

RENKEI Researcher Online Workshop

Exploring Japan-UK Research  
Collaborations in Health

23 & 24 June, 2021

## **Summary**

The first ever RENKEI Researcher Online Health Workshop, entitled 'Exploring Japan-UK Research Collaborations in Health', brought together over 70 researchers from various disciplines and career stages over two days.

The keynote speakers introduced their latest research into AI-based medicine through medical imaging and into new models for dementia care, each topic was of great interest in both countries. They were followed by representatives of two funding organisations, who laid out the various grants available for UK-Japan collaborations in this area.

Panel sessions on patient safety, medicine and informatics, and ageing introduced the broad range of related research being carried out by RENKEI members, and discussed the potential for collaboration. Some areas identified include maternal patient safety and no-fault compensation systems; staff wellbeing and the impact on patient safety; the impact of culture on the investigation of mistakes; deciding on the most relevant data and improving its quality; international standards for shared data sets; the use of apps to promote behavioural change for better health; and measuring the neurological impacts of such interventions.

If you identified collaborative research partners at the workshop, please do consider applying for the RENKEI seed funding, as well as for funding offered by partners such as JSPS and the Great Britain Sasakawa Foundation.

## **Introduction**

RENKEI (Research and Education Network for Knowledge Economy Initiatives) is a partnership of 6 Japan and 6 UK research intensive universities, with the British Council acting as its secretariat. The member universities aim at strengthening the knowledge exchange and research collaboration between Japan and the UK. RENKEI provides a unique opportunity to bring together researchers from leading universities in Japan and the UK to tackle key global challenges.

Health was selected as one of two priority areas for the partnership's activities in 2017. The first researcher workshop was scheduled to be held at Nagoya University in 2020, but was postponed and moved online due to the COVID-19 pandemic and restrictions on international travel, an unprecedented situation which underlined the need for international research collaboration in areas related to health. As the first RENKEI workshop in the area of health, the main

aims were for RENKEI members to learn more about each other's research expertise and interests in the areas of health, and to identify potential for collaborative research.

In order to encourage the latter aim, three seed funding grants of GBP 5,000 each are available, one for each sub-theme. Workshop participants are encouraged to develop collaborative research proposals and apply for one of these grants.

Over 70 researchers from a broad range of disciplines and career stages at all twelve RENKEI member universities, including Durham University, which joined RENKEI in June 2021, participated in the workshop.

## **Opening**

The workshop was opened by Professor Hideki Kasuya, on behalf of the organising team at Nagoya University. He spoke about the importance of health to human lives and also to economies, and about the potential for bilateral research. Matt Knowles, Director of the British Council Japan, welcomed participants and introduced the seed funding available after the workshop. The British ambassador to Japan, Julia Longbottom, spoke about recent developments to strengthen the bilateral relationship, such as the signing of the UK–Japan Comprehensive Economic Partnership Agreement and the UK government's commitment to the Indo-Pacific region and to science and technology in its recent spending review. She emphasised the important role which universities play in supporting this bilateral friendship and responding to challenges together. Finally, Professor Kazuhito Kawakita, Vice President of Nagoya University, expressed appreciation to the wide-ranging audience gathered to look at such important issues.

## **Guest speakers**

The two guest speakers introduced various types of funding offered by their organisations to support bilateral research. Kotaro Koderu from the Japan Society for the Promotion of Science emphasised that JSPS takes a bottom-up approach, independent of government priorities, and does not specify subject areas for most calls. JSPS offers several types of grant, including a fund for the promotion of joint international research as part of the Kakenhi grants; match funded grants with the Royal Society; open partnership joint research projects, which can be granted together with any international partner; and a large-scale

joint research grant with UKRI on the theme of pandemic response, LEAD, which is currently open.

Jenny White talked about the four main opportunities available from the Great Britain Sasakawa Foundation: regular grants, available to researchers in both countries; PhD fieldwork awards, with similar conditions; Butterfield Awards, specifically for medical and scientific collaboration; and studentships for postgraduate students. Awards are intended as seed funding to spark larger collaborations.

Further details of the funding available from both organisations can be found in their presentations.

### **Keynote speakers**

Professor Kensaku Mori of the Department of Intelligent Science, Graduate School of Informatics, Nagoya University, spoke first about the future of AI-based medicine through medical imaging. During the last decade, we have entered the third neural network boom, built on the solid foundations of widespread use of artificial intelligence. In this next stage, the main question for medical personnel will be how to work in symbiosis with medical artificial intelligence. Some examples of the work of AI include diagnosis and assistance with surgery in real time. However, various issues remain, including the collection of wide and varied data, the time required to gain regulatory approval, and privacy issues. Professor Mori shared some ways to address these issues, such as the use of medical databases like UK Biobank.

Professor Dame Louise Robinson, Professor of Primary Care and Ageing & Regius Professor of Ageing, Newcastle University, introduced her research looking at new models of dementia care. According to the WHO, dementia is a global public health issue, which is very costly to society as well as to individuals. Over the last decade, policies in the UK and other countries have shifted away from specialist-led care to focus more on the role of primary and community care. Professor Robinson's four-year research project is looking at this shift around the world, in order to identify good practice models and test these out. There is potential for collaborative research with Japan, where care is still mainly provided at a specialist level.

## **“Patient safety” session**

Chairs: Yoshimasa Nagao, Nagoya University, and Sarah Slight, Newcastle University

### Presentations

- Dr Haruhiro Uematsu 上松東宏, Nagoya University

Large amounts of data contained in incident reports, mostly in free-text format. Morphological analysis carried out by machine learning generates “risk scores” which can be used to compare departments and hospitals, and monitor risk chronologically. Could this technology be applied to other languages?

- Professor Shin Ushiro 後信, Kyushu University

Cerebral palsy is a shared issue in the UK and Japan, costing health systems a lot of money and potentially leading to a shortage of obstetricians. A no-fault compensation system was introduced in Japan a decade ago, leading to a rapid decline in lawsuits. There has been interest in this system from abroad, including the UK.

- Professor Rebecca Lawton, University of Leeds

The Yorkshire and Humber Patient Safety Translational Research Centre tests new ideas and theories from basic science, looking at their impact on patient safety. It works with both patients and staff to design research, building tools, websites, and systems to support patient safety. Research topics include workforce wellbeing, the safe use of medicines and digital innovation.

- Professor Jane O'Hara, University of Leeds

“Resilient healthcare” is a new approach which looks at the ability of a health system to adapt and respond to changing demands. The biggest challenge in both countries is how to apply this exciting, intuitive theory in practice. What tools best support it? A global network of researchers are looking at this, including in the UK and Japan.

- Dr Sarah Slight, Newcastle University

The team at Newcastle University are looking at the use of health information technology to prevent medication errors, the impact of surgical safety incidents on staff, and the use of AI to predict the likelihood of disease, so that one can intervene earlier. There is potential for collaborative research particularly into the overlap between these areas.

## Panel discussion

Dr Slight began by asking panellists what they considered to be priority areas in patient safety over the next year, and this led on to discussion of some potential topics for collaboration:

- Staff wellbeing and mental health, because of the known impact of burnout on patient safety. In the UK, sick leave levels are going up since the pandemic, and staff seem to be leaving the healthcare service.
- Building resilience among staff, e.g. preparing them for making mistakes. What is the impact of redeployment on wellbeing and retention?
- There are often inconsistencies between various standards or accepted practices. One focus may be trying to eradicate these.
- One positive outcome of the pandemic has been that teams have self-organised to cope with changed situations and solve problems, which is a fundamental principle of resilient healthcare. How and why were teams able to change? How do we support this in an ongoing way?
- There is no objective indicator to measure wellbeing or mental health. Could machine analysis be used to investigate this (but what data would be used)?
- Is there potential for collaboration on maternal patient safety? This is a very similar issue in both healthcare systems. How are the healthcare systems responding in each country?
- Incident reporting is the cornerstone of measuring patient safety globally, but very little resource is devoted to reporting itself, which is generally poor-quality. Medics investigating medics: how does hierarchy affect the process? This is embedded in culture, so international comparison would be interesting.

## **“Medicine and informatics” session**

Chairs: Professor Kenji Mizuguchi, Osaka University, and Professor Sotirios Tsaftaris, University of Edinburgh

## Presentations

- Dr Sai Sun, Tohoku University

Each person has a preferred speed for spontaneous body movements, e.g. walking, speaking. These may influence health e.g. stress levels, cardiorespiratory fitness, and intrinsic brain functioning. Research to investigate

these processes is hoped to lead to the development of engineering products mirroring them.

- Dr Saturnino Luz, University of Edinburgh

Digital biomarkers for neurodegenerative diseases need to be inexpensive, safe, and accurate, but existing biomarkers do not meet these criteria. Behavioural data such as speech or movement can be analysed using machine learning to act as “digital biomarkers”, with the advantage that the data can be collected at scale, in natural settings, over time. Preliminary results show a high degree of accuracy.

- Professor Kenji Mizuguchi 水口賢司, Osaka University

We aim to establish computational systems approaches to rational drug discovery, based on databases, data-driven modelling, and principle-based modelling techniques. Some such initiatives have demonstrated improved accuracy in experimental validation. Combining data-driven modelling and principle-based modelling techniques is the way forward. However, relevant data are quite fragmented, so integration and standardisation are the major challenges.

- Professor Yen-Wei Chen 陳延偉, Ritsumeikan University

Deep learning can be used in AI-based diagnosis of COVID-19 – automatic segmentation of infected area on CT images. The key to deep learning is to train the model, but the amount of input required from doctors is a challenge. The Deep Atlas Prior model aims to incorporate medical knowledge as prior knowledge, improving accuracy.

- Professor Paula Ruth Williamson, University of Liverpool

Examples of research carried out at Liverpool to exploit routinely collected data to improve healthcare systems. Such data was linked to results on mass testing for COVID-19. This showed a lower uptake of screening in deprived areas, so mobile testing vans were moved there in real time. Other research looked at data collected on children 1 – 3 to find whether this can predict problems at age 11.

- Professor Naoki Nakashima 中島直樹, Kyushu University

Learning Health Systems use feedback between clinicians and research to improve quality and effectiveness. However, the problem in Japan is that data and outcome oriented medical pathways are not standardised. The ePath

Project standardised some common pathways for the four main vendors of medical records systems. Participant hospitals can now exchange clinical pathways.

- Professor James Batchelor, University of Southampton

We encourage clinicians to get involved with digital health, because it is easier to teach informatics to clinicians than to teach medicine to computer scientists. Data is being pulled from various sources, including clinical records and trials, to create one data warehouse, enabling visibility of complex data. The big challenge of collecting clinical data is lack of structure, so mapping is needed.

- Professor Sotirios Tsaftaris, University of Edinburgh

Clinicians are faced with an enormous amount of unstructured data. AI has a lot of promise, but current systems are not integrated. One “big AI” is needed, which can process multiple inputs, learn concepts, generalise, and require less human supervision. It would also generalize and create synthetic data resembling disease characteristics to augment datasets.

#### Panel discussion

Professor Tsaftaris talked of how the COVID-19 pandemic has highlighted the necessity of collecting data and making it available for rapid study in emergencies, and asked the panel what they considered to be the most pressing issue to solve first – the need for more data, or the need for better computer infrastructure.

- The biggest challenge for COVID is how to collect the data in the first place. Medical records are often inaccurate because completing them is felt to be a distraction. We need to improve data quality through providing electronic medical records that also help clinicians to do their work.
- In parallel, or preferably before this, we need to consider data relevance: spend more time deciding what the most important data is to collect. But how do we decide what is relevant? We need to look at which important health outcomes we want to improve.
- Transferring theory-based data to a general audience, including patients, is a challenge.
- Data collection is key to medical AI. Data not simply on the final results, but also on the process, is very important to deep learning.
- However, obtaining more data is not in our control. What aspects can we influence in order to generate better results?



- We need to openly share the products of our work, e.g. sharing algorithms or annotated data sets. There are few international standard data sets.
- Some causes for concern are a potential talent drain and broken trust in the use of AI. However, panellists were generally optimistic about the potential for AI in medicine.

### **“Ageing” session**

Chairs; Dr Yoshihisa Hirakawa, Nagoya University, and Professor Malcolm Jackson, University of Liverpool

#### Presentations

- Dr Yoshihisa Hirakawa 平川仁尚, Nagoya University

COVID-19 has interrupted end-of-life care. A meta-review of online articles found an interrupted grieving process and lack of coordination between different types of care. Possible solutions include community-based advance care planning; real-time dissemination of information on the healthcare situation; online systems to coordinate advance care planning; and changes to legislation to make advance care planning more accessible.

- Professor Malcolm Jackson, University of Liverpool

Researchers at the MRC-Versus Arthritis Centre for Integrated research in Musculoskeletal Ageing, which includes Liverpool, are undertaking an integrated programme of research evaluating key mechanisms that contribute to musculoskeletal disorders and carrying out trials of interventions designed to prevent or reduce age-related loss of function. They have developed a popular free MOOC for the public.

- Professor Mai Kabayama 樺山舞, Osaka University

A longitudinal study to investigate factors in healthy life expectancy found that different factors, such as loss of independence, absence of employment, and living alone are important to different demographics, allowing interventions to be targeted. However, the presence of illness is not a factor in healthy life expectancy: social factors appear to be key.

- Dr Adam Brandt, Newcastle University

Many activities use the arts and culture to improve the quality of life of people with dementia. An interdisciplinary team at Newcastle is looking at the communication involved. Involving carers in communication helps manage anxiety and provide personalised instruction, but may maintain a relationship of dependency. The team plans to look at post-pandemic adaptations and their effects on communication and develop training materials.

- Professor Satoshi Fujita 藤田聡, Ritsumeikan University

Nutritional and exercise interventions are both necessary to prevent loss of muscle mass. Protein intake should be balanced across the three main meals, resulting in less muscle mass. Resistance exercise is also important, and can be safe for people with different medical conditions, as long as the exercises are adapted. The two interventions need to be combined.

- Dr Hiroshi Kondoh 近藤祥司, Kyoto University

The research team developed a protocol to identify around 130 metabolites which might be involved in ageing. A ten-year research project comparing 50 young and 50 older people identified 14 metabolites which change in older people. Similar analysis is being undertaken to identify markers of frailty.

### Panel discussion

Dr Hirakawa asked panellists what they considered to be the possibilities for bilateral interdisciplinary collaboration, given the diversity of the research introduced in terms of areas of focus and methodologies.

- Common themes are the importance of exercise and nutrition, running through from basic science to social care. There is potential to develop this for wider application, and to understand how it is applied.
- Neurological issues in terms of muscle control.
- How do we encourage the behavioural change required? Researchers at Southampton have developed an app on strength-based exercises, and another on rehabilitation from long COVID. They are working together with food companies, and with home care companies: there is a need to train care staff.
- Many older people have reduced activity due to COVID. It is important to find out what they are doing while at home, not just what they do when they come to a university to participate in a programme, e.g. measure sleep using AI. Daily monitoring to adjust interventions is important.

- The challenge for interventions is coming up with meaningful but flexible guidelines. How can we assess their neurological impacts?
- It involves putting the biology together with the behaviour mediated by the brain and their interrelation in the environment of the individual.

### **Closing session**

Chairs from each of the panel sessions summarised their discussions and the potential for collaboration. Topics suggested included text analysis of incident reports to give quantitative measurements; the sharing of annotated data in a range of fields; and the development of apps to encourage behavioural change.

The organisers reminded participants of the availability of seed funding, and reiterated the importance of interdisciplinary health research, particularly at this time. We hope to hold the next RENKEI Health workshop in person if circumstances permit.