

pulse@UM

► Big Data in Diabetes Care: Advancing Quality and Improving Outcomes

► The Democratisation of Global Infectious Disease Surveillance Data

► Using Google Analytics for Research: A Case Study

► Deciphering radiomics signatures of breast cancer: the BREOMICS approach

► COVID-19 Bibliometrics Continues to Provide Insight and Impact of Scholarly Publications

► Risk Assessment and Surveillance System for Healthcare Workers in UMMC

► The Chronic Disease Monitoring System (ChroSMoS)

SPECIAL ISSUE

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IN MEDICINE AND HEALTHCARE RESEARCH

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FOREWORD FROM THE DEPUTY DEAN

Dear Colleagues,

Each day, for the past year, we have been bombarded with data and information about the COVID-19 pandemic, real or fake. How these data are collected, analysed and presented strongly influences decision making at all levels; from when and where to implement MCOs nationally; hospital's decision to reschedule patients' appointments; to how the public makes choices about whether or not to be vaccinated.

This first issue of PULSE@UM this year shows how our researchers use data analytics to explore and solve some of the most pressing health care problems: from the COVID-19 pandemic, diabetes care, to making hospital financial management more efficient.

Associate Professor Dr. Lim Li Ling, Prof. Dr. Sherinee and the team are building clinical registries (MeMEMORY and MeLODY) supporting big data analytics, making personalised and effective diabetes care (precision medicine). Dr. Vivek and Prof. Dr. Sanjay highlight the importance of data sharing, transparency and quality, and how public health can and must serve as a tool to examine disease epidemiology and use it as evidence to find effective solutions to mitigate the disease. Another must-read is Prof. Dr. Awang's insightful 3-pronged COVID-19 mitigation strategy - an integrated system that can capture and analyse real-time early warning syndromic surveillance data.

Another exciting highlight in this issue of PULSE@UM is how UMMC is actively championing digital health

and big data analytics, may it be in the context of a novel approach in risk stratifying diabetes patients suitable for teleconsultations; integrating COVID-19 risk assessment and surveillance for healthcare workers into the electronic medical record and human resource management systems; building a case-mix system to reduce financial insufficiency which can reduce over-or under-expenditure; and enhancing the accuracy of non-invasive breast lesion diagnosis ('virtual biopsy') using artificial intelligence (BREOMICS). All these digital solutions have a huge potential to up-scale and transfer across different disease entities and clinical disciplines.

Finally, the Faculty of Medicine Strategic Plan 2021-2025 is ready! For the Research Strategy, we will be working towards a short-, medium- and long-term plan to develop skilled and responsible researchers; promote an inter-disciplinary research partnership; and build an equitable research ecosystem.

Together, let us steer research in the right direction, especially during this time of uncertainty and constant change. ■



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<https://resfom.um.edu.my/bulletin/bulletin-pulse/>

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MESSAGE FROM THE DEAN

Welcome to the first issue of Pulse@UM of the year.

I am particularly pleased that this FOM research bulletin has been successfully compiled despite the disruptive events of the past year. PULSE@UM aims to disseminate the information of research, education and community activities conducted by our faculty members. Previous issues have been highly informative, capturing and highlighting faculty members' achievements to colleagues, collaborators and the community at large.

The production of PULSE@UM is aligned with the FOM's research strategic plan to produce impactful global research. We aim to translate research into practice that will benefit the community as a whole. FOM research strategies are underpinned by core ethical principles, interdisciplinary collaboration and equity in research resources. The access to fully equipped, advanced research facilities at the FOM and the medical centre has enabled our researchers and students to conduct various research activities focusing on knowledge creation, knowledge translation and high impact outcomes that are people centred. The FOM strategic plan is further elaborated in the Insight section of this issue.

Also highlighted is the work of our faculty on a very special research theme: Big data and artificial intelligence in medicine and healthcare research.

This is an emerging field of study that has gained significance in medicine and healthcare for its huge potential impact on the wellbeing of humanity, particularly when applied to the discovery of new diagnostics and therapeutics. Evidence-based scientific research and its analogies in

machine learning and the broader field of artificial intelligence have the potential to make a paradigm shift in the future of medicine and healthcare.

FOM researchers are now combining the agility of big data developments with the scale of artificial intelligence capabilities to accelerate healthcare delivery, leading to effective breakthroughs that greatly advance medicine in the region. The key categories of applications where these breakthroughs are taking place involve surveillance, diagnosis and treatment recommendations, patient engagement and adherence, and administrative activities. PULSE@UM Cover Stories highlights some of the changes in the nature of FOM healthcare professionals' practice in these areas as a result.

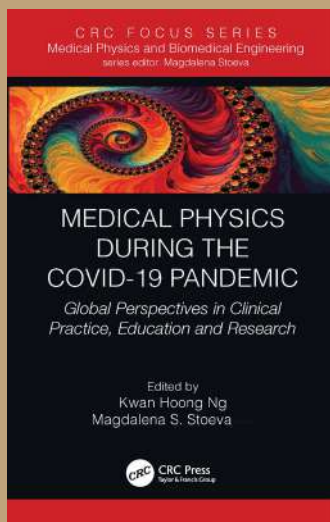
On a separate note, as the premier Malaysian medical faculty, we pride ourselves on providing high-quality training and producing many outstanding students, researchers, scientists, medical doctors and specialists. Their achievements contribute significantly to UM's standing nationally and internationally. In this issue, PULSE@UM brings to you the latest achievements of our students, faculty and alumni towards the betterment of national healthcare and community welfare.

As the newly-appointed FOM Dean, I am humbled and pleased to support and be part of our faculty members' momentous journey. I would like to thank our faculty members for their perseverance and motivation in providing training and conducting high-impact research despite the challenges during the global COVID-19 pandemic. Together, I am sure we will continue to push FOM, UM to greater heights as a global centre of research and academic excellence.

Onwards and upwards! ■

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MEDICAL PHYSICS DURING THE COVID-19 PANDEMIC

Global Perspectives in Clinical Practice, Education and Research

EDITED BY KWAN HOONG NG, MAGDALENA S. STOEVA



Spreading to every corner of the Earth, the COVID-19 virus has had an unparalleled impact on all aspects of our lives. This book explores in detail how the COVID-19 pandemic has affected clinical practice, education, and research in medical physics, and how colleagues on the frontline dealt with this unpredictable and unprecedented pandemic. It tackles key questions such as: How did medical physicists first respond to the situation? What innovative strategies were taken and how effective were they? How are medical physicists preparing for the future?

There will be a focus on the different experiences of regional medical physicists and the responses and outlooks in clinical practice, education, and research in the affected continents, Asia-Pacific, the Middle East, Europe, Africa and North and Latin America. With over 91 contributors from 39 countries, this unique resource contains key perspectives from teams from each territory to ensure a global range of accounts.

The collective opinion and wisdom from the major medical physics journal editors-in-chief are also explored, alongside how the pandemic has affected the quantity and quality of publications. Voices of early-career researchers and students of medical physics will be included, with narratives of their experiences coping with life during the pandemic. Lastly, communicating leadership in times of adversity is highlighted.

This book will be a historic account of the impact of the COVID-19 virus on the field of medical physics. It will be an ideal reference for medical physicists, medical physics trainees and students, hospital administrators, regulators, and healthcare professionals allied with medical physics.

KEY FEATURES

1. The first book to cover the impact of COVID-19 on the field of medical physics
2. Edited by two experts in the field, with chapter contributions from subject area specialists around the world
3. Broad, global coverage, ranging from the impact on teaching, research, and publishing, with unique perspectives from journal editors and students and trainees



Big Data, put simply, is the analysis of information, not only at massive volumes but of great variety and high velocity, in order to yield outcomes of substantial veracity and values. In 2012, the International Data Corporation projected the value of the digital universe to reach a mind-boggling of 40,000 Exabytes (40 × 10¹⁸ bytes) by the year 2020. Leveraging on this, Big Data has been utilised by industries worldwide for different purposes. Advancements in data science have enabled the development of machine learning and artificial intelligence that can facilitate health predictions.

real-world evidence to provide insights into diabetes epidemiology, treatment effectiveness and safety, and health economic impact. Integrating population- and individual-level data on preventive medicine; systems biology, information technology, and ecological models will enhance the implementation of precision medicine in diabetes (Figure 2). This data-driven approach is necessary to guide policy, treatment and reimbursement decision-making.

In the current unprecedented COVID-19 pandemic, real-world evidence through robust

BIG DATA IN DIABETES CARE

ADVANCING QUALITY AND IMPROVING OUTCOMES

In health care, Big Data is implemented by digitally consolidating different parameters of health information (Figure 1). This information is gathered from complex and heterogeneous platforms, including but is not limited to, electronic health records, prescription information, geospatial mobility patterns, and data from clinical trials, laboratory, imaging, digital health technology, and multi-omics analytics. This massive volume of data is compiled in a data warehouse or registry, and subsequently processed via data wrangling in order to deliver key metrics to multi-level stakeholders for health services planning, improving health outcomes and reducing health care costs in the long run.

The care of people with diabetes stands to benefit the most from the implementation of data science. In addition to genetic predisposition, rapid globalisation, urbanisation, and lifestyle transitions have accelerated the diabetes epidemic in Asian countries including Malaysia. The understanding of current diagnostic, prognostic, and therapeutic areas in diabetes has undergone evolutionary changes over the years.

To complement the findings of randomised clinical trials, there are growing demands for high-quality

data analytics has shown that people with diabetes have 1.4 to 2.4 times increased risk of death or intensive care admission, suggesting fundamental issues in the organisation and delivery of diabetes care. Given the complex care needs of people with diabetes, a multi-level and multi-component strategy is crucial to improve diabetes prevention and management (Figure 2 and Figure 3). Several high-income countries and regions including the USA, United Kingdom, Hong Kong and Singapore have successfully leveraged data to drive actions at policy, system, provider and individual levels for tackling the syndemic of type 2 diabetes and obesity (Figure 3). This nation- and territory-wide initiatives, include but are not limited to, diet-related policies (e.g., food labelling regulations, sugar-sweetened beverage taxes, healthy school food), diabetes prevention programmes, risk assessment and management programmes, and patient support programmes.



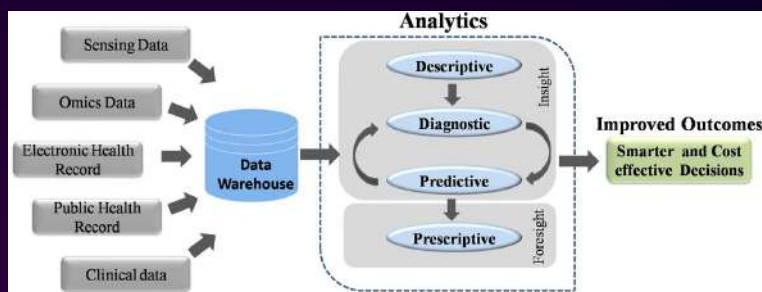


Figure 1: Workflow of Big Data analytics.

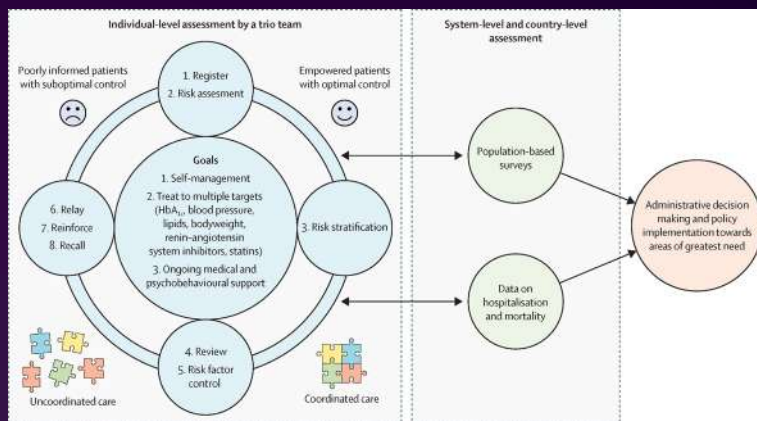


Figure 2: Transforming fragmented care into a multi-component integrated care system to support the delivery of high-quality diabetes care.

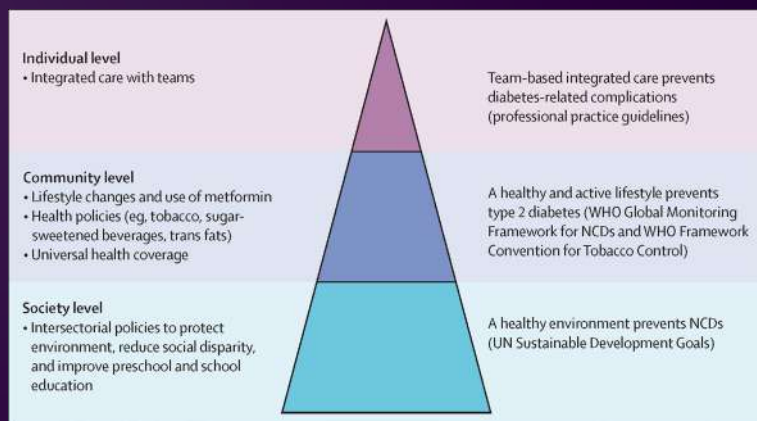


Figure 3: A conceptual framework for a multi-level and multi-component society-community-individual strategy to integrate primary and secondary prevention of diabetes.

Closer to home, there are ongoing efforts to utilise data to improve disease surveillance including the setting up of MeLODY (Multi-ethnic Lifestyle, Obesity, and Diabetes Registry in MalaYsia; contact limleeling@um.edu.my) and MeMORY (Multi-ethnic Maternal Offspring Registry in MalaYsia; contact shireene.vethakkan@gmail.com). These approaches are timely in Malaysia, given the unabated rise of diabetes

prevalence to 18.3% in 2019.

To this end, Big Data is a revolutionary tool to facilitate precision medicine in diabetes. Multi-level stakeholders including policymakers, payers, communities, health care providers, and people with diabetes must join efforts to unlock key discoveries and outline the opportunities for winning the battle against diabetes. ■

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The Democratization of Global Infectious Disease Surveillance Data

PRACTICAL CONSIDERATIONS, CONCERNS AND OPPORTUNITIES

The rapid emergence and integration of the internet, mobile phones, satellites, and sensors into everyday human life has ensured that data continues to be increasingly intertwined into the fabric of our postmodern society. In the 1990s, a single 3.5-inch floppy disk with a capacity of 1.44MB could perhaps carry a fair amount of data one generated overtime periods of days to weeks. Fast forward 30 years, and each human on the planet now produces 1.7MB of data per second. Such is the ubiquity of data within our day-to-day existence that terms such as “big data” are now viewed in an almost banal perspective.

This data revolution has in no doubt had ripples in all fields including in the surveillance of disease. The great American epidemiologist, Alexander

Langmuir, defined surveillance in 1963 as a “continued watchfulness of trend in all relevant data”- foreshadowing the concepts of velocity, volume, variety, veracity, variability and value that have become the cornerstone of big data. This intersection of big data and surveillance has led to the discipline of digital epidemiology, which promises increased precision in the identification of at-risk populations, increased efficiency of surveillance, and more targeted interventions.

We have increasingly witnessed the democratization of data in the last decade. Examples of this are 1) democratization of surveillance data - Project Tycho (<https://www.tycho.pitt.edu>) and 2) use of novel surveillance methodologies such as the mining of social



media data - Twitter API. These efforts, however, are dwarfed by the sheer scale at which the COVID-19 data machinery has so rapidly developed. In just a year, organisations such as the John-Hopkins Coronavirus resource centre, Worldometers, and Our World in Data have all assembled global data collation networks of basic surveillance aggregates. This global democratization of COVID-19 associated data has allowed for rapid development and dissemination of data visualisation and data analytics.

Nonetheless, in mining and utilising these data sources there remain several important practical considerations. Despite movements within the open data space within the last decade- COVID-19 has again highlighted the reluctance of authorities to report data with complete transparency (Neill, 2020). Instead, data has been reported in portions, in inconsistent locations, in non-standard formats, contravening typical conventions of data storage and with no detailed descriptions of the data structure.

Data, be it aggregates of cases or deaths, is eventually a reflection of a public health apparatus which are dynamic both across national boundaries and time. It is useful to think of a disease as an iceberg- with the public health apparatus a camera capturing a picture of the said iceberg. A more efficient camera would have the capacity to capture images in greater resolution and size- possibly even capturing portions of the iceberg that are underwater.

Just as the internet has served as an information superhighway that can be accessed from the comfort of your home, the accessibility of surveillance data within the COVID-19 epidemic has been almost universal. Early in the pandemic, this led to many non-experts wading into the field of infectious disease, and epidemiology earning themselves the moniker of "armchair epidemiologist." This led to a deluge of data visualisation and analytics creating an "infodemic"- an environment that very quickly led to factions and followings on social media with a host of narratives and counter-narratives

The Covid-19 pandemic is far from over. There is also the threat of larger future pandemics by other emerging and re-emerging infectious diseases. We need further democratization of data and further evolution of the digital epidemiology discipline to be better prepared. ■



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Web-based apps have been widely used as a form of health intervention. Studies have shown that web-based apps are effective in changing health behaviour. However, to understand how to implement web-based apps in a real-world setting, a form of monitoring is necessary. One of the tools that is currently available for free is Google Analytics (GA). GA is a free tool that can be used to monitor web-traffic by tracking and analysing web-traffic data. It provides some insights into the behaviour of people that access the website by monitoring data such as number of visits, duration, pages accessed and user location.

In this case study, we used ScreenMen, a web-based app that was developed to increase the uptake of screening in men. ScreenMen undertook a rigorous and systematic development process based on theories, evidence and needs of men. ScreenMen targets men between 20 and 50 years of age as this group of men usually do not go for health screening. ScreenMen can be accessed easily via various

platforms including laptop, desktop and mobile devices, as long as a web-browser and internet connection are available. A pilot study is currently being conducted to implement ScreenMen in a government health clinic. By using GA, we are able to determine the number of patients who accessed and completed ScreenMen; and the time taken to complete the screening process using ScreenMen. A unique QR code is generated for each promotional material (e.g., pamphlet, bunting, banner) in the health clinic so that it allows the

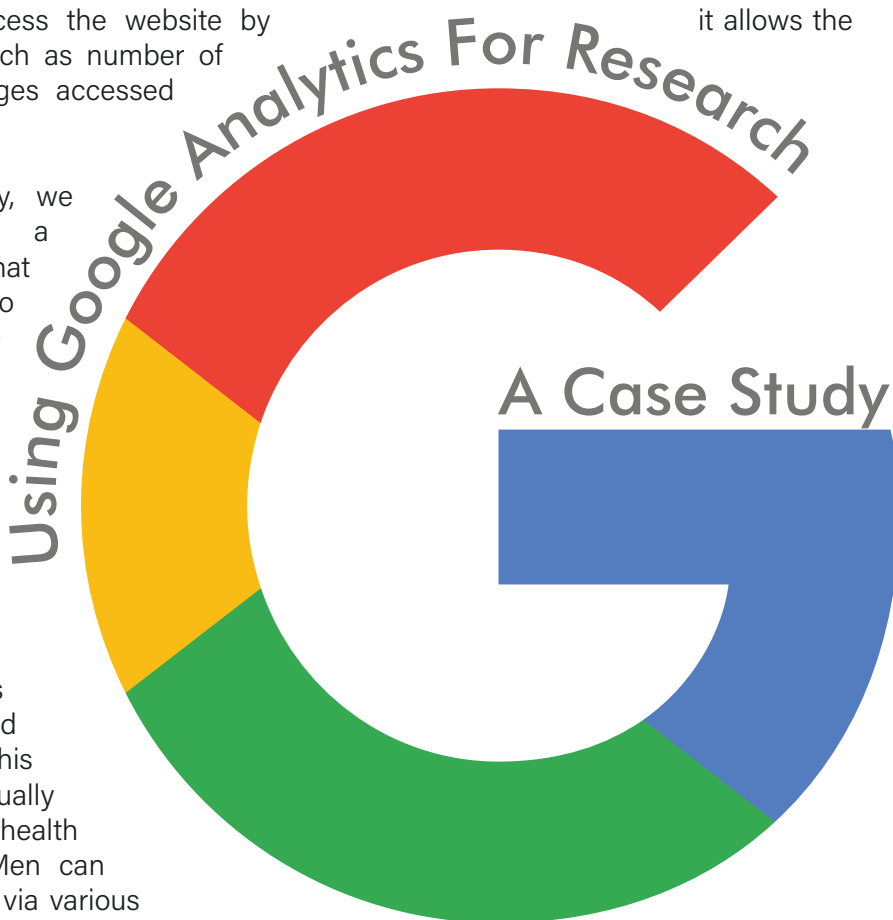


Image Source: Google



researcher to identify how men prefer to access ScreenMen.

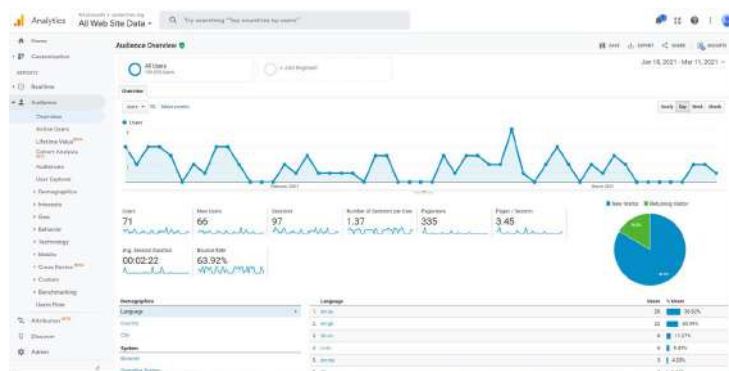
The main strength of using GA as a data collection method is that it can easily capture comprehensive data on user behaviour. For example, we are able to track every single user who accessed ScreenMen: the time, duration and each web page accessed in the web-based app. We are also able to track the users based on their location, the types of platform, and number of times they accessed ScreenMen.

However, GA has its limitations; ascertaining the validity of the data can be a problem. For example, in our study, we are looking at men using ScreenMen but we cannot be certain if the users are men or women. Another validity issue is the duration of using ScreenMen; if the user is idle while accessing ScreenMen, the duration of completing the web-based app will be longer than expected.

Overall, GA is a good tool to collect data on web-traffic and user behaviour in using



Image Source: Google



a web-based app. However, other forms of evaluation are necessary to complement GA as a data collection and analytic tool. Future studies should look into the effectiveness of using GA as part of the process evaluation of web-based apps. ■

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Image : Ang Qi Xuan

According to GLOBOCAN 2018, 18.1 million new breast cancer cases and 9.6 million breast cancer deaths were reported worldwide. It is the second most common cancer, representing 11.6% of all cancers in females after lung cancer. Breast cancer, if detected and treated early, would result in a better prognosis for patients. Whilst mammography has been proven to reduce breast cancer mortality, its sensitivity decreases in younger women and women with mammographically dense breasts (Figure 1).

Currently, histopathological diagnosis from a biopsy or surgical specimen is the gold standard for the determination of breast cancer subtypes. However, it has been associated with adverse clinical outcomes and variable responses between patients with the same diagnosis and treatment.

Furthermore, biopsy is prone to under-sampling due to the heterogeneous nature of the lesion.

Deciphering Radiomics Signatures of Breast Cancer the **BREOMICS** approach

In contrast, imaging modalities such as mammography, ultrasound, and magnetic resonance imaging (MRI) can visualise the whole breast lesion and its heterogeneous nature. Conventional radiological practise involves subjective perceptual skills in the diagnosis and stratification of breast cancer risks, leading to variations across interpreters and the adverse effect of fatigue.

In addressing subjective radiological interpreters' limitations, computer-aided detection /diagnosis (CAD) systems based on different machine learning algorithms have been developed and deployed in some commercial mammography systems since 1998. In the last decade, deep learning-based artificial intelligence (AI) systems in medicine have also gained momentum.

Here, researchers from the Faculty of Medicine, in collaboration with the Faculty of Computer Science & Information Technology, took on the approach of exploring radiomics features of breast cancer. This project, code-named "BREOMICS" stands for (BREast radiOMICS), attempts to decipher breast cancer through the revolutionary use of radiology image datasets.

Radiomics is the extraction of a vast amount of quantitative features from digital medical images,

Image : Ang Qi Xuan

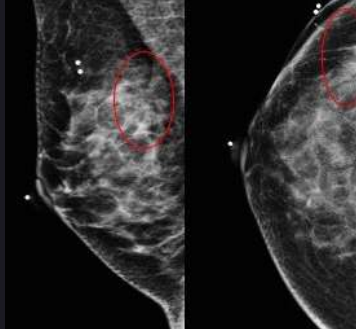


Figure 1: Mammographic images of a dense breast with an ill-defined tumour

not usually visible to the naked human eye, through high output computing to produce image-based tumour phenotyping. The central idea behind the concept of radiomics is that the quantitative image features (also called image phenotypes) reflect the tissue or disease. In other words, medical images are not just images; they are data that can be mined.

Radiomics involves image acquisition -> image segmentation -> radiomics feature extractions -> feature reduction -> radiomics modelling. There are two different approaches to radiomics, the conventional handcraft radiomics and the deep learning-based approach (Figure 2).

Handcraft or conventional radiomics mainly extract and select features such as histogram, morphology, wavelet feature from the medical images after the pre-processing steps such as denoising, normalisation and segmentation. Accurate

segmentation is usually performed by radiologists. Hence, it is very human-dependent. Deep learning radiomics, on the other hand, employs end-to-end learning, a learning mechanism where the training of a system is represented by only a single model, bypassing the intermediate layers usually presented in conventional handcraft radiomics pipeline designs. However, the full advantage of deep learning radiomics needs to leverage on big data availability, the close inter-discipline collaboration between clinical experts, medical physicists and computer science specialists.

Recent improvements in deep learning radiomics (DLR) extracting high-level features from medical imaging could promote the performance of computer-aided diagnosis (CAD) for cancer. Deep learning-based approach has been utilised in different parts of the radiomics process.

In the era of precision medicine, BREOMICS aims for a total understanding of breast cancer which will uncover the

intrinsic relationship between various radiologic imaging phenotypes with other breast cancer biomarkers, able to interrogate the whole breast lesion with a single "virtual biopsy", providing an accurate differential diagnosis of breast lesions, towards a more precise and personalised treatment. ■

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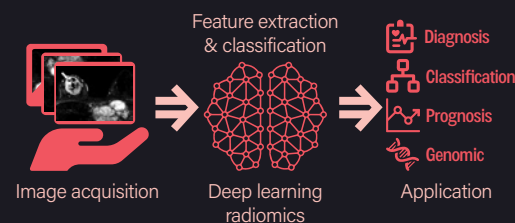


Figure 2: Deep learning-based radiomics



COVID-19 Bibliometrics Continues to Provide Insight and Impact of Scholarly Publications

Together with team members - Associate Professor Kiran Kaur (UM); Associate Professor Noorhidawati (UM); Dr. Yanti Idayu Aspura (UM); Dr. Anjanna Kukreja (UMMC); Associate Professor Yeong Chai Hong (Taylor University); Dr. Ray Kemp (UK); and Mae Geraldine Charles (UM), Professor Ng Kwan Hoong has earlier developed a web-based resource for accessing new research publications on Covid-19 using bibliometric measures (www.covid19bibliometrics.org).

Since its launch in April 2020, the COVID-19 Bibliometrics project led by Prof Ng Kwan Hoong continues to provide

weekly insight and updates on selected publications (www.covid19bibliometrics.org). The Bibliometrics is linked to the Malaysian National Institute of Health homepage (<http://library.nih.gov.my/web/guest/covid-19>). Besides the COVID-19 Bibliometrics, pdf files are also archived in Zenodo repository, (an open-access repository developed under the European OpenAIRE programme and operated by CERN. (<https://zenodo.org/communities/covid19bibliometrics>)).

While scientists are turning their attention to COVID-19, related scholarly publications have increased

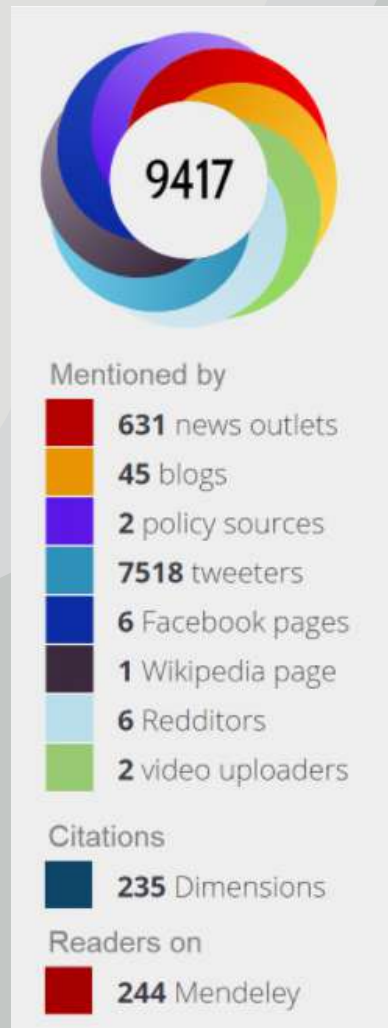


Figure 1 : The almetrics of Covid-19 articles

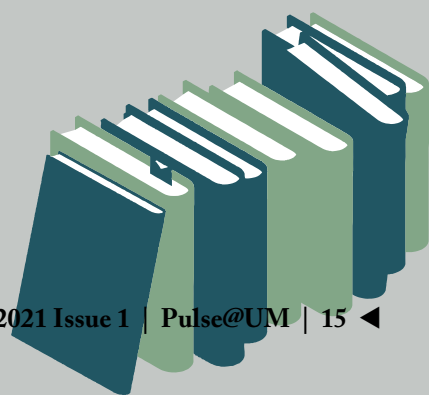
The altmetrics was adapted from a publication titled "It is time to address airborne transmission of Coronavirus Disease 2019 (COVID-19)" (<https://www.altmetric.com/details/85310761>, as of 22 Feb 2021), showing the popularity of social media as a platform in searching for COVID-19 related information.

tremendously since March 2020, as found in Scopus and Web of Sciences index databases. However, little is known about how these publications are impacting the society since the citation metric takes time to gather the citation counts and may not capture the actual usage and impact. Hence, the team began to investigate the altmetric features such as readership of the publications, and how these publications were disseminated to the society through social media channels. Figure 1 shows the almetrics of COVID-19 related articles which provides evidence that social media has now become an important platform for information generation, dissemination, and consumption. ■

AUTHOR



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RISK ASSESSMENT & SURVEILLANCE SYSTEM

FOR HEALTHCARE WORKERS IN UMMC

The COVID-19 pandemic has greatly impacted the country, especially among the healthcare workers (HCWs) at the frontline. Thus, risk assessment is crucial and forms the basis for managing the risk of HCWs for COVID-19, including those in the University Malaya Medical Centre (UMMC). The risk assessment consists of the assessment of both: i) hospital environment to identify areas within UMMC with the risk of SARS-CoV-2 transmission and ii) HCWs who have been exposed to COVID-19 patients within the hospital environment and the community.

The ability to categorise the risk based on exposure is essential to ensure the containment of the spread of COVID-19 among our HCWs. Since beginning of the pandemic, the risk criteria for COVID-19 were established in UMMC based on the guidelines of the World Health Organization (WHO), the United States - Centre for Disease Control and Prevention (US-CDC) and the Ministry of Health Malaysia. Initially, the risk assessment was conducted manually to assess the HCWs at risk by a surveillance team. The labour-intensive



Figure 1: The UMMC COVID-19 surveillance team

approach required more than 30 people to work in the surveillance team. With the collaborative efforts from the UMMC Information Technology Department and the input from the Public Health Department and Occupational Safety and Health (OSHE) Unit of the Faculty of Medicine, University of Malaya, the manual system was replaced with an online risk assessment and surveillance system. This online system integrates the risk assessment and surveillance to the UMMC electrical medical records (EMR) and human resource (HR) system, creating a more streamlined communication platform and removes the labour redundancy. With this, the HCWs in UMMC can now be assessed and rated immediately. The digitalised data also provides real-time risk monitoring of HCWs while synchronising the administrative execution between the management and HR of UMMC. ■

Figure 2: The surveillance team working on the online system

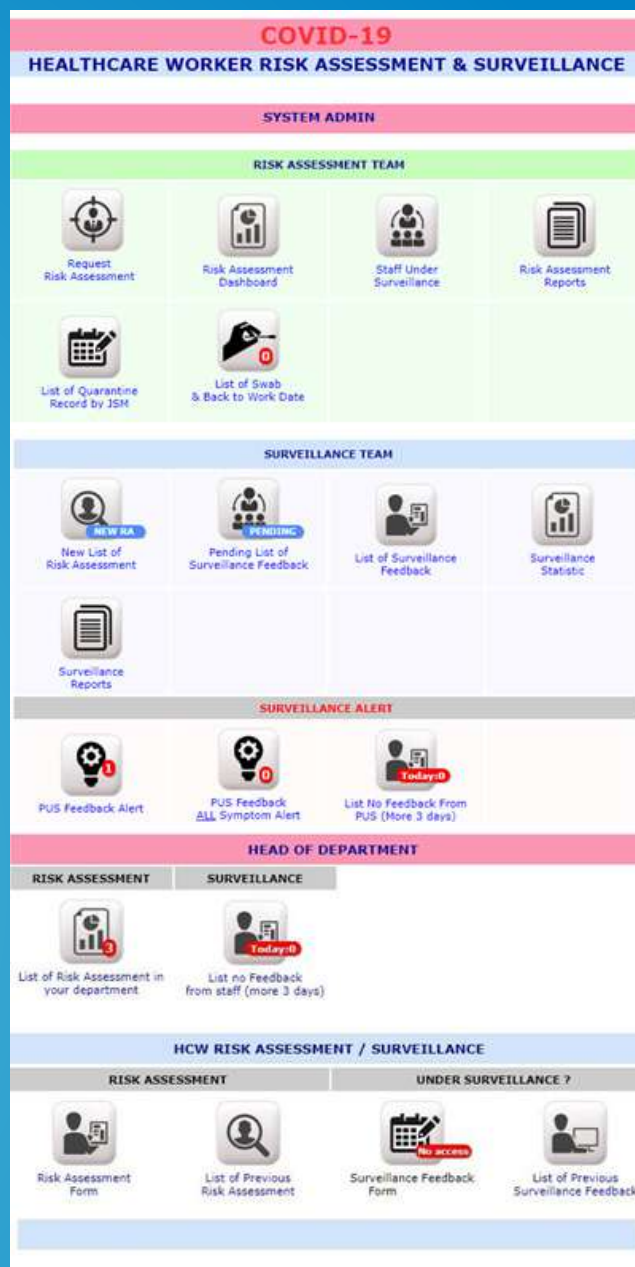


Figure 3: User interface for COVID-19 HCW Risk Assessment and Surveillance

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CHROMOS

The Chronic Disease Monitoring System

COVERD-19 pandemic has affected the service provision for patients with chronic diseases, who are main users of the healthcare services even before the outbreak. Scheduled follow-up consultations for patients with chronic diseases have been interrupted to reduce the risk of transmission of COVID-19 to this high-risk population, as well as to channel the workforce and service to focus on the care for patients with COVID-19 infection.

Patients with chronic diseases, particularly those with Type 2 diabetes mellitus (T2DM) need regular monitoring for their disease control and complications. The postponement of their follow up appointments may disrupt the continuity of care, which is necessary for identifying signs of poor control and early signs of diabetic complications. However, turning up at outpatient clinics may expose them to the risk of getting COVID-19 infection. Patients with T2DM have been found to be at higher risk of severe pneumonia and poorer prognosis, compared to other patients.

Telemedicine, particularly teleconsultation, could be a potential solution to address these problems by allowing continuous monitoring of the disease during the pandemic, and at the same time, not exposing the patients to risks of acquiring COVID-19. Studies

have shown that telemedicine can achieve health outcomes similar to face-to-face consultations. As such, it can improve the control of blood glucose among patients with T2DM and is practical as well as cost-effective. In addition, telemedicine has been successfully implemented, with high levels of patient satisfaction.

Despite the established benefits of telemedicine, it may not be suitable for all patients. Therefore, a group of researchers developed the Chronic Disease Monitoring System (ChroSMoS) – a novel teleconsultation risk stratification system for patients with T2DM. We hope that this system will help doctors to identify and prioritise patients to receive either face-to-face care or teleconsultation for monitoring of their chronic disease, based on their risks and profile. The research team comprises researchers and clinicians from the Department of Primary Care Medicine, Faculty of Languages & Linguistics, and

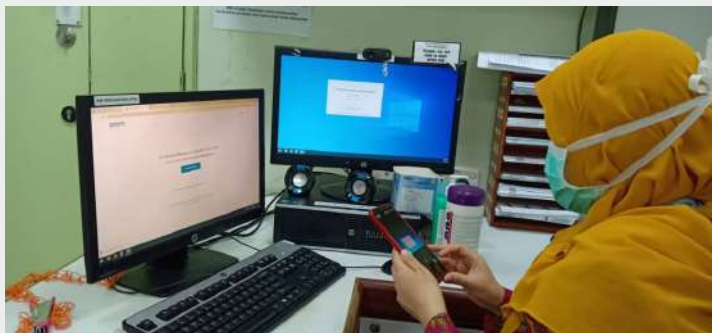


Figure 1: Teleconsultation was being set up in the clinic

Faculty of Computer Science & Information Technology, University of Malaya. Currently, the ChroSMoS project has just completed the Phase 1 of the study which aimed to explore the factors influencing doctors' decision on appropriateness of teleconsultation for following up patients with T2DM. This will be followed by Phase 2, where the technical team will develop a risk stratification system which could be integrated into an electronic medical record system. Phase 3 aims to evaluate the feasibility of implementing the system for patients with T2DM. In view of the large number of patients with T2DM who come for follow-up at the UMMC, we hope that this system will aid

doctors to carefully select the patients who are suitable for a teleconsultation in a systematic manner.■

AUTHORS



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References:

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Figure 2: Teleconsultation training session for primary care doctors





Impactful Global Research: Faculty of Medicine's Strategic Plan 2021 – 2025

In the recently unveiled Faculty of Medicine (FOM)'s Strategic plan for 2021-2025, impactful global research is one of the four thrust areas; other thrust areas include academic excellence, people and empowerment, and infrastructure and financial sustainability. With the aim to translate research findings from the "Bench" to the "Community", FOM hopes to focus on high-quality research in discovery medicine, precision medicine and people-centred medicine that will enable translation of new knowledge into tangible impact that will benefit the people and society and help address key health problems. Innovative research methods including translational science, data-to-care science, decision science and implementation science will be among the driving forces of FOM research priorities, as illustrated in Figure 1.

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Moving towards the vision of impactful global research, three essential goals with aligned strategies have been identified, as follows:

Goal 1: Skilled and ethical researchers

To create and implement a comprehensive research training programme and ensure ethical conduct of research

Goal 2: Interdisciplinary research partnership

To facilitate collaborations between researchers, create and empower interdisciplinary research interest groups, and engage and involve communities in research

Goal 3: Equitable research ecosystem

To allocate grants equitably for impactful research and to provide accessible and sustainable research resources

Image : freepik / pchvector

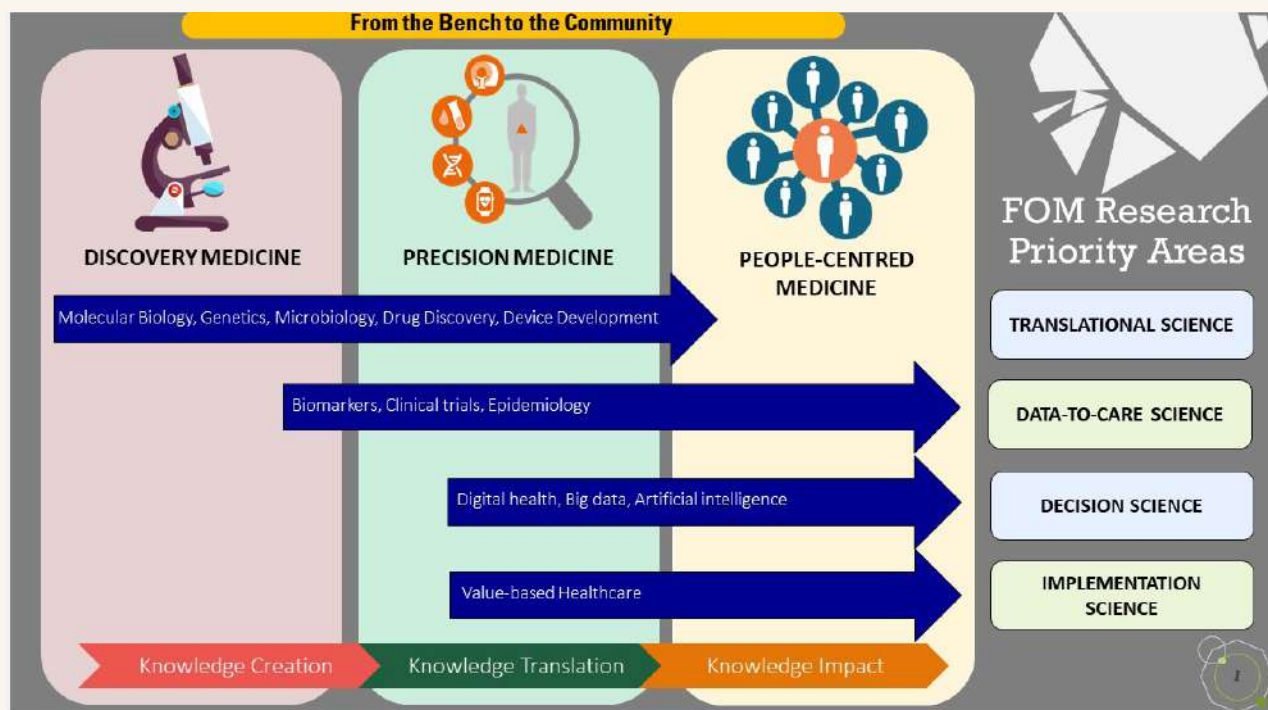


Figure 1: FOM Research Priority Areas



Image : freepik / pchvector

CASE-MIX DIVISION and the relevance of the division in UMMC

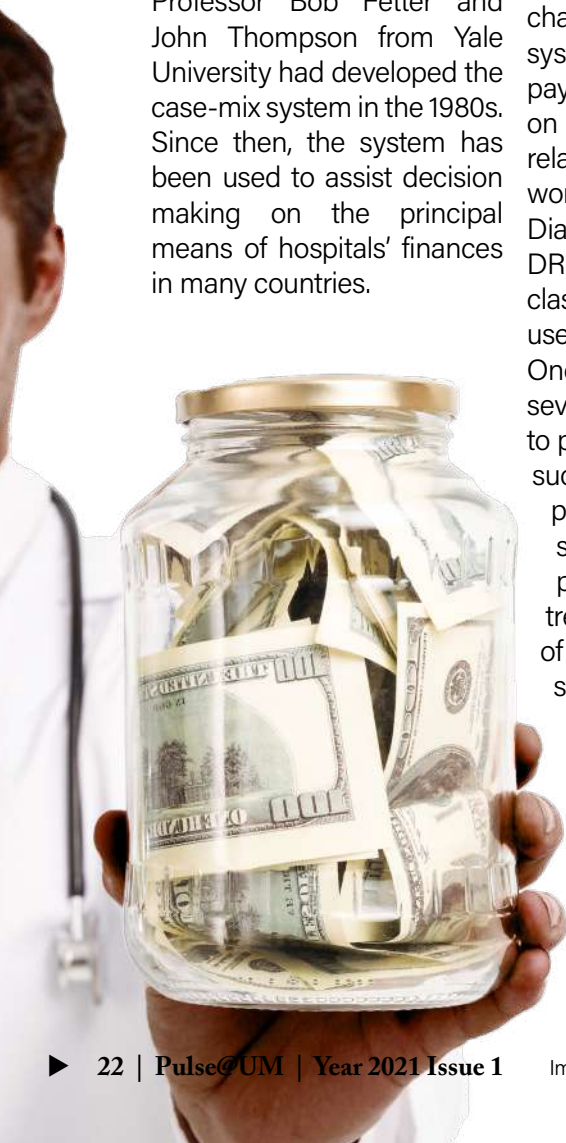
Efficiency is the key to effective management in a hospital especially with regards to the finances of the hospital. Without a proper system in place, a hospital may over- or under-spend, thus affecting the whole system and services. To address this concern, Professor Bob Fetter and John Thompson from Yale University had developed the case-mix system in the 1980s. Since then, the system has been used to assist decision making on the principal means of hospitals' finances in many countries.

What is a case-mix system?

It is a system that provides a classification of patient treatment episodes designed to classes, which are relatively homogenous with respect to the resources used, and which contain information on patients with similar clinical characteristics. A case-mix system provides prospective payment to hospitals based on the hospital's diagnosis-related group (DRG) workloads. What is DRG or Diagnosis-Related Group? DRG is the best-known classification system that is used in the case-mix system. One DRG code consists of several inputs that are related to patient treatment episodes such as the age of the patient, principal diagnosis, secondary diagnosis, procedures performed, treatment received, severity of the diagnosis, length of stay, and discharge status.

Apart from providing prospective payment to the hospital, the system also standardises the reimbursement to the hospital based on DRG. The prospective payment and reimbursement will be done based on the standardised care given and resources used within the DRG. When the cost of treating a specific patient is unusually high compared to other patients within the same DRG classification, the case will be classified as an outlier. Cases that are classified as outliers cause wastefulness of resources and results in inefficiency of hospital management. Case-mix system helps to increase efficiency and quality of hospital care, improves transparency in hospital activities and encourages cost containment initiatives. Apart from that, the system can also be used to assess the performance of the hospital in general, or the individual clinician in specific, in terms of quality of care, resources utilisation and clinical outcome.

What are the benefits of Case-Mix and DRG?



Case-Mix in Malaysia

In Malaysia, the annual budget received by the majority of the Ministry of Health's hospitals is based on the capitation methods. Hospitals are required to manage their own finances. As mentioned, financial inefficiency will cause hospitals to over- or under-spend and will especially affect future budget. To date, several university hospitals in Malaysia have been using the case-mix system, and it was documented that the system can be quickly implemented and produces quality results, for better management of the hospitals. UMMC has moved forward with the establishment of a new department of case-mix in the hospital.

Relevance of Case-Mix Division in UMMC

The Case-Mix Division was established with the main objective of developing and implementing a case-mix methodology to support more efficient management of health resources. This division is of foremost importance in UMMC, and its relevance will become more important in the near future due to the uncertain global economics

brought by the COVID-19, predicted to prevail at least until the end of next year. The Case-Mix Division will be the ultimate resolution towards managing the finances of UMMC efficiently. Without the case-mix system, there will be variations in clinical treatment and resources used to treat similar disease in the same DRG code. This will result in variations in average waiting time during clinic visits, length-of-stay in the hospital, investigations conducted and treatment given. Subsequently, it will also affect the medical costs incurred and the clinical prognosis of the patient and reflect the hospital's performance in terms of financial and clinical outcomes.

In a Nutshell

Case-mix system helps to increase the efficiency and quality of hospital care, improves transparency in hospital activities and encourages cost containment initiatives. The system can also be used to assess the

performance of the hospital in general, or individual clinician in specific, in terms of quality of care, resources utilisation and clinical outcome. ■

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Image : freepik / drobotdean



BIG DATA ANALYTICS FOR COVID-19



During this COVID-19 pandemic, Malaysia's approach in containing infections has been very traditional. This means that an infection was generally identified a few days after it had happened and after the patient had already been in contact with a number of people. Contact tracing and testing were then instituted, and known contacts were identified and traced. The disadvantage of this approach is the delay in identifying a case and subsequent contacts. As a result, clusters tended to be large and the infection had usually spread to many people before it could be contained. There is no early warning system to warn people of infections in the community. What is required is a good integrated system for big data collection, an extensive real-time early warning syndromic surveillance system and the capacity to analyse this big data in real-time.

The first thing that is required is an integrated big data system for public health. This requires personal, immigration, travel, payment and telecommunication data to be integrated into the public health surveillance system. Once the location for the source of infection is known, all travellers can then be located, contacted and tested for infection before they have the opportunity to spread the disease. Their contacts can also be located quickly and if necessary quarantined before other cases develop.

The second thing that we need is an

extensive real-time syndromic surveillance to alert health authorities on the possibility of a new cluster forming in the community. Clues about a spike in cases can be found if we have a good surveillance system in place. This can be done quite easily if an online reporting system is set up in all Ministry of Health and private clinics, which have internet access, to form part of an early warning system. As COVID-19 has only a few symptoms that need to be monitored, patients with certain specific symptoms should have their details captured in the system. Eventually, this data should be transmitted to a central location like the state or national disease control agency, to ensure no delay in the analysis. Data analysis should be done daily (automated if needed) and compared to baseline levels of such symptoms. If unusual symptomatic spikes are detected, targeted testing and contact tracing can be carried out in those localities for possible COVID-19 cases, where action can be taken early to contain any new cluster.

Lastly, all these data systems and databases can only be optimally integrated and analysed if there is real-time data sharing and consultation with experts. With technologies readily available in the country, it is believed that the data can be integrated, in real-time and analysed quickly. ■

AUTHOR



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The Evolutionary Tales of Haematology

An inaugural lecture entitled, "The Evolutionary Tales of Haematology" was delivered on 26th January 2021 by Professor Dr Gan Shiaw Sze @ Gan Gin Gin, who is Professor of Internal Medicine and Clinical Haematology at the Department of Medicine, Faculty of Medicine, University of Malaya. She graduated with honours from University of New South Wales, Australia in 1992.

As the head of clinical haematology unit from 2003 up till 2018, she was instrumental in improving the haematology day care services and expanding the haematology clinical services in University Malaya Medical Centre. She is also the first haematologist to perform matched unrelated donor haematopoietic stem cell transplant in an adult patient in Malaysia. Her primary research interest is in genetic polymorphisms in haematological related diseases and haematopoietic stem cell transplantation.

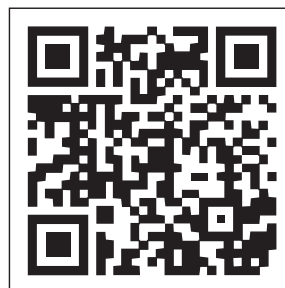
In her lecture, Professor Dr Gan Shiaw Sze @ Gan Gin Gin shared with the audience that haematology is a field that many are not too familiar with. She described haematology as a branch of medicine, dedicated to the study of blood and its disorders. Over the past few decades, the field of haematology has advanced and evolved at lightning speed. Knowledge gained through research and clinical studies has significantly improved the understanding of blood disorders. Insights into the molecular and genetic levels have resulted in numerous innovations and novel findings.

A snapshot of some of the seminal discoveries in haematology was described in the lecture. Chronic myeloid leukaemia was used as an example to explain how basic research can revolutionise treatment approaches, which ultimately lead to significant improvement in patients' survival and quality of life. Haematopoietic stem cell transplantation is another ground-breaking advancement that was highlighted in her lecture. Haematopoietic stem cell transplantation has not

only saved many lives, but also laid the foundation for immunotherapy. Immunotherapy is a new approach that utilises our own immune systems to identify and control diseases such as cancer. Cancer immunotherapy is probably one of the most innovative technologies in modern medicine. Parallel with immunotherapy, gene therapy is another rapidly evolving therapeutic approach which offers potential cure for patients with inherited blood disorders such as haemophilia and thalassemia.

At the end of her talk, Professor Dr Gan Shiaw Sze @ Gan Gin Gin concluded that haematology is a dynamic field in which many exciting innovations have evolved, changing the way patients and diseases are managed.■

The full video of Professor Dr Gan Shiaw Sze @ Gan Gin Gin's inaugural lecture is available at:





Connect the DOTS

Moving Forward!

Everyone who will graduate from the Faculty of Medicine, would often wonder how the medical school prepares them for life beyond the corridors of the university. We often have an idealistic approach to what medicine is with a 'me against the world attitude' and wanting to save everyone we can. Later, reality bites when we are bogged down by some mundane clinical work and become frustrated if our perceived career does not pan out as planned.

A bit of background first on how it all started for me. The year was 1998 and I was starting my houseman ship training in Sabah. Then, there were a few areas of specialisation like neurosurgery, vascular surgery and cardiothoracic surgery that were not available in Kota Kinabalu. Due to that we often transferred patients on commercial flights back to Kuala Lumpur for further care. Those were the days that the field of aeromedicine was not that developed in Malaysia and airport security was not as strict as it is now. We used to bring blood and carry oxygen cylinders on board with the security personnel merely waving us on

as it was a routine sight.

It was only in 2003 that I was formally trained to perform transportation of critically ill patients when I signed up to be a medical escort doctor with a private medical assistance company on an ad-hoc basis while pursuing my postgraduate training in Anaesthesiology and Critical Care. I did my first mission then with Dato Col Rtd Dr Jaseemuddeen Abu Bakar, who was the senior mission doctor for the repatriation of sick ventilated patients from Miri to Subang. That first mission has extended into many different adventures for both of us as we would frequently work on cases together. Jaseem had many years of experience from his time in the military, fulfilling various missions overseas and being deployed to conflict zones. He started dabbling in various critical transport using helicopters and of course, the mother of all planes involved in aeromedical evacuation - C130.

Apart from Dato Col Rtd Dr Jaseemuddeen Abu Bakar who completed his Masters in Anaesthesia from University of Malaya as Class of 1997, Dr. Tajuddin Ahmad from the class of 1993 and Dr Shahridan Fathil from the class of 1996 joined us in setting up a



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society that will be able to focus on this work - Society of Aeromedicine Malaysia (SAMM). The idea of SAMM came about when we thought that there might be like minded individuals who may be able to offer their time and expertise to help Malaysians. Therefore, besides our usual work in hospitals where we are attached to, we regularly receive requests to help patients who are stranded in hospitals overseas and unable to return home because of their medical illnesses.

In the last 5 years, we have

helped at least 3 patients every year without charging them. Of course, some of these were highlighted by the press as crowdfunding was involved, and it generated a lot of publicity. Among the more notable ones were baby Ainul Mardhiah, a critically ill baby whom we moved to London and back for her surgery.

Therefore, our advice to future graduates is that sometimes, we just have to trust the process and connect the dots moving

forward. You may not know why you are doing certain things now and feel tired doing it. Do not. Hopefully, it will all become clear when you look back many years from now. All the best in your future undertakings. ■





Healthy shopping



COOKING COMPETITION

HEALTHY FAMILIES

REACHING OUT TO THE COMMUNITY

TOWARDS A HEALTHY LIFESTYLE

Healthy Families' is a successful community programme designed for the health and wellbeing of a community that provides personalised family coaching to increase health literacy and promotes healthy lifestyle among the B40 economic group in Taman Medan Cahaya, Petaling Jaya, Selangor, Malaysia. Using existing infrastructure and expertise from various organisations such as the Faculty of Medicine, University of Malaya, NGOs, Ministry of Health (MOH) as well as academics, local authority and the local parliamentary representative team, the community was able to identify their health issues and challenges faced when wanting to practice healthy lifestyles. The 1st programme was carried out from January to June 2019 with participation from 50 families, funded by the local politician while the 2nd

programme was carried out from October 2019 to April 2020 with another 50 families and was financially supported by the Sime Darby Foundation.

In line with the objectives of the programme, several activities were conducted for over six months such as lifestyle coaching sessions for families with at least one household member with a chronic disease, weekly boot camp, public exercises such as Zumba classes, workshops on nutrition, supermarket sweep aimed at smart and healthy shopping as well as health campaigns and seminars for the families identified as participants and all the people in the community. The participants of the programme were willing to be involved in the activities planned for them throughout the programme. The strength of the programme is that local volunteers were involved in

the planning stage and they had also engaged their fellow members of the community who had cooperated during the implementation of the various health interventions. Although they were conducted for only six months, both programmes have resulted in some positive changes, for instance, the mean weight loss of the participants ranged from 2.0kg to 2.8kg per person, with bigger differences observed among those who were obese. The daily food consumption was also reported to be healthier with higher fruits and vegetables intake as well as increase in drinking plain water.

The COVID-19 pandemic declared in February 2020, however, posed a challenge to the Healthy Families 2.0 programme. During the pandemic, the health education materials were disseminated via emails, WhatsApp groups and Facebook. Despite the different approaches, both programmes had been successful with similar positive changes observed. It was very



EXERCISE activity



Zumba



LAUNCHING 50 Healthy Families 2.0



NUTRITION Talk



VIRTUAL CLOSING CEREMONY

encouraging to see that the participants from the first programme continued with their Zumba classes and communication (on what healthy menus are and where to get healthy food, etc.) even after the programme had ended. This could be seen from postings in their social media network. More importantly, the participants were satisfied and happy with the personal coaching while the community at large had benefited from the health education campaigns and the navigated health care access. A good rapport had been developed and local networking had been established which would facilitate future community engagement. These programmes provide evidence that empowering the people to practice a healthy lifestyle could result

in them sustaining the efforts to in implementing health interventions.

Special thanks to the team who was involved in the planning, and successful implementation of the programme. The team consists of academicians from the Faculty of Medicine, University of Malaya headed by Dato' Prof. Dr Adeeba Kamarulzaman; the Member of Parliament for Petaling Jaya P105, YB Maria Chin Abdullah; Mrs. Ong I-Ping, the coordinator of the programme; Mrs. Chang Feng Leng and Mrs. Lina Naamali, staff of the Sime Darby Foundation staffs; the project executive, Mrs. Siti Rukhaiyah Safren; the team members from the Ministry of Health, Taman Medan Health Clinic, led by Dr Vickneswari Ayadurai and Dr Menaga Kaliyana Sundaram and the list of people who worked

behind the scene to make this programme a success namely Prof. Dr Maznah Dahlui, Prof. Dr Moy Foong Ming, Assoc. Prof. Dr Mohd Nahar Azmi Mohamed, Mrs. Nur Asyikin Yakub, Mrs. Siti Rukhaiyah Safren, Dr. Mohd Aizat Mohd Zain, Mr. Hanif Sabtu, Mrs. Asiah Ishak, and Mrs. Nuratiqah Farhana Md Zam and last but not least the community of Taman Medan Cahaya as participants of this programme. ■

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Awards & Achievements



1

Honorary Fellowship of the American Society of Colon and Rectal Surgeons (ASCRS)

Professor April Camilla Roslani

Dean, Faculty of Medicine



ASCRS is a professional medical society that champions standards and advancement within the specialty of colon and rectal surgery, providing many opportunities for networking, research, training and education designed for the colon and rectal surgeon.

2

Member of the World Health Organization (WHO) Science Council

Professor Dato' Dr Adeeba Kamarulzaman

Professor of Infectious Diseases

The WHO Science Council is a high-level Scientific Advisory Group which act as the voice of Scientific leadership and will advise on advances in science and technology that could directly impact global health.



3

Early Career Medical Physicists Scholarship Award

by the Winter Institute of Medical Physics/ "Class of 2021 Early Career Scholars"

Ms. Umi Nabilah Ismail

2nd year PhD student,

Department of Biomedical Imaging



Title: Feasibility of marrow adipose tissue quantification using MRI as a biomarker for β -thalassemia.

4

11th Creation, Innovation, Technology & Research Exposition (CITREX) 2021
on 7th of April 2021

Gold Award:

Dr. Wong Kah Hui

Department of Anatomy

Ms. Lew Sze Yuen PhD candidate

Department of Anatomy



Title of Entry: NevGro® for mental and emotional wellbeing

5

Siriraj International Medical Microbiology, Parasitology and Immunology
Competition (SIMPIC) from 13th to 14th of March 2021

Silver Medal:

Clara Wong Zi Yi UMMP Stage 3.2

Lee Zheng Yang UMMP Stage 3.1

Bronze Medal: **Leon Guo Jian** UMMP Stage 3.1



6

10th Inter-Varsity Medic Olympiad (IVMO) 2021
on 10th of April 2021 organised by the Faculty of Medicine, Universiti Teknologi MARA
(UiTM), Sg Buloh Campus

Second place category A014:

Soo Yong Long UMMP Stage 2

Second place category A015:

Ng Kai Jian UMMP Stage 2

First place category G015:

Janice Ko Keh Shin, Teo Chiu Yee,

Leong Jia Ting, Alya Shaqirah Azraq UMMP Stage 2



7

International Debate Competition
supported and hosted by the Indian Association of Geriatrics

Second Prize:

Santia K.Lingam UMMP Stage 3.1

John Paul Sim UMMP Stage 2

Topic of the final debate: EUTHANASIA IS ETHICAL: Why Prolong Painful Existence.

8

TIPH Global Ambassador Award
by the Global Network for Academic Public Health

Professor Dr Woo Yin Ling

Department of Obstetrics and Gynaecology

Ms Khoo Su Pei PhD candidate

Department of Obstetrics and Gynaecology





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