(08)
生醫永續：北科生醫健康論壇 2024 產學交流平台

Shaping the Future of Sustainable Biomedicine: Intelligent Medicine Conference of Beitou Shilin Biotechnology Park

時　　間：113 年 6 月 22 日(星期六) 08:30~17:00
地　　點：臺北榮民總醫院 介壽堂

08:30-08:35	***司儀開場介紹***	
08:35-08:40	***開場致詞***	陳威明理事長 Wei-Ming Chen
08:40-08:45		衛福部 邱泰源部長 Tai-Yuan Chiu
08:45-08:55	***臺北榮總貴賓：大合照***	

Session 1：生醫永續

座長：陳威明 理事長 (Wei-Ming Chen)

08:55-09:15	Healthcare 4.0:建構未來智慧與永續醫療的數位基石 Healthcare 4.0: The way towards future care and hospital sustainability	施崇棠董事長 Jonney Shih
09:15-09:35	從企業到醫院的永續典範轉移 From enterprise to healthcare: A paradigm shift in sustainability	簡又新董事長 Eugene Chien
09:35-09:50	Panel Discussion	
09:50-10:05	***Coffee Break***	

Session 2：環境保護、社會責任與企業治理

座長：吳淑芳 校長 (Shu-Fang Wu)
**　　　侯明志 副院長 (Ming-Chih Hou)**

10:05-10:25	醫療機構推動淨零排放政策與展望 Promotion and prospects of net-zero policy in health systems	劉越萍司長 Yueh-Ping Liu
10:25-10:45	高雄榮總實踐 ESG 醫院治理之經驗分享 Share with you: Kaohsiung Veterans General Hospital Experience regarding ESG investment	陳金順院長 Jin-Shuen Chen
10:45-11:05	重新想像 ESG:不在成本、而在需求 Reimagining ESG: Emphasizing demand over cost	于國華研發長 Kuo-Hua Yu
11:05-11:25	醫療機構行業 ESG：簡介 SASB 的規範 Health care industry's ESG: An introduction of SASB	蕭正英主任 Cheng-Ying Shiau
11:25-11:40	Panel Discussion	

PHILIPS 講座

座長：林永煬 副院長 (Yung-Yang Lin)

11:40-12:10	Codeless 影像 AI 與數據型 AI 開發流程簡介	黃崇堯醫師
12:10-12:15	Closing of the morning section	

12:15-13:30   ***Lunch Time***

13:30-13:35   ***Opening of afternoon section***
下午開場介紹

Session 3：智慧醫療 AI 應用

座長：李蔡彥 校長 (Tsai-Yen Li)
        曾令民 副院長 (Ling-Ming Tseng)

13:35-13:55	以生成式人工智慧重塑醫療健康之未來新願景 Reimagining healthcare with generative AI: A vision for the future	張嘉淵技術長 Ted Chang
13:55-14:15	宏碁智醫:從創新到落地 Acer Medical: From innovation to implementation	連加恩董事長 Allen Lien
14:15-14:35	透過 Azure OpenAI 加速數位醫療轉型:過去、現在、與即將的未來 Digital healthcare transformation with Azure OpenAI: Past, now and coming future	陳守正總經理 Danny Chen
14:35-14:55	5G 及 AIoT 驅動智慧醫療應用-打造便捷優質的醫療服務 5G and AIoT Empowering Smart Healthcare - Creating Convenient and High-Quality Medical Services	蘇添財院長 Tian -Tsair Su
14:55-15:15	Panel Discussion	

15:15-15:35   ***Coffee Break***

Session 4：智慧醫療實務應用

座長：洪乙仁 院長 (Yi-Jen Hung)
        王署君 副院長 (Shuu-Jiun Wang)

15:35-15:50	胸部 X 光以 AI 預測骨質疏鬆 A Deep Learning Model (VeriOsteo® OP) for Osteoporosis Detection Using Standard Chest X-ray: A Multicenter Study	李政鴻副院長 Cheng-Hung Lee
15:50-16:05	高齡長者命名測試中語音訊號預測認知功能異常 Voice signals for predicting cognitive impairment in older adults	陳亮恭院長 Liang-Kung Chen
16:05-16:20	智慧醫療:人工智慧與健康大數據 Smart healthcare: Artificial intelligence and big data	徐建業教授 Chien-Yeh Hsu
16:20-16:35	臺北榮總智慧醫療發展藍圖 Smart hospital development blueprint for Taipei Veterans General Hospital	李偉強副院長 Wui-Chiang Lee
16:35-16:55	Panel Discussion	

16:55-17:00   ***Closing Remarks***

Healthcare 4.0: The way towards future care and hospital sustainability

Healthcare 4.0：建構未來智慧與永續醫療的數位基石

Jonney Shih
施崇棠
Chairman, ASUSTek Computer Inc., Taipei, Taiwan, ROC
華碩電腦股份有限公司

The COVID-19 pandemic has significantly impacted the healthcare system, leading to the need for reform and the adoption of new technologies. The future of healthcare will be shaped by three key trends: Precision Health, Virtual Care, and Hospital Resilience. Precision Health is a personalized approach to healthcare that takes into account an individual's unique genetic makeup, lifestyle, and environmental factors. Virtual Care, also known as telehealth, allows patients to receive medical care remotely, using technology such as video conferencing, mobile apps, and wearable devices. Hospital Resilience refers to a hospital's ability to withstand and recover from disruptive events, such as natural disasters, pandemics, and cyber attacks. Hospitals also face severe challenges, including staff shortages exacerbated by the COVID-19 pandemic and highlighted in the 2024 WEF report, concerns about patient privacy amid digitalization, and struggles in economically disadvantaged countries. Additionally, the industry's substantial carbon footprint and other ESG issues pose formidable challenges.

These trends are being empowered by digital technologies, such as Artificial Intelligence (AI), Internet of Things (IoT), and Real-time technologies, which are driving the development of a Healthcare Cyber-Physical System (CPS). The Healthcare CPS is a network of interconnected devices, sensors, and systems that work together to deliver smart, personalized healthcare. The Healthcare CPS is composed of three layers: smart infrastructure, smart platforms, and smart applications. Smart infrastructure is equipped with advanced technologies such as AI, IoT, and real-time monitoring to enable real-time data collection and analysis. Smart platforms refer to the software platforms that enable the integration and analysis of data from multiple sources. Smart platforms use AI and machine learning algorithms to identify patterns and trends in data, enabling healthcare providers to make informed decisions about patient care. Smart applications refer to the software applications that enable healthcare providers to deliver personalized care to patients.

ASUS has been at the forefront of this transformation, providing innovative solutions such as wearables, portable ultrasound devices, xHIS platforms, and AI supercomputers to help hospitals and bio-research institutions navigate these challenges. Moreover, ASUS prioritizes a sustainable strategy, viewing it as essential to core operations. For over two decades, ASUS has transitioned from passive compliance to integrating sustainability into its operations by emphasizing data-driven, scientifically managed sustainability efforts as well as focusing on climate action, circular economy, responsible manufacturing, and value creation.

From enterprise to healthcare: A paradigm shift in sustainability

從企業到醫院的永續典範轉移

Eugene Chien
簡又新
Taiwan Institute for Sustainable Energy, Taipei, Taiwan, ROC
臺灣永續能源研究基金會

Under the global trend of sustainable development and ESG, hospitals and the healthcare industry are gradually shifting towards more responsible business models. Although the healthcare sector started later compared to the corporate world, it has shown significant progress. On the path to net zero in the healthcare industry, the UNFCCC held the first Health Day at the COP28 conference, acknowledging and highlighting the interconnection between climate and healthcare impacts. The carbon footprint of healthcare accounts for 4.6% of Taiwan's carbon emissions and as much as 7.6% in the United States. Many hospitals in the UK and the US have begun implementing green reduction measures to minimize environmental impact, achieving notable results on the path to net zero.

In this era of great transformation, the healthcare system needs to understand and embrace the opportunities brought by the transition to net zero. Since new knowledge and concepts drive industry changes, reforms in on-the-job training, internal training for employees, and lifelong learning initiatives are essential to foster new thinking patterns. Through continuous innovation and improvement, hospitals can not only stand out in the competition but also bring long-term positive impacts to society as a whole. These comprehensive changes provide new directions for the healthcare industry, aiming to play a significant role in the wave of sustainable development.

Promotion and prospects of net-zero policy in health systems

醫療機構推動淨零排放政策與展望

Yue-Ping Liu

劉越萍

Ministry of Health and Welfare, Department of Medical Affairs, Taiwan, ROC

衛生福利部 醫事司

In 2021, during the United Nations Climate Change Conference (COP26), 50 member states signed the "Country commitments to build climate resilient and sustainable health systems" with the aim of achieving net-zero goal for the global health systems by 2050. These commitments entail establishing climate resilient health systems and sustainable low carbon health systems. Notably, there are 16 ambitious member states set specific target years to achieve net-zero, highlighting that the international communities attach great importance to sustainable health systems. Taking the United Kingdom as an example, the National Health Service (NHS) amended the Health and Care Act in 2022 and incorporated response to climate change as a key mission.

In Taiwan, the National Development Council proposed the "Taiwan's Pathway to Net-Zero Emissions in 2050 " in 2022, and the "Climate Change Response Act" was passed on January 10th 2023, stipulating that Taiwan aims to achieve greenhouse net-zero emissions by 2050. This signifies the imperative for all sectors to push for net-zero emissions and places a significant responsibility on the health systems, which serves the dual purposes of promoting high-quality health and care and responding to climate change. The presentation today will begin by sharing insights on international trends in terms of promoting sustainability in health systems, which can serve as a reference for health systems in Taiwan while also providing directions and considerations for future domestic policies.

Share with you : Kaohsiung Veterans General Hospital Experience regarding ESG investment

高雄榮總實踐 ESG 醫院治理之經驗分享

Jin-Shuen Chen
陳金順
Administration Department, Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan, ROC
高雄榮民總醫院 院本部

Kaohsiung Veterans General Hospital (KSVGH) is the only public medical center in the Kaohsiung-Pingtung District. Under the supervision of the government and the Veterans Affairs Council, KSVGH assumes the three major roles of public hospital, veterans' hospital and medical center in the Kaohsiung-Pingtung District, and continues to fulfill its social responsibilities.

In Taiwan, the operation of the veterans' hospital system is a self-funded operation and is self-sufficient. Its governance principles also need to be similar to corporate governance systems, and be responsible to legal, financial, professional, and policy considerations, and to the public. However, the difference is that hospital governance is a public welfare institution and non-profit organization that serves the general public. In 2020, Taiwan released "Corporate Governance 3.0-Sustainable Development Blueprint", which proposed its core vision as "implementing corporate governance and enhancing the sustainable development of enterprises" and "creating a sound ESG ecosystem and strengthening the international competitiveness of the capital market." In line with national policies, hospital management also needs to keep pace with the times, so that hospitals can develop sustainably.

The main content of this lecture is to briefly describe the similarities and differences between corporate governance and hospital governance, and to review the literature on hospital governance. Next, we will share the process of our hospital following the TW-SDGs goals, our hospital strategies, and our receipt of the 2023 National Sustainability Award. We will conclude by sharing our vision for future development.

Reimagining ESG: Emphasizing demand over cost

重新想像 ESG：不在成本、而在需求

Kuo-Hua Yu
于國華
Research & Development, Taipei National University of the Arts, Taipei, Taiwan, ROC
國立臺北藝術大學

The United Nations has successively proposed CSR, ESG, and SDGs to guide the world towards sustainable development. Among these, both businesses and organizations are increasingly prioritizing ESG.

ESG aims to regulate the deviation in corporate operations that excessively prioritize profit figures. Under the goal of sustainable development, businesses cannot disregard moral and ethical obligations. Corporate operations must incorporate the costs of social responsibility, environmental protection, and ethical corporate governance into their cost plans to demonstrate the true performance of the enterprise.

In fact, apart from the calculation deviation in business operating costs, a more significant reason for the current global ecological and social crises lies in the excessive demand from advanced societies. Unmet demands lead to overconsumption, resulting in societal inequality and an unsustainable burden on the Earth.

Indigenous peoples or many traditional societies possess traditional knowledge. They respect natural ecosystems and pursue reasonable needs, enabling them to maintain ecological and social balance and harmony. The current global emphasis on collective action regarding ESG helps alleviate the pressure and pace of ecological and social destruction. More importantly, it is about how humans can redefine their understanding of needs and control desires, allowing excessive and extremely unfair consumption to return to levels acceptable to both the ecology and society.

ESG serves as an indicator of the civilization level of corporate operations. Another indicator of modern societal civilization is how we learn from traditional societies' ecological ethos and implement sustainable development in our lives.

Health care industry's ESG : An introduction of SASB

醫療機構行業 ESG：簡介 SASB 的規範

Cheng-Ying Shiau
蕭正英
Occupational Safety and Heath Office, Taipei Veterans General Hospital, Taipei, Taiwan, ROC
臺北榮民總醫院 職業安全衛生室

Corporate Social Responsibility (***CSR***), first coined in the 1950s, is an internal organizational policy or a corporate ethic strategy aiming to make a business accountable. It is a strategic initiative that contributes to a brand's reputation. It became more codified into a set of business practices such as sustainability initiatives in 1990s. ***ESG*** is a set of aspects, including environmental issues, social issues and corporate governance that can be considered in responsible investing / impact investing. ***ESG criteria make business' CSR efforts measurable***. The term ESG first came to prominence in a 2004 report titled "Who Cares Wins", which was a joint initiative of financial institutions at the invitation of the United Nations (UN). Since 2020, there have been accelerating incentives from the United Nations to overlay ESG data with the Sustainable Development Goals (***SDGs***).

Through Corporate Sustainability Report, corporates and organizations communicate and demonstrate accountability for their impacts on the environment, economy and people. Global Report Initiative (***GRI***) provides the world's most widely used sustainability reporting standards. The GRI standards have 3 major parts: universal standards, sector standards and topic standards. GRI sector standards currently support only 4 business sectors, namely "Oil and gas", "Coal", "Agriculture Aquaculture and Fishing", and "Mining".

The Sustainability Accounting Standards Board (SASB) is a non-profit organization, founded in 2011 by Jean Rogers to develop sustainability accounting standards. As would be expected, sustainability issues manifest differently from one industry to another due to differences in business models, resource dependencies, and other factors. SASB's Sustainable Industry Classification System® (SICS®) organizes industries using a combination of traditional classification factors and sustainability risks and opportunities. SASB has developed industry-specific standards for 77 industries across 11 sectors.

Hospital or heath care institutes is one of the 6 businesses in the health care sector, as defined by the SICS of SASB. The industry is characterized by high fixed labor and facilities costs, and an increased regulatory focus on reduced costs of care and improved outcomes. In this talk, the 11 SASB topics for Health Care Delivery will be concisely presented to the audience.

Reimagining healthcare with generative AI: A vision for the future

以生成式人工智慧重塑醫療健康之未來新願景

Ted Chang

張嘉淵

CTO of Quanta Computer Inc.

廣達電腦股份有限公司

The field of artificial intelligence, particularly generative AI, is rapidly evolving and poised to reshape various industries, including healthcare. This keynote speech envisions how generative AI models could serve as a transformative force in reimagining healthcare delivery, accelerating medical research, and enhancing patient outcomes.

Recent advancements in large language models, diffusion models, and other generative techniques have unlocked unprecedented capabilities in creating new data, such as text, images, and audio, based on training datasets. These models possess the potential to revolutionize drug discovery processes, generate personalized educational materials, augment medical imaging analysis, and support clinical decision-making.

This presentation explores the current challenges faced by the healthcare industry, including slow drug development pipelines, limited access to personalized care, and inefficiencies in diagnostic imaging. It then delves into how generative AI could address these challenges, democratizing access to healthcare through tailored virtual assistants and educational resources, while accelerating medical breakthroughs and enhancing diagnostic accuracy.

Furthermore, the keynote envisions how generative AI could integrate with emerging technologies like the Internet of Things and robotics to create new healthcare delivery models. It paints a future where personalized, AI-assisted care plans adapt to individual patient needs, and telemedicine is enhanced by generative AI support for remote patient monitoring.

While embracing the transformative potential of generative AI, the speech also addresses the critical need for robust evaluation, mitigation of biases in training data, and adherence to ethical principles surrounding privacy and responsible use of sensitive medical data. It emphasizes the importance of interdisciplinary collaboration between AI researchers, healthcare professionals, policymakers, and ethicists to maximize the benefits while mitigating risks.

Ultimately, this visionary keynote aims to inspire the audience to actively participate in shaping the future of healthcare, fostering innovation while prioritizing ethics and patient well-being. It calls for a generative revolution that augments human capabilities and paves the way for a future where AI plays a pivotal role in providing better healthcare for all.

Acer Medical: From innovation to implementation

宏碁智醫：從創新到落地

Allen Lien
連加恩
Acer Medical Incorporated, New Taipei, Taiwan, ROC
Acer Incorporated, New Taipei City, Taiwan, ROC
National Yang Ming Chiao Tung University, Taipei, Taiwan, ROC
宏碁智醫股份有限公司
宏碁股份有限公司
國立陽明交通大學

Acer Medical, a subsidiary of Acer, leverages artificial intelligence, extensive clinical datasets, and software development capabilities in its operations. Acer Medical remains committed to make AI work for the core needs of humanity by applying AI in healthcare, such as precision medicine, preventive medicine and public health. The company has successfully introduced four medical equipment products, with three of them representing AI image interpretation solutions. Achieving regulatory approvals from both Taiwanese and international regulatory authorities, Acer Medical adheres to the ISO 13485 quality system, meeting rigorous global standards.

Acer Medical remains committed to ongoing collaborative research with its partners, dedicated to ensuring that intelligent and human-centric medical care remains accessible on a global scale.

Digital healthcare transformation with Azure OpenAI: Past, now and coming future

透過 Azure OpenAI 加速數位醫療轉型：過去、現在、與即將的未來

Danny Chen
陳守正
GM of Public Sector, Microsoft Taiwan
臺灣微軟 公共業務事業群

The integration of Generative Artificial Intelligence (AI) presents both opportunities and challenges in revolutionizing the operations of government institutions and healthcare facilities. In the current landscape, these entities grapple with the formidable task of digital transformation. Challenges include outdated infrastructure, data security concerns, and resistance to change within bureaucratic systems.

Generative AI holds immense promise in addressing these challenges by enhancing administrative efficiency for government personnel and boosting productivity for healthcare professionals. Through advanced algorithms and automation, Generative AI streamlines administrative tasks, optimizes resource allocation, and facilitates data-driven decision-making in government agencies. In healthcare settings, Generative AI empowers medical personnel by automating routine processes, assisting in diagnostics, and personalizing treatment plans, thereby improving overall patient care and safety.

Furthermore, Generative AI elevates the quality of public services by enhancing the citizen experience. By analyzing vast datasets and predicting citizen needs, government agencies can tailor services, streamline interactions, and improve accessibility. This personalized approach fosters greater trust in government institutions and enhances overall public satisfaction.

In conclusion, while the implementation of Generative AI in government and healthcare poses significant challenges, its transformative potential cannot be overstated. By addressing these challenges and leveraging the opportunities presented, Generative AI stands to revolutionize these sectors, ultimately improving administrative efficiency, healthcare outcomes, and public service delivery.

5G and AIoT empowering smart healthcare: Creating convenient and high-quality medical services

5G 及 AIoT 驅動智慧醫療應用：打造便捷優質的醫療服務

Tian-Tsair Su
蘇添財
Chunghwa Telecom Laboratories., Taoyuan, Taiwan, ROC
中華電信研究院

The concept of health equity has been widely embraced as a universal value. While Taiwan's medical standards are relatively high, there are still challenges to achieving health equity. These challenges include limited access to healthcare in remote and offshore areas, shortages of healthcare professionals, and rising costs.

Chunghwa Telecom, with its extensive ICT expertise in fixed-line and mobile communications, big data, cybersecurity, the Internet of Things (IoT), and artificial intelligence (AI), is poised to revolutionize healthcare accessibility in Taiwan. We have established a high-coverage wireless communication network, developed a telemedicine platform, and integrated mobile medical devices to support remote consultations, video consultations, and counseling services. These efforts are not just about improving medical care accessibility in remote and offshore areas but also about saving patients time and transportation costs and, most importantly, ensuring they receive high-quality medical care. This is a step towards a future where healthcare is accessible to all, regardless of location.

To address the shortage of healthcare professionals and rising costs, we have developed localized (Mandarin/Taiwanese/English/Hakka) speech-to-text (STT) and generative AI technologies. These technologies are used to create medical AI assistants, intelligent customer service agents, and AI voice assistants for healthcare applications. Our goal is to alleviate the shortage of healthcare workers and reduce hospital operating costs, ensuring the financial sustainability of healthcare in Taiwan.

In the future, we will continue to innovate and develop our technologies. we are establishing develop low earth orbit (LEO) satellite communications to further enhance the coverage of our wireless communication network. Our speech recognition technology will be expanded to support Indonesian and Vietnamese languages for hospital customer service, breaking down language barriers for new immigrants seeking medical care. We will also develop large language models for the medical field, assisting hospitals in creating medical generative AI applications. Additionally, we will provide context-aware, human-like virtual services to support hospital Q&A services, reducing the workload of hospital staff. These future developments reflect our commitment to continuously improve and adapt our technologies to meet the evolving needs of the healthcare industry.

A deep learning model (VeriOsteo® OP) for osteoporosis detection using standard chest X-ray: A multicenter study

胸部 X 光以 AI 預測骨質疏鬆

Cheng-Hung Lee
李政鴻
Central office of Administration, Taichung Veterans General Hospital, Taichung, Taiwan, ROC
臺中榮民總醫院 院本部

An increasing number of studies are dedicated to the development of deep learning models in medical imaging for Osteoporosis prediction. The Chest X-ray (CXR) serves as a standard examination within routine physical examinations, stands as the most frequently utilized image diagnosis modality. It constitutes a valuable subject for osteoporosis research and prevention. Since T12 and L1 vertebrae are commonly associated with osteoporotic fractures based on previous literature, this study collaborates with Acer Medical Inc. to develop a deep learning model, VeriOsteo® OP, for bone mineral density (BMD) prediction and the identification of individual with high risk of osteoporosis using the image of CXR.

We retrospectively reviewed individuals with age above or equal to 50 who underwent both CXR and Dual-energy X-ray Absorptiometry (DXA) examinations with interval within six months. We excluded individuals with absence of T-score value of L1-L2-L3-L4 or the difference of T-score value between adjacent vertebrae greater than 1. The VeriOsteo® OP contains two Artificial Intelligence (AI) image deep learning models. The first model employs image detection techniques to delineate the T12 and L1 regions on CXR and adjusts the image contrast and window level. Then, upload the extracted image to the second model to predict the averaged BMD value of L1 to L4 vertebrae. Finally, convert the predicted BMD into a T-score value and diagnose Osteoporosis (T-score ≤ -2.5) based on the World Health Organization (WHO) announcement.

This study included 440 patients with a mean age of 62.5. Of 304 patients were from the medical center Taichung Veterans General Hospital (VGHTC) and the other 136 patients were from the community physical examination center Joy Clinic. Male and female comprised 20.2% and 79.8% respectively and 253 individuals (57.5%) were diagnosed as osteoporosis. Significantly correlation (R = 0.88) was found between the BMD values of model prediction and gold-standard DXA measurement. The accuracy of osteoporosis diagnosis (T-score ≤ -2.5) was 88.99% with sensitivity 88.71% and specificity 89.36%. The area under curve (AUC) of osteoporosis diagnosis was 94.61%, which indicates the model have well-performing diagnostic capability.

The proposed model VeriOsteo® OP validated by multicenter data represents a promising and reliable auxiliary tool for the osteoporosis diagnosis using the T12 and L1 image region on CXR. The VeriOsteo® OP provides an opportunity for early detection of osteoporosis and further osteoporosis related fracture prevention.

Voice signals for predicting cognitive impairment in older adults

高齡長者命名測試中語音訊號預測認知功能異常

Liang-Kung Chen

陳亮恭

Taipei Municipal Gan-Dau Hospital (Managed by Taipei Veterans General Hospital), Taipei, Taiwan, ROC

臺北市立關渡醫院 委託臺北榮民總醫院經營

Cognitive impairment, such as Alzheimer's disease, is a growing concern among the aging population. Early detection is crucial for timely intervention and management. However, current diagnostic methods can be invasive, costly, and time-consuming. This study explores the use of voice signals from cognitive assessment recordings as a non-invasive and cost-effective tool for predicting cognitive impairment in older adults.

The study employed a novel approach involving automatic speech recognition (ASR) and machine learning techniques. Voice recordings from cognitive assessment tasks, including fruit/animal fluency tests and news recitation, were collected from older adults at Taipei Veterans General Hospital. The recordings were transcribed using ASR models, and semantic features related to fluency and expressiveness, such as word counts, unique word usage, keyword density, and language perplexity scores, were extracted from the transcripts. These features were transformed into intuitive measures like lexical fluency, lexical richness, speech rate, accuracy, and voice fluency. A Logistic Regression model was trained using these transformed features to predict cognitive impairment status, determined by the Montreal Cognitive Assessment (MoCA) score. To ensure robustness, a five-fold cross-validation technique was employed.

Overall, 115 older adults were enrolled (71 of them were cognitively normal by the MoCA results). The study included data from 161 fruit fluency tests, 119 word card tests, and 149 news recitation recordings. The Logistic Regression models achieved promising performance, with accuracy ranging from 74.49% to 80.67% across different cognitive tasks. The results demonstrated the potential of voice signals as a reliable indicator of cognitive impairment.

This research contributes to the understanding of speech recognition technology's capabilities in semantic comprehension and provides an analytical foundation for further studies in related domains. The proposed method shows promise as a non-invasive and cost-effective tool for early detection of cognitive impairment in older adults, potentially enabling timely intervention and management.

Smart healthcare: Artificial intelligence and big data

智慧醫療：人工智慧與健康大數據

Chien-Yeh Hsu
徐建業
Department of Information Management, National Taipei University of Nursing and Health Sciences, Taipei , Taiwan, ROC
臺北護理健康大學 資訊管理系

Medical information has received much attention in recent years, and its applications have developed very rapidly. The development process of smart medical care is all centered on data. The current trend of medical and health big data is quite consistent with the health cloud promoted by the Ministry of Health and Welfare. The future trend of medical information is based on cloud personal health care. Among them, integrated information communication construction, personal medical health data acquisition, storage, utilization, sharing, protection, and cloud health care services are the main topics of discussion. How to use individual and group health data analysis to promote smart health care is a very important key approach. Topics to be discussed today include: individualized smart and precision medicine and healthcare, analysis and application of huge amounts of medical and health data, international standards for medical information such as HL7 FHIR and its development, infrastructure for health and medical information and the development of electronic medical records, health data processing and value-added application, data governance and personal data protection. It is expected that a complete medical and health care information architecture will be established in the future, using digital technology, data analysis and artificial intelligence to establish prediction models and conduct timely and efficient detection and intervention to achieve personalized precision health care.

Smart hospital development blueprint for Taipei Veterans General Hospital

臺北榮總智慧醫療發展藍圖

Wui-Chiang Lee
李偉強
Deputy Superintendent, Taipei Veterans General Hospital, Taipei, Taiwan, ROC
臺北榮民總醫院 院本部

Taipei Veterans General Hospital (TVGH) is committed to digital transformation with the primary goal of enhancing the quality and safety of patient care, improving governance efficiency, and reducing clinical staff workload. In recent years, the hospital has made efforts in energy conservation and digital transformation to promote effective resource utilization and sustainability.

To achieve patient-centered digital transformation, TVGH comprehensively examines and develops smart healthcare from the patients' perspectives, including hospital referrals, outpatient services, emergency services, inpatient care, surgery, nursing, pharmaceuticals, diagnostic testing, medical administration, environmental maintenance, and post-care telemedicine and home care. In terms of technology, artificial intelligence plays a crucial role, along with technologies such as the Internet of Things, business intelligence, blockchain, cloud-based applications, big data analytics, telemedicine leveraging high-speed 5G transmission, 3D printing, augmented reality, and virtual reality. These technologies are not only widely applied in daily clinical practices but also serve as important tools for clinical training and advanced research. The latest supercomputer, "Veterans No. 1 Cloud," was launched in 2023 to support the hardware and computing power requirements of the aforementioned digital transformation.

In addition to pursuing large-scale cross-hospital projects with government agencies such as the National Science Council, the Ministry of Digital Development, and the Ministry of Health and Welfare, the hospital actively collaborates with domestic information and communication technology giants such as Microsoft Taiwan, ASUS, Quanta, Acer, Chunghwa Telecom, Advantech, and Philips. The hospital has been recognized with numerous domestic and international awards for smart healthcare innovation, including the 2024 Best Smart Hospital award by Newsweek.

The tighter integration of healthcare and information and communication technology is an international trend. TVGH must not hesitate or be content with the current situation at this critical moment. The combination of artificial intelligence and healthcare is highly anticipated and will likely be the decisive factor in the next phase. The hospital will mobilize its research and development team, recruit more colleagues and experts, and expand collaboration with relevant organizations domestically and internationally, including the neighboring Beitou Science Park. It aims to collaborate with biotechnology and information communication technology companies in the park, as well as nearby medical centers, medical universities, and research institutions to develop into a benchmark smart healthcare industry cluster in northern Taiwan.