Editorial Preface

Making Extreme Medicine a Routine:
Lesson From the Current COVID-19 Outbreak

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We are delighted to continue our efforts at IJEACH to create a new forum for exchange of information and publishing the excellent research work of scholars on all aspects of the emerging trends in the digitization and automation of healthcare. The speed with which the COVID-19 virus has spread has taken most governments apparently by surprise: in less than three months, the outbreak has all but shut down economies worldwide, putting millions of people into isolation, working from home and in quarantine. In this rapidly emerging new reality, lessons need to be learned. The first lesson is to make extreme medicine a routine. Extreme Medicine explores different limits of endurance and the lens each offers on one of the systems of the body. Examples of extreme medicine come from challenges like the Arctic exploration which have created opportunities for breakthroughs in open heart surgery; battlefield doctors who pioneered techniques for skin grafts, heart surgery, and trauma care; underwater and outer space exploration have revolutionized our understanding of breathing, gravity, and much more. Despite these improvements, significant gaps and challenges exist in global pandemic preparedness. Evidence from the current Coronavirus outbreak as well as others suggests that the likelihood of pandemics has increased over the past century because of increased global travel and integration, urbanization, changes in land use, and greater exploitation of the natural environment. These trends likely will continue and will intensify (Jamison et al., 2017). Harvard Business School models suggested in 2006 predicted that the next pandemic is likely to come in three waves, with each wave sweeping across the globe in a matter of weeks and lasting as long as three months. So there needs to be a shift in the nature of continuity planning, away from strategies that protect infrastructure and toward those that protect employees and people during a sustained crisis (Dowell & Bresee, 2006). In 2009, WHO described a framework for the world preparedness and response to a coming influenza pandemic (World Health Organization, 2009), however, no much attention has been given to the implementation of this framework that requires drastic changes to how governments, business and civil society should build infrastructures in response to possible pandemic. Figure 1 illustrate some of the possible mechanisms that help societies to be in a good preparedness level for pandemic like the current COVID-19 through adopting the notion of extreme medicine.

IN THIS ISSUE

In this issue we are having six papers two regular papers and four special issue papers extended from the accepted papers at the IC-FeH 2019 International Conference on Future e-Health: Advancing e-Health with innovative research results that was held at Zhuhai, China during November 1-3, 2019. The guest editor of this special issue is Dr. Simon Fong, University of Macau who made all the efforts to invite these authors to extend their papers. According to Dr. Fong, the International Conference on Future e-Health 2019 (IC-FeH 2019) is the first conference born out of the synergy of fusing the new economy power of Zhuhai – a beautiful water bay city in the southern coast between Macau and Hongkong and the national strategic plan of protecting every citizen's health. The aim of IC-FeH 2019 is to look ahead for the most bold and innovative ideas of high-tech healthcare technologies.

Figure 1. Requirements for enforcing extreme medicine

Evolving from individual cooperate meetings, press briefing and exhibition, IC-FeH 2019 serves as an international platform gathering experts from local and afar, encouraging research collaborations, bridging e-Health developments from concepts to commercialization and between East and West. As an essential role in driving Zhuhai's innovation strategy, IC-FeH 2019 is designed to integrate innovational resources and enable commercialization of scientific & technological achievements, through a series of research results presentations, professional interactions, medical/health data analytics workshops and tutorials. The conference was held between November 1-3 in the beautiful city of Zhuhai with over 50 participants and 13 paper presentations selected from over dozens of submissions.

The first regular paper is entitled "Predicting Patient Admission From the Emergency Department Using Administrative and Diagnostic Data" by Dr. David W. Savage of NOSM, et al. This paper target the increase of patient flow at the Emergency department (ED). Many interventions have been proposed in this direction. The objective of this study was to predict patient admission early in the visit with the goal of reducing waiting time in ED for admitted patients. ED data for a one-year period from Thunder Bay, Canada was obtained. Initial logistic regression models were developed using age, sex, mode of arrival, and patient acuity as explanatory variables and admission yes or no as the outcome. A second stage prediction was made using the diagnostic tests ordered to further refine the predictive models. Predictive accuracy of the logistic regression model was adequate. The AUC was approximately 81%. By summing the probabilities of patients in the ED, the hourly prediction improved. This study has shown that the number of hospital beds required on an hourly basis can be predicted using triage administrative data

The second regular paper is entitled "Impact of Attentional Loading and Task Constraints on Postural Control of Healthy Older Adults" by Dr. Eryk Przysucha, Lakehead University, et al. In this paper the ability to understand complex cognitive process which divide attention so that many different sensory stimulus can be attended to simultaneously has been studied. In the past different theories and models have emerged attempting to delineate how such processes unfold, and how different constraints may possible affect them. However, only few such as Bottle Neck Theories are particularly relevant when examining how attention, or attentional load, impacts postural control. In line with these models, the interference that emerges during the simultaneous performance of multiple tasks is due to processes occurring during motor programming stage of the information processing continuum. This is due to the fact that (motor) programming is a serial process, which is attentional demanding. Thus, when a person is attempting to program one motor action, the presence of any secondary task results in attentional interference that jeopardizes the programming of the primary action. In the context of postural control, the magnitude of such interference differs across populations, task demands and the nature of the attentional load imposed. Previous research has investigated the impact of age, the role of different types of surfaces and different attentional tasks on balance control of older adults. However, these issues were often examined independently, as none of the previous designs examined the degree to which these factors interact together when older adults are asked to maintain balance. In this paper detailed analysis on the degree to which postural control is affected by age, different attentional tasks and environmental changes has been studied.

The first article from the IC-FeH special issue is entitled "Feasible E-Health Strategies to Reduce Maternal Mortality in Kenya" by Dr. Richard Charles Millham, Durban University of Technology, et al. In this paper maternal mortality has been studied in sub-Saharan Africa. Although e-health technologies are rapidly advancing, many technologies are infeasible given the infrastructure constraints and context of sub-Saharan Africa. In this paper, we propose and implement a feasible e-health strategy, which involves the use of simple mobile phone technology and was designed to reduce maternal mortality and neonatal rates through information dissemination, among the nomadic people within a select part of Kenya. This strategy was developed, through an interactive pilot study, to determine the most feasible technique, which was found to be SMS messages, and most appropriate customized information depending on the patient's condition and period in pregnancy. A cross-sectional randomized e-health intervention was implemented in order to determine the effectiveness of the intervention. Due to exceptional circumstances, such as a prolonged health strike, this intervention had mixed results but shows promise of both feasibility and effectiveness.

The second article from the IC-FeH is entitled "Security of E-Health Systems Using Face Recognition Based on Convolutional Neural Network" by Dr. Zhixian Chen, Beijing Institute of Technology, et al. In this paper the improvement face recognition methods for e-Health has been studied. This paper proposed a novel face recognition approach, which is based on Convolutional Neural Network (CNN). In detail, through resolving the convolutional kernel, Rectified Linear Unit (ReLU) activation function, Dropout and Batch Normalization, this novel approach reduces the number of parameters of the CNN model, improves the non-linearity of the CNN model, and alleviates overfitting of the CNN model. In these ways, the accuracy of face recognition is increased. In the experiments, the proposed approach is compared with Principal Component Analysis (PCA) and Support Vector Machine (SVM) on ORL, Cohn-Kanade and Extended Yale-B face recognition data set, and it proves that our approach is promising.

The third article from the IC-FeH SI is entitled "Crowdsensing-Based Gamification for Collective Assistance for Post-Era of Coronavirus Epidemic in Community Living" by Renfei Luo, University of Macau, et al., Crowdsensing exploits the sensing abilities offered by smart phones and users' mobility. Users can mutually help each other as a community with the aid of crowdsensing. The potential of crowdsensing has yet to be fully realized for improving public health. A protocol based on gamification to encourage data sharing and mutual assistance is proposed. The game is called "Lemmings" which stands for Location-based Mutual and Mobile Information Navigation System;

it is based on a classical video game where a group of creatures have to work and win through the puzzle game together. This game includes an asynchronized messaging system where a player may proactively seek for answers or advice by depositing a question on the messaging server. The server will automatically disseminate the question which is related to a specific location, to a group of users who are either within the proximity currently or have just recently been there. The users/players are encouraged to help each other in post-pandemic Corona-virus period; karma scoring distinguishes the most helpful users in the community.

The fourth article from the IC-FeH is entitled "Health and Well-Being Education: Extending the SCARF Learning Analytics Model for Identifying the Learner Happiness Indicators" by Tengyue Li, University of Macau, et al. In this paper the use of learning analytics (LA) for e-Health Education has been studied. With LA it is possible to be integrated in decision making. Education in schools on public health needs to evolve in response to the new knowledge and the emerging needs like how to deal with violence or eviction as well as understanding health pandemics like the Corona virus. However, in education, emotion should be considered prior to a full cognition. While negative emotions tend to make us clearly remember data including the minutest detail, positive emotions tend to help us remember more complex things. Using learning analytics, the authors based on LA extended the SCARF model to include social life indicators like happiness. The hypothesis of our extended SSCARF model has been via ignited by the experimentation and data mining from our work with a voluntary teaching program in a local rural school. The results show of SSCARF model reveals that happiness is of more value in the children's learning compared to the material wealth.

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