

BRAINWAVES

Research Newsletter from the Royal Hospital for Neuro-disability

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AI-Powered MEMORI Software Enhances Patient Care by Predicting Infection Risk at the Royal Hospital for Neuro-disability

Article contributed by

SANOME

At Sanome, our goal is to transform vast amounts of healthcare data into clinically actionable insights for healthcare teams. We've developed a software called MEMORI, integrated into PatientSource, the Electronic Patient Record (EPR) system currently used at the Royal Hospital for Neuro-disability (RHN), that predicts the risk of a patient developing an infection within the next 7 days.

MEMORI provides clinicians with a robust and meaningful tool, the MEMORI risk level, to identify infection cases more accurately and faster, thereby enabling teams to intervene earlier, ultimately leading to improved patient outcomes and improved healthcare system efficiencies.

MEMORI is the result of a more than a year-long collaboration with the RHN, starting in January 2023. During that time, we engaged with various healthcare professionals, including nurses, HCAs, consultants, and clinical fellows, to understand their work, challenges, and how we could best support them.

During several ideation sessions, hospital-acquired infections were identified as the most impactful area where we could assist. Based on retrospective data from RHN and in collaboration with the Research department, we estimated around 100 transfers to St-George's Hospital annually, with approximately 80% due to infections. These emergency transfers impose significant emotional, physical, and financial costs.

Following these ideation sessions, we developed MEMORI further and returned to RHN for feedback sessions, presenting successive versions of the software. The feedback was invaluable in refining MEMORI to be practical and user-friendly for clinical teams.

The next step is to evaluate the utility and the effectiveness of MEMORI in a real-world environment. With that in mind, the RHN has agreed to host a prospective study for which Ethics approval was obtained where MEMORI will be trialled out on a small number of patients in a specific ward.

This pilot will be conducted in the Drapers ward, specializing in patients with severe brain injuries and will initially last for a few months. For consenting patients, MEMORI will generate a risk level indicating their likelihood of developing an infection within the next 7 days. This risk level is intended to be an additional resource for healthcare professionals, used alongside existing measures.

The main purpose of the pilot is to assess MEMORI's usefulness and usability. User feedback is crucial, as MEMORI should empower clinical teams without adding extra work. Our hope is to implement MEMORI in multiple wards at RHN, supporting the staff in providing the best possible care.

The use of Bispectral Index monitoring when providing intravenous sedation for dental treatment in severe brain injury

Mili Doshi

Having a severe brain injury affects the ability to cooperate with dental treatment. The dental team has treated patients under IV sedation safely and effectively for many years. It can be difficult to determine when the patient with a brain injury has reached the optimal level of sedation due to varying levels of consciousness and communication.

The Bispectral Index monitor (BIS) measures the level of consciousness during sedation and general anaesthesia and converts brain activity to a numerical value ranging from 0 to 100. Zero represents no brain activity, and one hundred indicates an alert and awake status.

BIS monitoring could be useful to ascertain when patients are appropriately sedated. However, the placement of the BIS sensors (figure 1), patient movement and dental treatment may impact the reliability of such monitoring.

The dental team was funded by the Society for the Advancement of Sedation Dentistry (SAAD) and the Royal College of Surgeons of England to undertake a feasibility study of the use of BIS monitoring in adults with cognitive impairment undergoing dental treatment conscious sedation.

Data were collected from three centres (The Royal Hospital for Neuro-disability, Surrey and Sussex NHS Health Care Trust, and Kent Community Health NHS Foundation Trust). Thirty-one patients were recruited for this study, 10 had a severe brain injury, and 21 had a profound learning disability.

This study found using BIS monitoring for the patient group is feasible. Applying the sensor and getting a reading in most patients was possible. Dental treatment causes a lot of muscular activity and an increase in BIS reading, which might impact its reliability. BIS readings were helpful at the start of sedation and in recovery to assess when the patient is back to their baseline. BIS monitoring could be a helpful tool when sedating patients with a brain injury.



BIS index range	State
100	Awake • Responds to normal voice
80	Light/moderate sedation • May respond to loud commands or mild prodding/shaking
60	General anaesthesia • Low probability of explicit recall • Unresponsive to verbal stimulus
40	Deep hypnotic state
20	Burst suppression
0	Flatline EEG

Conference Recap: Advancing IPC for a Healthier Future

Our recent conference united leading IPC experts to prioritise global health through effective practices. Celebrating advancements in diagnostics and treatments, it highlighted ongoing challenges and the need for sustainable IPC integration in healthcare. Experts including Dr. Holly Slyne, Rose Gallagher MBE, Della Warren, Sarah Fletcher, Rebecca Padbury, and Debbie Calver shared their insights on the latest innovations. The event reinforced the crucial role of continuous improvement and innovation in IPC for a healthier future.



Dr Alexandra Rose Completes Groundbreaking PhD on Mood Assessment in Patients with Severe Cognitive and Communication Impairments

Dr Alex Rose

Dr Alexandra Rose has recently completed her PhD in the assessment of mood in those with severe cognitive and receptive communications after brain injury, as part of the RHN PhD programme. She embarked on her PhD in 2019 and, despite challenges and a global pandemic, she completed her studies on time and even managed to get married mid-way through. The studies she completed as part of her project looked at establishing the current practice that professionals use when assessing mood in this population, and gaining consensus on what should be done considering the lack of a clear gold standard when cognition and communication impairments preclude people from clinical interviews and screening measures. Her work provides clinical information and suggested solutions to the findings of her systematic review (published in *Clinical Rehabilitation* in 2023), which showed that self-report screening tools for mood have not been validated in this population and other methods of assessment are required. The studies have been written up into three separate papers (currently in the process of being published); 1. Surveys of clinical psychologists and medical professionals on current clinical practice when assessing mood in this population, 2. In depth semi-structured interviews with clinical psychologists and medical professionals on their approach to assessments and issues that arise when assessing mood in this population, and 3. Focus groups with experts working with this population to gain consensus on what should be done when assessing mood in this populations. Dr Rose's work demonstrates the difficulties in these mood assessments, elucidates current clinical practice, and

suggest a formulation-based model derived through focus group consensus. Her findings would be of interest to all clinicians working with this population as there is a paucity of research in this area.

Dr Rose presented her PhD results at conferences in Glasgow, The Netherlands and London and virtually in Australia. She is co-convening the World Federation of Neurorehabilitation Neuropsychology specialist interest group (WFNR NRSIG) conference in Portugal, where she will also present her final results. Dr Rose would like to thank The RHN, Dr Sophie DuPort and Rupert Norfolk for encouraging her to complete the PhD, her PhD supervisors Professor Jonathan Evans and Dr Breda Cullen for their constant support, Dr Sarah Crawford for always being a wise advisor, and to her husband and family for their endless cheerleading.

Dr Rose successfully defended her thesis in November 2023 and has since secured an honorary research fellow post at the University of Glasgow. Dr Rose continues to work as the Principal Clinical Psychologist in the RHN brain injury service and is working on post-doctoral projects. She is excited to be a founding member of an international group of psychologists and speech and language therapists looking at developing a mood measure specific to this population. Her ultimate goal is to develop a valid mood assessment process specific to people with persisting cognitive and communication impairments after brain injury, to enhance the treatment patients and residents at the RHN and other national (and international) settings.



New Consultant at RHN Leads Innovative Research to Enhance Brain Injury Rehabilitation

I have been at the RHN for just over a year now. After completing a PhD in London, I moved to specialty training in East Anglia and was then working as a consultant in neurorehab on the South Coast since 2009 until coming here. As well as my clinical work on Draper's ward, I am involved with developing some basic areas of research, which will hopefully benefit our patients. One of the things we have been doing over the last few months is working with the clinical fellow doctors on projects looking at aspects of medical care of the patients across the organisation. This is to try to understand how best to meet their needs as well as develop evidence for clinicians involved with brain injury rehabilitation in other settings. The clinical fellows are working on a range of topics including botulinum toxin treatment for salivary problems in brain injury, the prescription (and discontinuation) of anti-convulsant medication, advanced care planning in patients on mechanical ventilation, hormonal problems after brain injury and the use of and monitoring of neurostimulants in disorders of consciousness. We are hoping to present results here and to the wider world over the next few months. In the summer, I am hoping to start a project looking at the experiences of staff involved with CANH discontinuation. Please do get in touch if you would like to know more! lbradley@rhn.org.uk

Articles

Keddie M, Vincer H, Shah P, Doshi M. An investigation of bispectral index monitoring when providing intravenous sedation for adults with severe cognitive disability. *SAAD Dig.* 2024; 40(1): 23-27

Magee WL, Narayanan A, O'Connor R, Haughey F, Wegener E, Chu BHL, Delargy M, Gray D, Seu AD, Siegert RJ, Tyas RJ, Yelden KC, Schnakers C "Validation of the Music Therapy Assessment Tool for Awareness in Disorders of Consciousness With the Coma Recovery Scale-Revised." *Arch Phys Med Rehabil.* 2023 Jul;104(7):1107-1114.

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Paterson H, Jayes M, Lancaster J and Murray J. "Users and Nursing Staff's Thoughts and Perceptions of Current AAC Training With Content Considerations for Future Training Interventions." *Communications Matters journal* 2023 August vol 37 n2: 21-27

Book editing

Oral Health and Dental Care in the Ageing Population edited by Mili Doshi, and Andrew Geddis-Regan Publisher Springer

Book chapters

Cultivated Therapeutic Landscapes "Gardening for Prevention, Restoration, and Equity" 1 edition Edited by Pauline Marsh, Allison Williams- Chap 7. Creating a therapeutic garden for people with Huntington's Disease and other neurological conditions by Josephine Spring

Rare Conditions, Diagnostic Challenges, and Controversies in Clinical Neuropsychology Out of the Ordinary. 1st Edition Edited By Jessica Fish, Shai Betteridge, Barbara A. Wilson:

Chap10-Neuropsychological, Neuropsychiatric and Functional Neurological Symptoms: The Challenges of Overlapping and Evolving Presentations by Alexandra E. Rose & Michael Dilley

Chap 22-The importance of accuracy when diagnosing Locked-in-syndrome (LIS) by Sarah Crawford, Sal Connolly, & Alexandra E. Rose

Chap 23-Ethical and practical issues for the psychologist working with patients with a disorder of consciousness by Elena Olgiati, Andrew Hanrahan, Paolo Mantovani, Jonathan Hinchliffe, & Sarah Crawford.

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