This ISCRR Horizon Scanning newsletter is intended to identify new and emerging health technologies, treatments, and services that may have the potential to improve the lives of people affected by transport accidents, or work-related illnesses and accidents. The technologies, treatments, and services are anticipated to have a significant impact on client care, safety, independence, function and mobility, and quality of life. Health-related innovations in the early stages of development, on the verge of diffusion, or not yet adopted into established health care systems but emerging in the next one to three years will be highlighted to help inform decision-makers on their adoption.

This second newsletter is a result of a year-long collaboration between ISCRR and CADTH. CADTH received funding from ISCRR to develop, pilot, and evaluate a horizon scanning system. The topics presented in this pilot newsletter have gone through a rigorous filtering and prioritisation process. Forty technologies, treatments, and services were originally identified through horizon scanning activities. Through consensus agreement amongst VWA, TAC, and ISCRR representatives, the topics with the greatest potential to improve TAC and WorkSafe client outcomes were selected.

The topics featured the newsletter will be monitored. For more information on this collaboration or this newsletter, contact the Evidence Review Hub at ER.Hub@iscrr.com.au.

The topics covered in this newsletter —

- Novel Peripheral Nerve Stimulation Device for Chronic Neuropathic Pain
- NKTR-181 — A Novel μ-Opioid Agonist Formulation
- A Multidisciplinary, Client-Centred Guide to Implementing Assistive Technology for Clients With Cognitive Impairments
- Community-Based Musculoskeletal Disease Management: A New Model
- A FRESH Approach to People Returning to Work With Traumatic Brain Injury
- New Ankle-Replacement Implant
- New Imaging Technology Identifies a Link Between Mild Traumatic Brain Injury and Cognitive Function
- Innovative Tool Assesses Changes in Brain Activity Associated With Concussion
- A Protein, S100B, May Increase the Body’s Autoimmune Response After Brain Injury
- Cloud-Based Speech Therapy
Novel Peripheral Nerve Stimulation Device for Chronic Neuropathic Pain

Nerve pain from a variety of neurological conditions and injuries can be debilitating and affect an individual’s quality of life. Current treatment options for neuropathic pain associated with a traumatic or surgical peripheral nerve injury include spinal cord stimulation and pain medication.

The StimRouter System is especially designed to relieve chronic neuropathic pain from such traumatic or surgical peripheral nerve injuries. Consisting of an implanted removable wire, the device delivers low-level electrical impulses, via the wire, directly to the nerve that carries the pain signal. The electrical currents serve to interrupt the pain signals to the brain, thereby reducing the pain’s severity.

Using a local anesthetic, in an outpatient setting, a small incision is made to implant the wire. The StimRouter System also includes a wireless External Pulse Transmitter (EPT) that is worn outside the body. The EPT sends electrical signals through the skin to the implanted lead. It stores different stimulation programs that match the patient’s level of activity or level of pain.

Unlike other neurostimulators, the StimRouter is designed to be used at the pain site rather than at the spinal cord. The device is intended to improve the quality of life of individuals with neuropathic pain and reduce their reliance on medications. Peripheral nerve stimulation works similarly to spinal cord stimulation but by applying the pain-relieving doses of a current to a small peripheral nerve rather than to a large area.

The StimRouter device is manufactured by Bioness.

Approved in Australia: No
Stage of development: Experimental
Setting for use: Outpatient
NKTR-181 — A Novel μ-Opioid Agonist Formulation

Chronic pain is a global epidemic, with opioid painkillers the analgesic of choice. While they are the most effective pain reliever, they are also the most abused, often leading to addiction, overdoses, misuse, and death. NKTR-181 is a first-in-class opioid analgesic that is intended as an alternative painkiller to oxycodone, one of the most commonly abused opioids.

NKTR-181 is designed to enter the central nervous system at a rate that is 90% slower than that of traditional opioid drugs. Its design also prevents it from being easily misused. Because the delivery of NKTR-181 to the brain is slowed, euphoria is decreased, thus making the product less desirable for drug abusers.

There is another benefit for patients with legitimate analgesic needs. The drug’s slowed delivery to the brain also decreases the potential for dangerous adverse effects, such as respiratory depression and sedation.

Nektar Therapeutics manufacturers NKTR-181.

Approved in Australia: No
Stage of development: Experimental
Setting for use: Acute care, supportive care, independent living
A Multidisciplinary, Client-Centred Guide to Implementing Assistive Technology for Clients With Cognitive Impairments

Assistive devices and technologies help individuals with physical and mental impairment maintain some level of independence by overcoming environmental impediments. Currently, there is limited knowledge of how to prescribe the appropriate assistive device for various impairment issues. The selection of the right assistive technology is believed to be a complex process, yet it is crucial to maintaining client independence, minimising the need for support, and ensuring the successful long-term use of the device or technology.

A new guide has been developed by researchers at the Rehabilitation Unit at the Karolinska Institutet in Stockholm, Sweden for prescribing assistive technology for people with cognitive impairment. The framework provides guidelines for occupational therapists and neuropsychologists. A qualitative approach was used in developing and validating the guide. It includes six main steps:

- meeting the client
- setting goals
- assessing client needs
- selecting the appropriate device
- developing a teacher and training plan
- providing an evaluation and following up.

Emphasis is placed on empowering the client and their carer.
Community-Based Musculoskeletal Disease Management: A New Model

According to the Western Australia Department of Health, service delivery in Australia for complex and/or chronic musculoskeletal disease management is inadequate. A new model published in September 2013 by the Western Australia Department of Health is intended to articulate common service delivery recommendations across existing models of care for musculoskeletal health. It also describes a model of coordinated and interdisciplinary care for people with musculoskeletal conditions.

The Department of Health’s disease-management model is aimed at individuals who are responsible for planning and developing services for musculoskeletal health conditions, especially in community-based settings. It identifies strategies for managing eight priority areas for promoting and facilitating good musculoskeletal health.

The priority areas include:

- service delivery in rural and remote settings
- promotion of musculoskeletal health and injury prevention to facilitate community awareness and prevention
- patient self-management
- community-based, interdisciplinary health services
- building workforce capacity
- service coordination
- the adoption of evidence-based approaches
- the tailoring of service delivery to particular groups.

The effective engagement of physicians will help in the adoption of such a model, as will publicising health promotion messages.
A FRESH Approach to People Returning to Work With Traumatic Brain Injury

Researchers at the University of Nottingham in the United Kingdom are conducting a “Working After Brain Injury” feasibility study.

Called “Facilitating Return to work through Early Specialist Health” or FRESH, the randomised controlled trial includes a nested, qualitative process evaluation involving 102 working-age people with traumatic brain injury. Patients will be randomly allocated to receive either early specialist traumatic brain injury vocational rehabilitation, or ESTVR, in addition to usual National Health Service (NHS) rehabilitation (the intervention group); or usual NHS rehabilitation only (the control group). Therapists will be trained and supported to deliver ESTVR. Work/educational and benefit status will be measured, as will the support received; the mood, well-being, and functional ability of the individuals with traumatic brain injury; and carer strain. Participants will be followed up at three, six, and 12 months.

The primary objectives of the feasibility study are to:

1. Determine whether an ESTVR package that includes a manual, training, and mentoring model based on an existing NHS service in Nottingham can be developed and implemented in three different NHS regional traumatic brain injury referral centres with differing service configurations.
2. Test the feasibility of delivering ESTVR in these referral centres, measuring the impact and cost-effectiveness compared with usual NHS care on returning to work (finding new work for those unable to return to an existing job), and job retention (returning to work with an existing employer) in a multi-centre feasibility, randomised controlled trial.
3. Determine whether ESTVR can be delivered in a way that is acceptable to traumatic brain injury patients, staff, and employers when compared with usual NHS rehabilitation.
4. Determine whether primary outcomes can be identified on how NHS ESTVR services are important to service users, NHS service providers, and professionals.

The results of this study are anticipated in 2016.
Arthritis pain can be very debilitating, affecting mobility and functioning. Hip and knee replacement surgery are often done to relieve the pain in those joints. Ankle replacement surgery is now on the rise, too, becoming the treatment of choice for individuals suffering from arthritis pain. According to Dr. Jonathan T. Deland of the Hospital for Special Surgery in New York, "one of the main advantages of ankle replacement is that it provides patients with better movement and mobility compared to ankle fusion in which bones in the ankle are fused together using metal screws." Ankle replacement also helps avoid stress on other joints in the foot. It also aids in decreasing the susceptibility of arthritis appearing in those joints.

The newest model of ankle implant is designed to last longer and reproduce the ankle’s natural motion compared to earlier models. The new implant requires a different surgical technique than existing implants, with an incision made on the side of the ankle rather than the front. According to Dr. Deland, "[T]his...will cause less disruption to the soft tissues surrounding the ankle joint and allows for the replication of curved bone surfaces like those in a normal ankle."

The new implant was approved by the United States Food and Drug Administration in 2012.
New Imaging Technology Identifies a Link Between Mild Traumatic Brain Injury and Cognitive Function

A new neuroimaging tool, diffusion tensor imaging (DTI), is being used to demonstrate the extent of brain damage after clinically mild injuries.

This tool has become a popular imaging technique in brain research. A recent study used DTI to visualize a clear neurobiological link between cognitive dysfunction and white matter injury following mild to moderate injury. (While grey matter contains nerve cells, white matter connects those nerves to each other and can impair the nervous system, if diseased.) The study involved 44 individuals with mild traumatic brain injury (TBI) and nine with moderate TBI, and compared them with 33 individuals with no brain injury.

At six days post-injury, the participants’ cognitive skills were tested and they were given a DTI scan. A year later, this process was repeated in 23 of the participants.

When compared with individuals with no brain injury, participants with injuries demonstrated damage to white brain matter. On a test designed to assess thinking and memory skills, scores were 25% lower in brain-injured participants compared with healthy participants.

DTI may be better able to characterize brain injury in mild TBI compared to CT or MRI because it can detect diffuse axonal injuries (DAI). DAI’s are small, and subtle brain alterations that are characteristic of many mild TBIs but are not visible in CT or MRI can be detected by DAI’s. DTI could play an important role in the prognosis of patients with mild TBI and help scientists understand the nature of brain injury in mild TBI.

Approved in Australia: No
Stage of development: Experimental
Setting for use: Hospital
A novel assessment tool has been developed to diagnose neurological disorders and brain injury. The Brain Network Activity (or BNA) analysis system is designed to evaluate brain function. The technology combines non-invasive, multi-channel electroencephalogram (EEG) technology with signal processing and analysis algorithms to measure patterns of brain networks activated during specific brain processes. The technology aims to deliver both quantitative and qualitative insights into brain functionality. It is intended to provide a deeper understanding of how the brain processes information and may have the potential to improve brain health and disease management.

The technology developer ElMindA Ltd. has established a database of brain activity from both healthy subjects and patients with brain-related disorders. The database includes more than 7,000 BNA datasets, which provide a clinically supported foundation to potentially help identify and manage neurological disorders such as attention-deficit/hyperactivity disorder — ADHD — or pain, and brain injuries such as concussion.

The effectiveness and clinical utility of the BNA technology is currently being studied in a clinical trial for the management of sports-related concussions in young athletes.

The BNA analysis system was approved for the assessment of brain function by the United States Food and Drug Administration in August 2014.
New evidence suggests that S100B, an astrocyte protein specific to the central nervous system, could play a role in the regulation of a neuroimmune response, connecting the function of the brain to the immune system. S100B is already known to be a useful biomarker in outcome prediction after TBI.

S100B is found only in the brain and spinal column. However, it can leak through the blood-brain barrier into the blood following a brain injury. Once in the bloodstream, the immune system identifies S100B as an intruder and releases antibodies to attack the protein.

The Ohio-based Cleveland Clinic in the United States conducted a study that recently found that repeated increases in S100B due to a head injury may boost an autoimmune response against the brain, which can result in chronic neurological disease. The study tested the theory that the presence of S100B in extracranial tissue is due to the production of antigen-presenting cells in the blood, which may induce the production of autoantibodies against S100B. To test this hypothesis, researchers used animal models of seizures, enrolled patients undergoing repeated disruption of the blood-brain barrier, and collected blood samples from epileptic patients.

When due the study’s findings, treatments for brain injury may include anti-inflammatory therapy or immunomodulators to decrease the autoimmune response.
TalkPath Therapy is an iPad app that is a component of a cloud-based speech therapy solution. It is intended for clinicians to use with adults with aphasia — a speech disorder that affects the ability to speak, write, or comprehend language.

TalkPath Therapy was designed by Lingraphica under the guidance of a team of speech-language pathologists; the company conducted significant usability testing with members of its Aphasia Users Group — each of whom is working to rebuild speech lost because of stroke. Research conducted by the company shows that, with continued practice, users can recover language lost due to a stroke or other brain injury.

During the extended trial period, Lingraphica is offering the subscription-based solution of more than 10,600 speech therapy and cognitive exercises, available on the iPad and the Web, for free. The downloadable app also provides clinicians with a dashboard for them to manage their clients’ progress, assign exercises to their clients, and check their reports.

In June of 2014, TalkPath Therapy for the iPad was named best mobile commerce app in the 2014 New Jersey Technology Council’s Mobile Applications Forum & Competition.
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