,c,*]

[a] Department of Physical Chemistry and Technology of Polymers, Silesian University of Technology, M. Strzody 9, 44-100 Gliwice, Poland
[b] Joint Doctoral School, Silesian University of Technology, Akademicka 2A, 44-100 Gliwice, Poland
[c] Centre for Organic and Nanohybrid Electronics, Silesian University of Technology, Konarskiego 22B, 44-100 Gliwice, Poland
E-mails: mskorupa@polsl.pl, tpatel@polsl.pl, aabdullah@polsl.pl, sshakibania@polsl.pl, vshukla@polsl.pl, ihaq@polsl.pl, kkrukiewicz@polsl.pl

* Author to whom correspondence should be addressed; Tel.: +48 32 237 1773

Abstract
The development of electroactive organic materials has been an unquestionable breakthrough for organic electronics, allowing for the design of polymer-based electrochromic and optoelectronic devices. Electroactive materials have been also considered as promising in the wide-field biomedical engineering, particularly considering their similarity with a living tissue in terms of elemental composition, surface morphology and mechanical properties. Electroactive materials are especially relevant in neural tissue engineering since the functionality of neural tissue is based on the transfer of electrical signals. Unfortunately, electroactive organic materials are also prone to bacterial colonization, which becomes as a considerable threat to patient's health. In our group, we have been working on the development of biocompatible, antibacterial and conducting implant coatings based on conducting polymers [1] and diazonium-derived electroactive monolayers [2]. With the use of electrochemical techniques, we have fabricated a library of electroactive materials with various physicochemical characteristics, differing in the way how they interact with a living matter. Antimicrobial effects have been verified against model microorganisms: *E. coli, S. aureus*, and *C. albicans*, while the biocompatibility has been confirmed towards human neuroblastoma SH-SY5Y cells. Unique combination of biological activity of developed materials with their electroactivity allows for further enhancement of their *modus operandi*, through the possibility of applying electrical stimulation to facilitate treatment. In this way, the results of our work are a major step towards the development of advanced bio-optoelectronic-based therapies.

Keywords: Antibacterial activity; Biomaterials; Conducting polymers; Electrochemistry; Neural cells

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Development of Copper Nanoparticles Based Antimicrobial Coatings Mediated by *Zingiber Officinale* to Combat Antimicrobial Resistance

ABDULLAH* and Katarzyna KRUKIEWICZ

Department of Physical Chemistry and Technology of Polymers, Silesian University of Technology, M. Strzody 9, 44-100 Gliwice, Poland
E-mails: (*) abdullah.abdullah@polsl.pl; Katarzyna.krukiewicz@polsl.pl

* Author to whom correspondence should be addressed; Tel.: +48 517 241 502

Abstract
Novel antimicrobial agents with better functionality and multitarget modes of action are needed to combat the global rise in antibiotic resistance in bacteria. Copper nanoparticles (CuNPs) have been found to be efficient against many bacterial strains. Thus, combining CuNPs with antibiotics might provide a new approach for designing CuNPs-based antimicrobial drugs. This work is designed to produce CuNPs utilizing ginger rhizome extract as a capping and reducing agent and to evaluate their antibacterial, antioxidant, and antileishmanial properties. The biosynthesized CuNPs were physiochemically characterized by using UV-visible spectroscopy, Fourier transform infrared spectroscopy, X-ray powder diffraction, energy-dispersive X-ray spectroscopy, and scanning electron microscopy. Agar well diffusion assay, disc diffusion assay, free radical scavenging assay, and MTT assay were employed to determine the antibacterial, antioxidant, and antileishmanial potential of CuNPs. The successful contact between microbial cell membrane and CuNPs was thought to account for the microbial cell membrane leakage and thus CuNPs were found effective in inhibiting the growth of both gram positive and gram-negative bacteria including *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus epidermidis*, and fungus *Candida albicans*. As determined by the size of inhibition zones, the maximum antibacteril activity was observed against *Staphylococcus epidermidis* (28.12±1.7 mm) and the minimum against *Pseudomonas aeruginosa* (11±0.5 mm). CuNPs have been demonstrated to have a synergistic impact in the suppression of bacteria when combined with broad and narrow spectrum antibiotics such as Ciprofloxacin, Gentamicin, Vancomycin, and Ceftriaxone etc. Furthermore, the significant antioxidant and antileishmanial properties make the CuNPs a multifunctional agent to be used in therapeutics. It is concluded that CuNPs have the potential to be used as antimicrobial agent in the development of alternatives to commercially available antibiotics and antibacterial coatings for medical implants to reduce the chances of infections.

Keywords: Copper; Nanoparticles; Antimicrobial resistance; Antibacterial coatings

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Immunoinformatics-Driven Design of an HPV-16 and -18 Synthetic Long Peptide Vaccine

Alexandru TÎRZIU[a,*], Leonard MADA[b], Corina VERNIC[a], and Virgil PĂUNESCU[a, c, d]

[a] Department of Functional Sciences, "Victor Babeş" University of Medicine and Pharmacy, Eftimie Murgu Square, no. 2, 300041 Timişoara, Romania
[b] Syonic SRL, Grigore T Popa Str., no. 81, 300254 Timişoara, Romania
[c] Center for Gene and Cellular Therapies in the Treatment of Cancer Timişoara-OncoGen, Clinical Emergency County Hospital "Pius Brinzeu" Timişoara, Liviu Rebreanu Str, no. 156, 300723 Timişoara, Romania
[d] Immuno-Physiology and Biotechnologies Center, Department of Functional Sciences, "Victor Babeş" University of Medicine and Pharmacy, Eftimie Murgu Square, no. 2, 300041 Timişoara, Romania
E-mails: alexandru.tirziu@umft.ro; leo.mada@syonic.eu; cvernic@umft.ro; vpaunescu@umft.ro

* Author to whom correspondence should be addressed; Tel.: +40 733 733 409

Abstract

Background and Aim: Human papillomavirus types 16 and 18 cause most cervical cancers worldwide. Existing VLP-based vaccines are unable to eliminate ongoing highly oncogenic infections. This study suggests an SLP-based vaccine for already infected patients, even with precancerous lesions. *Methods*: HPV16/18 E6 and E7 proteins' potent HLA class I and class II-restricted epitopes were extracted from IEDB or predicted by ANNs (IC_{50} < 50 nM, percentile rank < 2%). Population coverage was assessed via HLA-SLP interactions. SLP constructs, containing specific epitopes linked by cleavable peptides (LMRK, LLSVGG), underwent rigorous screening for allergenicity, toxicity, physicochemical parameters, antigenicity, and diversity. 3D structure prediction employed homology and ab initio modeling and was validated via QMEAN4 score and Ramachandran plots. Molecular docking (HADDOCK-2.4) evaluated SLP-TLR2 interactions. MD studies (GROMACS-2023.1) investigated SLP behavior in an electroneutral aqueous environment (300 K, 1 atm, 100 ns) via RMSD, RMSF, SASA, and R_{gyr} dynamics. *Results*: 28 class I and 16 class II-restricted epitopes had an IC_{50} < 50 nM and provided population coverages of 98.18% (class I) and 99.81% (class II). The selected 25 SLPs expressed a mean 1.5×10^{-2} toxicity score, no allergenic properties, a mean instability index of 37.61, and a mean VaxiJen score of 0.97. The QMEAN4 score ([0.665;0.813]), with >90% of the residues in the most favorable regions reflect good quality 3D structures. Molecular docking studies provided a ΔG of -13.20 ± 1.42 kcal/mol, and an average K_d of 3.5×10^{-9} M. MD simulations reflect favorable thermodynamic properties, based on mild RMSD ([0.1;0.87] nm), RMSF, SASA (49.37 ± 1.54 nm^2) and Rgyr ([1.15;1.34]) fluctuations over the 100-ns simulations. *Conclusions*: 25 in silico-designed SLPs stimulate both innate and adaptive immunity, with little to no toxic or allergenic effects. The presented vaccination platform could exert both a therapeutic (by tumor cell clearance) and a prophylactic effect (by eradicating E6 and $E7^+$ premalignant cells).

Keywords: Human papillomavirus; Cervical cancer; Therapeutic vaccine; Molecular modelling; *in silico*; Synthetic long peptides

Is "Health on The Net" Certification a Reliable Indicator of Quality? A Meta-Analysis of Romanian English Language Medical Websites

Valentin NĂDĂŞAN[a,*], Andrea-Ildiko GASPARIK[b], and Marius MĂRUŞTERI[c]

[a] Department of Hygiene, George Emil Palade University of Medicine, Pharmacy, Science and Technology of Târgu Mureş, 38 Gheorghe Marinescu Street, 540142 Târgu Mureş, Romania
[b] Department of Public Health and Health Management, George Emil Palade University of Medicine, Pharmacy, Science and Technology of Târgu Mureş, 38 Gheorghe Marinescu Street, 540142 Târgu Mureş, Romania
[c] Department of Medical Informatics and Biostatistics, George Emil Palade University of Medicine, Pharmacy, Science and Technology of Târgu Mureş, 38 Gheorghe Marinescu Street, 540142 Târgu Mureş, Romania
E-mails: valentin.nadasan@umfst.ro; andrea.gasparik@umfst.ro; marius.marusteri@umfst.ro

* Author to whom correspondence should be addressed; Tel.: +40 265 215 551

Abstract

Background: Health on the Net (HON) promotes access to reliable medical information. The study aimed to investigate the prevalence of HON certification and whether it is associated with the quality of informational content. *Methods*: The study included the results of 21 researches conducted between 2018-2021 about the quality of online medical information (1040 Romanian and English language webpages). HON certification was assessed using the HONcode toolbar application. Completeness and accuracy scores were extracted from previous research. The frequency of certification and compliance with individual HON principles was calculated. Associations between HON certification and information quality scores (completeness and accuracy) were tested using the student t-test. The threshold for statistical significance was set at 0.05. *Results*: Health on the Net certification was present on 1.1% and 21.6% of the Romanian and English websites, respectively. Compliance with the HON principles varied between 9.7% and 82.7% of Romanian-language websites and between 35.6% and 88.5% of English-language ones. The principle with the highest compliance was transparency regarding the texts' authors in both languages. The minimum compliance was with the principle of displaying the date of the last update in the case of Romanian-language websites and of attributing sources in the case of English-language websites. Association tests between HON certification and information quality showed the following results: HON certification vs. completeness $p=0.201$ for the Romanian subsample and $p<0.0001$ for the English-language subsample; HON certification vs. accuracy $p=0.018$ for the Romanian subsample and $p=0.886$ for the English-language subsample. *Conclusions*: Health on the Net certification of Romanian-language sites was almost absent, while English-language websites had relatively higher, but still low certification rates. HON certification was associated with content accuracy for Romanian-language websites and with the completeness of information for English-language sites. If subsequent research confirms the results of this meta-analysis, users should reconsider their reliance on HON certification.

Keywords: Infodemiology; Consumer health informatics; Health literacy; Access to information; Meta-analysis

ChatGPT Assistance in Academic Assignments by Example

Sorana D. BOLBOACĂ

Department of Medical Informatics and Biostatistics, "Iuliu Haţieganu" University of Medicine and Pharmacy, Louis Pasteur Str., no. 6, 400349 Cluj-Napoca, Romania
E-mail: sbolboaca@umfcluj.ro

* Author to whom correspondence should be addressed; Tel.: +40 374 834 506

Abstract
In one *Ethics and Academic Integrity* discipline assignment, the master's degree students (five students) were asked to choose one scenario (six scenarios were available). Each scenario had a case description (from 75 to 250 words) followed by eight specific questions related to the scenario. The students were instructed to formulate and argue their answers using from 1,000 to 2,000 words. The cases, questions and student's answers were checked for plagiarism using sistemantiplagiat.ro. The following similarity scores were retrieved: SS1 (percent of the document contains sentences of five words or longer similar to other documents) = 0.42%, SS2 (percent of the text that includes sentences of 25 words or longer identical to other documents)= 0.00%, CS (citation score as text in quotes) = 0.93%. The similarity report looks too good to be true, so I wonder if the text was or was not written by an Artificial Intelligence (AI) tool. ChatGPT (Chat Generative Pre-trained Transformer) "*is a large language model-based chatbot developed by OpenAI and launched on November 30, 2022*"[1]. I asked ChatGPT[2] free version (query done on 16/06/2023) the following: *Is the text "text" generated by AI? What is the % of words generated by AI? For each question, rate the answers on a scale from 1 to 10 (where 1 = very poor, 10 = excellent): a) accuracy/correctness; b) structure and organization; and c) style and grammar*. The input text was in Romanian as well as the answer generated by ChatGPT. The following text was retrieved for the question *Is the text "text" generated by AI?*: "*Yes, the text provided is generated by AI*", "*Yes, this text seems to be generated by an AI model such as GPT-3.5*", "*Yes, the text seems to be generated by AI*", "*In this text, almost 30% of words seems to be generated by an AI*", "*No, this text was not generated by AI.*", "*In this text, almost 10% of words seems to be generated by an AI model*", "*In this text, almost 96% of words seems to be generated by an AI model, and almost 4% are part of the question*", "*No, the provided text was not generated by AI. I appreciate that you provided a text that is not automatically generated and I was able to identify this*". Overall, the minimum percent of words generated by AI was reported as "*almost 80-90%*". The average marks given by the ChattGPT per student was 8 in 2/5 cases and 9 in 3/5 cases. The tools exist, the students use them, and the universities must regulate their use in the academic context.

Keywords: ChatGPT; Medical Student; Plagiarism; Assignment assistance

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Validation and Application of an Online Pharmacy Patient Satisfaction Questionnaire

Etidal-Mihaela MANOLIU-HAMWI[a], Cristina Gena DASCĂLU[b], Georgeta ZEGAN[c,*] and Cătălina Daniela STAN[a]

[a] Pharmaceutical Sciences II Department, Faculty of Pharmacy, "Grigore T. Popa" University of Medicine and Pharmacy, Universitaţii no. 16, Iaşi, 700115, Romania
[b] Medical Informatics and Biostatistics Department, Faculty of Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Universităţii no. 16, Iaşi, 700115, Romania
[c] Surgical Department, Faculty of Dental Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Universitaţii no. 16, Iaşi, 700115, Romania
E-mails: hamwi_etidal@yahoo.com; cdascalu_info@yahoo.com; georgetazegan@yahoo.com; catalinastan68@yahoo.com

* Author to whom correspondence should be addressed; Tel.: +40 741 114 385

Abstract
The world's applications of the Internet in public health services have expanded rapidly over the past two decades. In Romania, the online pharmacy was regulated and implemented in April 2019. The study aimed to validate a questionnaire about online pharmacy services and to assess patient satisfaction with these services. This cross-sectional descriptive observational qualitative study was conducted on 747 patients, 159 men and 588 women, aged between 18 and 85 years (mean age 31.44±11.324), who accessed online pharmacy services in Romania. The lot was made of convenience and "snowball" sampling. Patients completed an online questionnaire on google form [https://docs.google.com/forms/d/e/1FAIpQLSfSRGTcemtGLmsjfALAxKAMjnKMdt4DnCY0kauWi5cQQ8HAvw/viewform], with 10 items, structured in two sections regarding satisfaction with online pharmacy services and with financial aspects, between June 2022 and April 2023. The questionnaire is an adaptation to the specifics of Romanian pharmaceutical services of Johnson et al.'s questionnaire. The response scale of the questions was a five-category Likert type, ranging from "strongly disagree" to "strongly agree". The questionnaire was previously validated and the statistical analysis was done in SPSS 27.0 software. The Inter-rater Agreement index was 61.9%; Scale Content Validity was 87.6% for clarity and 84.8% for relevance; the completeness index was 95.2%; Bartlett's Test of Sphericity was 157.451 with 45 degrees of freedom (p=0.000); the Kaiser-Meyer-Olkin statistic was 0.667; The factorial analysis revealed 2 factors (with Eigen values >1.0), which are responsible for 71.3% of the variation of the 10 investigated items; The alpha-Cronbach coefficient for the entire questionnaire was 0.897. The mean score of the questionnaire was 3.8240±0.60278 and statistically significant differences were found according to the age groups (p=0.003) of the respondents and the frequency of accessing the online pharmacy (p<0.001). The questionnaire proved to be valid and showed the level of patient satisfaction with online pharmacy services.

Keywords: Telepharmacy; Questionnaire; Validation; Patient satisfaction

ChatGPT Performances in Explanation of Physiopathology by Example

Alexandra Ina BULBOACĂ[a], Adriana Elena BULBOACĂ[b,*], Ioana STĂNESCU[c], and Sorana D. BOLBOACĂ[d]

[a] Clinical Rehabilitation Hospital, 400347 Cluj-Napoca, Romania
[b] Department of Pathophysiology, "Iuliu Haţieganu" University of Medicine and Pharmacy, 400012 Cluj-Napoca, Romania
[c] Department of Neurology, "Iuliu Haţieganu" University of Medicine and Pharmacy, 400012 Cluj-Napoca, Romania
[d] Department of Medical Informatics and Biostatistics, "Iuliu Haţieganu" University of Medicine and Pharmacy, 400349 Cluj-Napoca, Romania
E-mail: ALEXANDRA.INA.BULBOACA@elearn.umfcluj.ro; (*) adriana_bulboaca@yahoo.com; ioana.stanescu.umfcluj@gmail.com; sbolboaca@umfcluj.ro

* Author to whom correspondence should be addressed;

Abstract
Physiopathology constitutes one of the basic disciplines that helps understand the mechanisms of diseases and, consequently, access effective and personalized therapies. ChatGPT is a working tool that promptly provides detailed answers to targeted questions, revolutionizing the way medical professionals interact with artificial intelligence (AI). The purpose of this study was to compare the answers provided by human intelligence with experience and professional qualification with the answers provided by ChatGPT, regarding the targeted questions addressed to one clinical case, to decipher the key pathophysiological mechanisms. The input was represented by cases published in Bulboacă et al.[1] ChatGPT-3.5 (https://chat.openai.com/) free version was used in our study. We provide one case (in Romanian language) and ask ChatGPT to answer five individual questions. We collected the answers on August 7, 2023. The following request was included in the ChatGPT window: We have the following case: "[case description]". Answer the following questions: [questions]. The evaluation of the responses given by the ChatGPT was done by one researcher and classified as correct, partially correct, or incorrect. The AI generated answers were partially correct in 4 out of 5 questions and incorrect in one question. ChatGPT can be a valuable instrument for medical teaching, but answer analyses must be added to ensure the validity of the responses and explanations.

Keywords: ChatGPT; Medical cases; Physiopathology

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Digital Teaching Tools and Medical Education – Challenges and Solutions

Cristina Gena DASCĂLU[a,*], Magda Ecaterina ANTOHE[b], and Victor Lorin PURCAREA[c]

[a] Medical Informatics and Biostatistics Department, Faculty of Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Universităţii Str., no. 16, 700115 Iaşi, Romania
[b] 3rd Dental Medicine Department, Faculty of Dental Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Universităţii Str., no. 16, 700115 Iaşi, Romania
[c] Marketing and Medical Technology Department, "Carol Davila" University of Medicine and Pharmacy, Eroii Sanitari Blv., no. 8, 050474 Bucharest, Romania
E-mails: cdascalu_info@yahoo.com; magda.antohe@yahoo.com; victor.purcarea@gmail.com

* Author to whom correspondence should be addressed; Tel.: +40 766 456 205

Abstract

Introduction: The modern educational process must integrate new tools, to keep pace with technological advances. The current generation of students (Generation Z-"digital natives") have specific demands regarding the learning process, because they are familiar from their early childhood with technology, being declared supporters of independent and active learning style, based on visual, tactile, and kinesthetic content as well as practical activities, and less on theoretical lectures. Significant changes are required in this context, and the academic curricula must be re-designed to keep its efficacy. Our paper aims to investigate the extent to which the preferences of medical students for the autonomous use of multimedia resources in the learning process are correlated with their opinions towards Internet and the intensity of using it in their daily activities. *Methods*: We investigated 551 medical students from 4 Romanian medical universities, 76.2% females, 63.7% in the 1st and 2nd years of study. Students were asked to express on Likert-scales their agreement with a list of statements about Internet services, as well as whether they like learning using multimedia tools and how intensively they use Internet services. *Results*: The students agree to a medium to large extent with the favorable statements about Internet services but are also aware of the negative influences that indiscriminate use of such technology can have. The intensity of Internet usage is high, although not exaggerated. The score of favorable opinions about Internet services is statistically significant correlated with the students' agreement to use digital tools in learning; the students enjoy the online learning, as well as the PowerPoint presentations and the documentation online. *Conclusions*: Generally speaking, the students who enjoy using multimedia resources for learning are constant users of Internet services as well; they use Internet mainly for information, and in the second place for communication through instant messaging applications.

Keywords: Multimedia-based learning; Blended learning; Internet services; Social networks; Medical students

Cyberbullying Experienced by University Students: A Study Protocol

Diana Ioana NICHIFOR[a] and Sorana D. BOLBOACĂ[b,*]

[a] Faculty of Medicine, "Iuliu Haţieganu" University of Medicine and Pharmacy, Louis Pasteur Str., no. 4, 400349 Cluj-Napoca, Romania
[b] Department of Medical Informatics and Biostatistics, "Iuliu Haţieganu" University of Medicine and Pharmacy, Louis Pasteur Str., no. 6, 400349 Cluj-Napoca, Romania
E-mails: diana.ioan.nichifor@elearn.umfcluj.ro, sbolboaca@umfcluj.ro

* Author to whom correspondence should be addressed; Tel.: +40 374 834 506

Abstract

Background: Bullying appeared for the first time in the scientific literature in 1897[1]. Access to the Internet and associated forms of digital communication open new environments for bullying, called cyberbullying. According to APA Dictionary of Psychology bullying is "persistent threatening and aggressive physical behavior or verbal abuse directed toward other people, especially those who are younger, smaller, weaker, or in some other situation of relative disadvantage" while "Cyberbullying is verbally threatening or harassing behavior conducted through such electronic technology as cell phones, e-mail, and text messaging"[2]. Bullying is perceived differently by young people in different cultures and environments and could lead to suicide-related ideology and behavior[3]. The aim of the study encompasses a tripartite nature. In the primary instance, it investigates the overarching effects of cyberbullying on the psychological well-being of college students. As a secondary point, the dissimilarities pertaining to gender, age, socio-economic background, and educational affiliations are examined. Furthermore, it focuses on the extent to which the students exhibit diminished levels of concentration and reduced focus on their academic achievements. *Methods*: This population-based cross-sectional study will include respondents of both genders aged 18 or above, with diverse socioeconomic statuses, and enrolled in Romanian universities. The instruments that will be used consist of self-administered online surveys, comprising a sociodemographic questionnaire, also assessing the academic level, a cyberbullying questionnaire survey, simultaneously evaluating patterns of internet utilization, and the 21-item Depression Anxiety Stress Scale (DASS-21). *Discussion*: The study delves into the intricacies surrounding cyberbullying and its potential multifaceted repercussions within college students. Given the dynamic evolution of digital communication and its profound influence on interpersonal dynamics, the study's significance resides in the promise of the findings to shed light on the challenges posed by this contemporary manifestation of aggression.

Keywords: Cyberbullying; Undergraduate students; Survey; Study protocol

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Assessment Study of Nurses' Attitudes Regarding the Safety of Care in Surgical Patients

Viorica NEDELCU[a,*], Mariana ZAZU[a,b], Oana Otilia NICULIȚĂ[a,b,c], Corina VERNIC[d], and Doina Carmen MAZILU[a,b]

[a] The Order of Nurses, Midwives and Medical Assistants in Romania - Bucharest Branch; Romanian Centre for Nursing Research: A JBI Centre of Excellence, Avrig Street, no. 12, 021575 Bucharest, Romania
[b] "Carol Davila" University of Medicine and Pharmacy, Eroii Sanitari Blvd., no. 8, 050474 Bucharest, Romania
[c] Fundeni Clinical Institute, Fundeni Str., no. 258, 022328 Bucharest, Romania
[d] "Victor Babeş" University of Medicine and Pharmacy, Discipline of Medical Informatics and Biostatistics, Square Eftimie Murgu, no. 2, 300041 Timişoara, Romania
E-mails: (*) veranedelcu@yahoo.com; m.zazu@yahoo.com; motilia24@yahoo.com; cvernic@yahoo.com; maz_carmen@yahoo.com

* Author to whom correspondence should be addressed; Tel.: +40 723 769 065

Abstract

Background and Aim: The modern surgical environment is complex and has a high potential risk of medical errors. In this context, the attitudes of healthcare professionals regarding patient safety represent an important component of organizational safety culture. *Materials and Methods*: We conducted a study in which we used the "*Safety Attitudes Questionnaire*", a standardized questionnaire with six scales: *Teamwork Climate, Safety Climate, Job Satisfaction, Stress Recognition, Perception of Management* and *Work Conditions*. The scores ≥75 signified positive attitudes of the respondents. Statistical data analysis was performed with the SPSS Statistics 20 program. *Results*: We included in the study 70 nurses, 46% from Anesthesia and Intensive Care Units (AICU) and 54% from surgical wards, most with secondary education (81%) and female gender (88%). The average age was 42.2±7.6 years and the average professional experience was 14.05±8.7 years. The lowest percentage of respondents with a positive attitude was identified for the *Management Perception scale* (53%), followed by the *Stress Recognition scale* (57%) and the *Work Conditions scale* (63%). On the other hand, the highest percentage of respondents with a positive attitude was associated with the *Job Satisfaction scale* (91%), followed by the *Safety Climate scale* (74%) and the *Teamwork Climate scale* (73%). The comparison of the average scores of the six scales for nurses from the two types of departments showed that there are significant differences in two scales: *Stress Recognition*, with higher scores in AICU, and *Work Conditions*, with lower scores in AICU. *Conclusions*: The low percentages of nurses with positive attitudes regarding the institutional management, stress recognition and work conditions highlight the need to implement effective strategies to improve organizational safety culture in hospitals, especially in AICU. The results are consistent with the literature and argue for the development of institutional educational programs and voluntary error reporting systems to achieve proactive professional safety attitudes.

Keywords: Attitudes; Nurses; Safety; Anesthesia and Intensive Care Units; Surgery

Knowledge, Attitude and Use of Evidence-Based Practice among Nurses and Midwives in Bucharest Hospitals

Doina Carmen MAZILU[a,b], Viorica NEDELCU[a], Corina VERNIC[c], and Mariana ZAZU[a,b*]

[a] The Order of Nurses, Midwives and Medical Assistants in Romania - Bucharest Branch; Romanian Centre for Nursing Research: A JBI Centre of Excellence, Avrig Str., no. 12, 021575 Bucharest, Romania
[b] "Carol Davila" University of Medicine and Pharmacy, Eroii Sanitari Blvd, no. 8, 050474 Bucharest, Romania
[c] "Victor Babeş" University of Medicine and Pharmacy, Discipline of Medical Informatics and Biostatistics, Square Eftimie Murgu, no. 2, 300041 Timişoara, Romania
E-mails: mazilu.carmen@oammrbuc.ro; viorica.nedelcu@oammrbuc.ro; cvernic@yahoo.com; (*) mariana.zazu@oammrbuc.ro

* Author to whom correspondence should be addressed; Tel.: +40 784 255 019

Abstract

Background and Aim: Evidence-based practice (EBP) is considered a critical element in safe and quality health care delivery. This paper is a report of a study describing the EBP knowledge, attitudes, and use of nurses and midwives practicing in hospitals in Bucharest. *Materials and Methods*: The descriptive, cross-sectional research design was conducted with a random sample of 245 nurses and midwives. The study used an online version 24-item validated questionnaire (adapted from Upton and Upton, 2006) to collect the data. Each item was measured using a 7-point Likert scale. Values between 1 and 3 were considered negative, between 3 and 5 were average values, and between 5 and 7 were positive values. Data were analyzed using the SPSS Statistics 20 program. The Chi-square test (p) was used to perform the comparative analysis of the scores of the three subscales (Knowledge, Attitudes, and Practices) according to socio-demographic characteristics. *Results*: Most of the average scores of the 24 items do not register positive values (m<5), with the exception of item *"Level of knowledge in information technology"* (m=5.20). The weighting of scores with high values is relatively low, for all three subscales, the lowest percentage being recorded by the Knowledge subscale (approx. 4% of respondents), and the highest percentage by the Practices subscale (almost 38%). There are no significant differences according to certain socio-demographic characteristics, the only exception being university education, which is assigned significantly higher scores for the Attitudes and Knowledge subscales. *Conclusions*: This study demonstrates the priority need to improve the level of knowledge and use of EBP in the evaluated medical units. Also, this study can be extended to the national level, and its results can represent the basis of the decision to develop a policy regarding the professional training of nurses and midwives in the field of EBP.

Keywords: Evidence-Based Practice; Nursing; Knowledge; Attitude; Practice

Assessment of Nurses' Knowledge Level Regarding the Procedure of Blood Transfusion in a Hospital from Bucharest

Mariana ZAZU[a,b*], Viorica NEDELCU[a], Daniela VOINEA[c], Daniela TRANDAFIR[c], Raluca Antoaneta ISTRATE[c], Corina VERNIC[d], and Doina Carmen MAZILU[a,b]

[a] The Order of Nurses, Midwives and Medical Assistants in Romania - Bucharest Branch; Romanian Centre for Nursing Research: A JBI Centre of Excellence, Avrig Street, no. 12, 021575 Bucharest, Romania
[b] "Carol Davila" University of Medicine and Pharmacy, Eroii Sanitari Blvd, no. 8, 050474 Bucharest, Romania
[c] National Institute of Pneumology Marius Nasta, Viilor Road, no. 90, 050159 Bucharest, Romania
[d] "Victor Babeş" University of Medicine and Pharmacy, Discipline of Medical Informatics and Biostatistics, Square Eftimie Murgu, no. 2, 300041 Timişoara, Romania
E-mails: (*) mariana.zazu@oammrbuc.ro; viorica.nedelcu@oammrbuc.ro; voineadaniela72@yahoo.com; dzarughian@gmail.com; raluca_crintea@yahoo.com; cvernic@yahoo.com; mazilu.carmen@oammrbuc.ro

* Author to whom correspondence should be addressed; Tel.: +40 784 255 019

Abstract

Background and Aim: Blood transfusion is an invasive procedure with a high risk that could have unwanted consequences for both the patient and the nurses. Therefore, nurses must have the necessary knowledge to perform their roles safely and effectively. The aim of the study was to assess nurses' knowledge level regarding the procedure of blood transfusion. *Materials and Methods:* The cross-sectional research study was conducted with a randomly selected sample of 26 nurses (response rate of 100%) and used a paper version validated questionnaire to collect the data. The scores of the knowledge <50% were considered as poor, between 50–74% - moderate, and ≥75% - high. The statistical data analysis was carried out using the SPSS version 20. *Results:* This study included nurses (45.35 ± 7.12 years average age and 18.96 ± 8.31 years average experience) from the medical wards (n=12), surgical wards (n=7), Intensive Care Units (ICU) (n=6) and Blood Transfusion Unit (BTU) (n=1). Most nurses were female, between 40 and 55 years old, post-secondary school graduates, and without specific blood transfusion courses. Based on the scoring system, nurses' overall knowledge of blood transfusion was estimated to be moderate (54 ± 5.16%). The percentage of knowledge calculated for each assessed dimension was 85.5% (*Transfusion safety*), 15.4% (*The last pre-transfusion control*), 46.2% (*Transfusion administration*), 46.2% (*Patient monitoring*), and 30.8% (*Transfusion complications*). In general, nurses from BTU, ICU, and surgical wards provided the most correct answers. *Conclusions:* The findings of this study indicated that the nurses' knowledge of blood transfusion was at a moderate level, which also corresponds with international research. Extending this study could demonstrate the need to implement courses in the field of transfusion management at the national level.

Keywords: Blood Transfusion; Nursing; Knowledge; Safety

Recent Developments in Breast Cancer Imaging

Amelia-Maria ISAC[a,*], Octavian-Constantin NEAGOE[b,c], and Corina VERNIC[d]

[a] "Victor Babeş" University of Medicine and Pharmacy Timişoara, Romania
[b] Second Clinic of General Surgery and Surgical Oncology, Emergency Clinical Municipal Hospital Timişoara, Romania
[c] Second Discipline of Surgical Semiology, First Department of Surgery, "Victor Babeş" University of Medicine and Pharmacy Timişoara, Romania
[d] Discipline of Biostatistics and Medical Informatics, "Victor Babeş" University of Medicine and Pharmacy Timişoara, Romania
E-mail(*): isac.amelia@yahoo.com

* Author to whom correspondence should be addressed;

Abstract

Purpose: Breast cancer stands as a primary contributor to cancer-related fatalities among women globally, underscoring the significance of early detection for better prognosis. Innovative imaging methods and biochemical indicators have emerged to augment the diagnosis of breast cancer; however, a systematic assessment of their clinical effectiveness and performance is imperative. *Materials and Methods*: It was conducted a comprehensive literature review by systematically searching PubMed and Scopus databases. Was included pertinent publications from the period spanning 2010 to 2022. The search terms employed were "breast cancer," "diagnosis," "imaging modalities," and "biomarkers". *Results*: Emerging imaging methods such as contrast-enhanced spectral mammography (CESM), diffusion-weighted magnetic resonance imaging (DW-MRI), and positron emission tomography-computed tomography (PET-CT) have exhibited promising outcomes in the realm of breast cancer diagnosis. CESM amalgamates the benefits of mammography and contrast-enhanced MRI, delivering heightened sensitivity and specificity. DW-MRI is a non-intrusive approach adept at identifying alterations in the diffusion characteristics of malignant tissues. PET-CT furnishes valuable functional insights into tumor metabolism and angiogenesis. Regarding biochemical markers, including carbohydrate antigen 15-3 (CA 15-3), carcinoembryonic antigen (CEA), and cancer antigen 125 (CA 125), these have been extensively scrutinized in the context of breast cancer diagnosis. Nevertheless, their diagnostic efficacy remains constrained due to their relatively low sensitivity and specificity, and they are predominantly employed for monitoring disease progression and gauging treatment response. *Conclusions*: Innovative imaging methods like CESM, DW-MRI, and PET-CT have displayed encouraging outcomes in the diagnosis of breast cancer. However, it is imperative to conduct more in-depth assessments to ascertain their clinical applicability and cost-effectiveness. The potential synergy of integrating imaging techniques with biochemical markers holds promise for augmenting diagnostic precision and mitigating the occurrence of false-positive and false-negative results.

Keywords: Breast Tumor; Medical Statistics; Data Analysis; Clinical Correlations

Benefits of Using Early Warning Scores - A Systematic Review

Ariana-Anamaria CORDOŞ*

Romanian Society of Medical Informatics, 300041 Timişoara, Romania
E-mails: Ariana.cordos@gmail.com

* Author to whom correspondence should be addressed; Tel.: +40 745 438 078

Abstract
The Early Warning Scores (EWSs) are tools for bedside evaluation based on five physiological parameters: systolic pressure, pulse, respiratory rate, body temperature and AVPU (alert, voice, pain, unresponsive) score. EWSs have been used in many hospital departments, including general wards, intensive care units, or emergency rooms. Several iterations of EWSs have been developed with varying levels of sensitivity and specificity for use in different populations. The aim of this research was to understand the benefits of using these tools. This systematic review followed the Preferred Reporting Items for Systemic Reviews and Meta-Analyses (PRISMA) guidelines. This study included literature published in PubMed under the MeSH term "early warning score". The search was performed on 12th July 2023. No restrictions on the types of articles were imposed. Considering the language limitations of the study investigators, only studies available in English were retained. A total of 392 items were retained. The articles' titles and abstracts were screened to investigate whether the benefits of using early warning scores were the topic. It resulted in 286 relevant articles. Two major strength categories have been identified: the patient oriented outcome and the healthcare personnel oriented benefits. The patient oriented outcome indicators that these tools can predict are: transfers to the intensive care unit, sepsis, in hospital cardiac arrest, mortality, or disease specific clinical deterioration. Multiple healthcare personnel oriented strengths of these tools have been identified, including their simplicity and ability to standardize communication and reduce staff work burden, especially if they are continuously electronically recorded. The research highlights the importance of the integration of data-driven models into personalized care and represents an opportunity to inform biomedical and health informatics research on designing and evaluating EWS-based clinical interventions.

Keywords: Early Warning Score; Physiological parameters; Benefits

Chemoinformatic Study of Benzodiazepines

Alexandra-Loredana ALMĂŞAN[a,*], Corina DUDA-SEIMAN[b], Edward ŞECLĂMAN[a], and Corina VERNIC[c]

[a] Department of Biochemistry, Faculty of Medicine, "Victor Babeş" University of Medicine and Pharmacy Eftimie Murgu Square, no. 2, 300041 Timişoara, Romania
[b] Department of Chemistry and Biology, Faculty of Chemistry, Biology, Geography, West University of Timişoara, 16 Pestalozzi, 300115 Timişoara, Romania
[c] Department of Functional Sciences, Discipline of Medical Informatics and Biostatistics, "Victor Babeş" University of Medicine and Pharmacy, Eftimie Murgu Square, no. 2, 300041 Timişoara, Romania
E-mails: ale.almasan14@gmail.com; corina.duda@e-uvt.ro; eseclaman@umft.ro; cvernic@umft.ro

* Author to whom correspondence should be addressed; Tel.: +40 739 951 169

Abstract
Benzodiazepines are a type of psychotropic drugs with tranquilizing effect, originally used as ansiolytics. However, benzodiazepines are highly addictive, and a person who abuses them faces a host of symptoms. Moreover, the market for new psychoactive substances is growing. The aim of this study was to predict *in silico* chemical structures on benzodiazepine skeleton with affinity for the GABA A receptor. A set of 50 benzodiazepine-based compounds was analyzed to develop a QSAR training set with respect to published binding values to GABA receptors. To develop a mathematical model, physicochemical properties (partition coefficient, molar refractivity, molar volume) were used to correlate with biological activity ($logIC_{50}$). We estimated the logIC50 and compared it with the observed values to test our model. To create the ADMET profile, we used the ADMETlab2.0 program. The molecular target for diazepam and nitrazepam molecules was predicted using SwissTargetPrediction. The visualization of the target structure was achieved with the Chimera program. The SeamDock molecular docking program was used to study molecular target interactions with diazepam and nitrazepam drugs. The best results of univariate correlation are shown by molar volume. The best statistics were obtained for univariate correlation. Diazepam and nitrazepam are small molecules with good oral availability that cross the blood-brain barrier, affecting the nervous system. The target predicted most likely to interact with drugs is the alpha-1 subunit of the GABA A receptor. The molecular docking study showed a favorable interaction between the molecular target and the drugs diazepam and nitrazepam. This QSAR model will allow rapid prediction of the binding activity of emerging benzodiazepines in a rapid and economic way, compared with expensive *in vitro/in vivo* analysis. Diazepam and nitrazepam interact with GABA A receptors, potentiating their activity.

Keywords: Benzodiazepines; GABA A receptor; QSAR (Quantitative Sstructure-Activity relationship); Chemoinformatics; Structural biochemistry

Cervical Cancer – A Serious Chronic Problem – Statistical Data from the Western Region of Romania

Ion PETRE[a,b*], Lavinia MOLERIU[a], and Corina VERNIC[a]

[a] Department of Functional Sciences, Medical Informatics and Biostatistics Discipline, "Victor Babeş" University of Medicine and Pharmacy, 300041 Timişoara, Romania
[b] Doctoral School, Faculty of Economics and Business Administration, West University of Timişoara, 16 J.H.Pestalozzi Str., 300115 Timişoara, Romania
E-mails: petre.ion@umft.ro; moleriu.lavinia@umft.ro; cvernic@umft.ro

* Author to whom correspondence should be addressed; Tel.: +4 0740 107 827

Abstract

Introduction: In Romania, every year, there are 4,343 new cases of cervical cancer and 1,909 deaths caused by this disease. The screening program for early detection of cervical cancer has been running since 2012, but unfortunately not with the same impact on the population. When it reveals characteristic changes in cervical cells, HPV testing is further indicated. *Material and method:* This retrospective study, in the period 2013-2022 includes the screening Babes Papanicolau smear in all women aged 25-64 years. Through the descriptive statistics of the collected data, we analyzed the dynamics of the phenomenon of occurrence and spread of cervical cancer depending on the environment of origin. We observed a higher incidence in urban areas than in rural areas, registering several new cases: 496 (57% urban), 375 (43% rural), in total 871 (100%) of cases, respectively cases remaining: 5,843 (55% urban), 4,858 (45% rural), in total 10,701 from an eligible population of ~ 400,000, of which only 30% tested Babes Papanicolau test. *Results*: Thus, in 2019, less than 30% of Romanian women said they had done a Babes Papanicolau test in the last three years, the proportion being half the European average. The participation rate – calculated based on statements – was 45% among women with high incomes, compared to 13%, women with low incomes and 51% for women with a high level of education, versus 11% for women of low level of training. The study of the distribution of cervical cancer in the Northwest Region shows that over 30% of cases are diagnosed in advanced stages (III and IV). *Conclusions*: Unfortunately, Romania, due to the incidence of cervical cancer cases occupies the first place in Europe, both in incidence and mortality; the mortality rate is four times higher than the European Union average.

Keywords: Cervical cancer; Screening; Statistical data

Evolution of the Complexity of Patient Care Activity in a Cardiac Intensive Care Unit

Liliana BUCUR[a], Viorica NEDELCU[b,*], Daniela MINCULEASA[a], Mihaela PODĂRĂSCU[a], Ştefania CĂLIN[a], Mihaela BRATANOF[a], Ioana MARINICĂ[a], and Daniela FILIPESCU[a]

[a] The Emergency Institute for Cardiovascular Diseases „Prof. Dr. C. C. Iliescu ", Anesthesia and Intensive Care Unit II, Fundeni Road, no. 258, 022322 Bucharest, Romania
[b] The Order of Nurses, Midwives and Medical Assistants in Romania - Bucharest Branch, Avrig Street, no. 12, 021575 Bucharest, Romania
E-mails: llnbucur@gmail.com; (*) veranedelcu@yahoo.com; danabuca25@gmail.com; podarascudaria@yahoo.com; stefania_calin@yahoo.com; mikibratanof@yahoo.com; i_raileanu@yahoo.fr; 1danielaf@gmail.com

* Author to whom correspondence should be addressed; Tel.: +40 723 769 065

Abstract

Background and Aim: The Cardiac Intensive Care Unit (CICU) is characterized by a high level of complexity of patient care activity, which implies particular responsibilities, skills and demands for professionals in these wards. To face these challenges, effective communication is needed within the multiprofessional medical team. *Materials and Methods*: We carried out a retrospective study for a period of 8 years (2015-2022), and we evaluated the number of patients cared for, the reason and type of admission, the presence of complex monitoring and life support devices, the activity score for the ICU (OMEGA-RO), and the length of stay in CICU. *Results*: The evolution of patients from 2015-2019 showed a constant upward trend: patients cared for - from 750 to 960; surgical patients - from 346 to 595; emergencies - from 300 to 508. Also, the number of patients with complex monitoring and assistance increased constantly, from 263 to 485. A constant increase was also observed for OMEGA-RO - from 149 to 170.2 and the average length of stay - from 2.8 to 4.5 days. The impact of the COVID-19 pandemic led to a reduction in patients' access to medical services, as evidenced by the decrease in the number of patients during 2020-2021. However, the data analyzed for 2022 prove the return to the trend of increasing the number of patients and the complexity of their care. *Conclusions*: The high complexity of the patient care process in CICU argues for the need to ensure an optimal level of human and material resources to facilitate the provision of safe and quality care. There is also a need for the periodic participation of the staff in training programs and continuous medical education, which ensures the maintenance and development of the specific skills of the professionals in these departments.

Keywords: Patient Care; Complexity; Cardiac Intensive Care Unit

Evaluation Study of Professional Burnout among Intensive Care Staff

Rodica Liliana COJOCARU[a], Oana KALKUZ[a], Cerasela NEAGU[a], Viorica NEDELCU[b,*], Alina IVAN[a], Carmen BĂLESCU[a], Alida MOISE[a]

[a] The Emergency Hospital "Prof. Dr. Dimitrie Gerota", Vasile Vasilievici Stroescu Str., no. 29-31, 021373 Bucharest, Romania
[b] The Order of Nurses, Midwives and Medical Assistants in Romania - Bucharest Branch, Avrig Str., no. 12, 021575 Bucharest, Romania
E-mails: rodyka75@yahoo.com; kalkuzoana@gmail.com; ceraneagu@yahoo.com;
(*) veranedelcu@yahoo.com; alina.mihalache09@yahoo.com; carmenarionbalescu@yahoo.com; alidamoise@gmail.com

* Author to whom correspondence should be addressed; Tel.: +40 723 769 065

Abstract

Background and Aim: Burnout results from chronic exposure to professional stress[1], which involves three dimensions: emotional exhaustion, depersonalization, and reduction of personal accomplishments[2]. It affects many healthcare professionals, with important physical and mental health consequences. *Materials and Methods*: In 2022, we carried out a study to evaluate the burnout among physicians, nurses, and auxiliary personnel, from all hospital departments. For data collection we used the Maslach Burnout Inventory questionnaire, which measures the three dimensions of the professional burnout syndrome: emotional exhaustion, depersonalization, and personal accomplishment. *Results*: The study included 235 employees: 34 from the Intensive Care Unit (ICU) and 201 from other departments. A percentage of 58% of the participants were nurses. The results of the analysis of the three dimensions of professional exhaustion for ICU staff reveals mean emotional exhaustion score of 13.2 ± 10.5 (low level), a mean depersonalization score of 1.9 ± 2.8 (low level), and a mean personal accomplishment score of 36.8 ± 5.0 (moderate level). Comparisons of group mean differences across hospital wards demonstrated statistically significant differences in emotional exhaustion, but not in depersonalization or personal accomplishment. No differences were identified according to the professional category of the participants. *Conclusions*: The study's results demonstrated the existence of a low level of exhaustion and depersonalization in ICU, but also a moderate level of reduced personal achievement. Significant differences between wards in terms of emotional exhaustion have been identified. The results do not confirm the data from the literature, where the incidence of burnout is higher among ICU staff. Further research is needed to identify the local facilitating factors that contribute to reducing the impact of stress in the ICU to support them and implement them in other hospital wards.

Keywords: Burnout; Healthcare staff; Intensive Care Units

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