MEDIA RELEASE

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For Immediate Release

NUHS deploys the ENDEAVOUR AI platform which hosts AI tools that predict hospital stay durations and waiting times. These AI systems can forecast future bed states across the NUHS cluster, enabling better right-siting of patients across NUHS institutions.

Singapore, 2 Dec 2022 – Hospitals around the world face a rising trend of high bed occupancy rates and increased bed wait times for patients presenting to Emergency Departments (ED) requiring admission. Increased demand for healthcare services, and tight manpower conditions exacerbate this problem in many public healthcare systems, including those in Singapore.

2 To address this issue, the National University Health System (NUHS) has developed and launched the ENDEAVOUR AI platform, which integrates live data from the next generation electronic medical patient records system (NGEMR) to compute multiple AI insights. Announced on the sidelines of the Singapore Healthcare AI Datathon and Expo on 2 Dec 2022, Associate Professor Ngiam Kee Yuan, Group Chief Technology Officer, NUHS, highlighted this as a key AI project in healthcare which seeks to transform patient experience and improve operational efficiency.

3 ENDEAVOUR AI features a live dashboard which gathers, processes and displays key medical information of all patients in across NUHS hospitals and clinics. For example, the system automatically alerts clinicians and administrators of increasing wait times in emergency departments, enabling early activation of manpower resources. Combined with ED attendance prediction tools, waiting times can be shortened especially during peak hours at 8am and 6pm with its predictive functions. The actual reduction can range from 30mins to hours depending on how manpower resources can be deployed.

4 To ease the hospital bed crunch situation, an AI tool is designed to predict estimated length of stay (eLOS) tool of each and every patient admitted to the three public hospitals under NUHS. The tool ‘reads’ patient’s history and doctors notes in real time to make predictions on how long a patient would stay when admitted. It can also ‘explain’, providing clinicians insights into factors in a patient’s record that might contribute to his or her stay. This acts as a doctor aid, enabling them to intervene early in anticipation of problems. For example, if a patient’s eLOS is more than two weeks, the program will flag this case to

the medical team, who may then take timely action to either change their management, or plan early transfers to a community hospital for rehabilitation.

5 The accuracy of the algorithm had been validated using NGEMR data in the last 6 months, and runs up to 30 times per hour to calculate eLOS for all patient admissions. With the predictions taken together, the system is able to predict hospital bed states as far as 2 weeks ahead of time to optimise bed capacity and patient placement. With the AI tool reading notes, vital signs and other test results, it can also predict risk of deterioration of a patient in hospital. The next stage is to develop the ability to recommend care plans that change the trajectory of a patient's disease course.

6 ENDEAVOUR AI also presents a comprehensive visualization of the bed situation in western sector's healthcare institutions'. For the first time, the bed management units are able to see number of patients across 5 institutions, JMC, JCH, NTFGH, NUH and AH.

7 A/Prof Ngiam said: "We leverage AI to improve healthcare practices and outcomes, enabling clinical practitioners to make faster, more accurate diagnoses and precise treatments. Healthcare institutions today aggregate vast quantities of data, but most of this data is analysed retrospectively. With the technology in ENDEAVOUR AI, we can now stream data in real time, feeding AI models that produce actionable insights on the fly, resulting in better patient outcomes."

NUHS plans to deploy imaging AI model to assess scoliosis as part of mandatory national school health screening for primary 5 to secondary 2

8 NUHS plans to further evaluate and deploy an internally developed imaging AI model to augment doctors in scoliosis xray assessment. Scoliosis screening from primary 5 to secondary 2 has been part of the mandatory national school health screening programme since 1981. Patients suspected of having scoliosis undergo scoliosis x-rays at the health promotion board to identify students who need specialist scoliosis treatment. Annually about 7000 radiographs are performed as part of screening, and the degree of spinal curvature must be manually measured by a doctor. This is time consuming and less experienced doctors tend to take more time and be less accurate. Results at times cannot be communicated at the same visit leading to increased anxiety for both parents and the child.

9 NUHS is in the midst of evaluating an internally developed artificial intelligence model for potential deployment. This artificial intelligence model is a collaboration by Dr Lau Leok Lim and Dr Jonathan Tan of NUHS Department of Orthopaedic Surgery, Dr James Hallinan and Dr Andrew Makmur of Department of Radiology and Dr Mohammad Shaheryar Furqan of NUS Yong Loo Lin School of Medicine.

10 This AI imaging model is designed to automatically measure the degree of scoliosis and augment the performance of the doctor interpreting the scans. In initial trials the AI model appears to reduce reporting time with a modest increase in accuracy. This may potentially lead to increased productivity due to less hours spent on interpreting these x-rays, earlier communication of results to the parents and child, and earlier referral and treatment by a scoliosis specialist. The team aims to collaborate to further evaluate this AI model and potentially implement it as part of the scoliosis screening program.

11 Singapore Healthcare AI Datathon and Expo (SHADE) 2022, co-organized by the National University Health System (NUHS) and MIT, is biggest this year. Post-Covid (hybrid) to be held at University Cultural Centre, it brings together international clinicians, data scientists, data engineers, software engineers and innovators in healthcare to address current problems in healthcare with data analytics and AI. Besides international speakers, industry workshops, datathon teams vying for prize money, Singapore's largest A.I showcase and conference showcases the latest developments and applications of Artificial Intelligence (AI) in healthcare, organized by NUHS and MIT. Each year, it showcases A.I.-powered initiatives, using machine learning algorithm, imaging, computer vision, precision medicine, predictive analytics, and of which many projects are now deployed and in execution.

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About the National University Health System (NUHS)

The National University Health System (NUHS) aims to transform how illness is prevented and managed by discovering causes of disease, development of more effective treatments through collaborative multidisciplinary research and clinical trials, and creation of better technologies and care delivery systems in partnership with others who share the same values and vision.

Institutions in the NUHS Group include the National University Hospital, Ng Teng Fong General Hospital, Jurong Community Hospital and Alexandra Hospital; three National Specialty Centres - National University Cancer Institute, Singapore (NCIS), National University Heart Centre, Singapore (NUHCS) and National University Centre for Oral Health, Singapore (NUCOHS); the National University Polyclinics (NUP); Jurong

Medical Centre; and three NUS health sciences schools – NUS Yong Loo Lin School of Medicine (including the Alice Lee Centre for Nursing Studies), NUS Faculty of Dentistry and NUS Saw Swee Hock School of Public Health.

With member institutions under a common governance structure, NUHS creates synergies for the advancement of health by integrating patient care, health science education and biomedical research.

As a Regional Health System, NUHS works closely with health and social care partners across Singapore to develop and implement programmes that contribute to a healthy and engaged population in the Western part of Singapore.

For more information, please visit http://www.nuhs.edu.sg

About National University of Singapore (NUS)

The National University of Singapore (NUS) is Singapore's flagship university, which offers a global approach to education, research and entrepreneurship, with a focus on Asian perspectives and expertise. We have 16 colleges, faculties and schools across three campuses in Singapore, with more than 40,000 students from 100 countries enriching our vibrant and diverse campus community. We have also established our NUS Overseas Colleges programme in more than 15 cities around the world.

Our multidisciplinary and real-world approach to education, research and entrepreneurship enables us to work closely with industry, governments and academia to address crucial and complex issues relevant to Asia and the world. Researchers in our faculties, 30 university-level research institutes, research centres of excellence and corporate labs focus on themes that include energy; environmental and urban sustainability; treatment and prevention of diseases; active ageing; advanced materials; risk management and resilience of financial systems; Asian studies; and Smart Nation capabilities such as artificial intelligence, data science, operations research and cybersecurity.

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