Institution:
Glasgow Caledonian University (GCU)

Unit of Assessment:
3: Allied Health Professions, Dentistry, Nursing and Pharmacy

Title of case study:
Enhanced support for stroke rehabilitation and long-term recovery through improved training and educational resources

Period when the underpinning research was undertaken:
1st January 2000 to 31st July 2020

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Prof. Jo Booth	Professor of Rehabilitation Nursing	2004 - present
Prof. Marian Brady	Professor of Stroke Care and Rehabilitation	1999 - present
Prof. Sebastian Chastin	Professor of Health Behaviour Dynamics	2007 - present
Dr. Bridget Davis	Researcher 1A	2008 - present
Dr. Christine Hazelton	Research Fellow and Optometrist	2009 - present
Prof. Maggie Lawrence	Professor of Stroke Prevention	2006 - present
Dr. Alex Pollock	Senior Research Fellow	2008 - present
Dr. Nicola Roberts	Senior Lecturer in Nursing	2011 - present
Dr. Uma Shahani	Senior Lecturer in Vision Sciences	1999 - present
Dr. Zoë Tieges	Psychology Researcher	2019 - present
Prof. Frederike van Wijck	Professor of Neurological Rehabilitation	2010 – present

Period when the claimed impact occurred:
1 August 2013 to 31 July 2020

Is this case study continued from a case study submitted in 2014?
No

1. Summary of the impact

Globally, support for recovery after stroke is substandard. Insights from our original research on priority areas for improving post-stroke recovery have been instrumental for the development of novel educational resources on vision rehabilitation and secondary stroke prevention (including physical activity and sedentary behaviour) for service users and providers in stroke rehabilitation and recovery support. These new resources, used by over 20,000 service users in 134 countries and completed by over 3,100 service providers within the UK and abroad (including Ireland, Australia, New Zealand), have raised educational standards and enabled the development of innovative, evidence-based stroke rehabilitation and recovery support services.

2. Underpinning research

Our research focuses on evidence gaps, prioritised through the James Lind Alliance Priority Setting Partnership on Life after Stroke, led by Pollock and Davis, i.e. vision rehabilitation and secondary stroke prevention.

Interventions for visual problems were investigated by Pollock and Hazelton in the first high quality Cochrane systematic review evidence synthesis on the topic [R1, G1]. It demonstrated that specific eye movement training was a promising intervention and could improve stroke survivors' quality of life - but existing clinical practice did not reflect the available evidence [R2]. Pollock, Hazelton and Brady conducted the first nation-wide survey (with a response rate of 90%) of treatments for stroke-related visual problems in 2011 [R2]. They identified important gaps and variations in care across Scottish inpatient clinical settings and key barriers to evidence-based practice, particularly a lack of training, guidelines and pathways.

Secondary prevention lifestyle interventions after stroke were investigated by Lawrence et al. in their 2015 systematic review and meta-analysis [R3, G2]. Using Cochrane methodology, this high quality review highlighted that these interventions improved lifestyle behaviours and physiological outcomes. In particular, behavioural interventions reduced blood pressure, waist

circumference and increased compliance with medication (anti-thrombotics, statins), thereby significantly reducing the odds of subsequent cardiac events. An accompanying qualitative review [R4, G2] highlighted important benefits of group-based secondary prevention interventions from the perspectives of stroke survivors and family members: feeling supported by others, acquiring new knowledge, and gaining confidence. This breakthrough in understanding provided new insights into how self-management of secondary stroke prevention by people affected by stroke could be optimised.

Further research on lifestyle interventions focused on physical activity and sedentary behaviour; the systematic review by van Wijck et al. in 2013 [R5] on physical activity was the first to comprehensively investigate stroke survivors' perceptions on psychosocial, physical and environmental barriers and facilitators to physical activity, following robust methodology. Findings highlighted that stroke-specific concerns (e.g. fear of subsequent stroke, post-stroke fatigue, embarrassment in a gym environment), lack of motivation (e.g. through depression, anxiety) and environmental factors were the main barriers, and that social support and the desire to get back to valued activities were the most important facilitators to post-stroke physical activity. These insights were essential for the development of specialist educational resources to better engage stroke survivors in physical activity. Sedentary behaviour, independently associated with high mortality and morbidity, was investigated by Tieges, van Wijck and Chastin in 2015 [R6, G3]. Utilising state-of-the-art objective activity monitoring, it investigated behaviour patterns in the largest cohort and longest follow-up period (i.e. one year) of studies published at the time. A key finding was that sedentary behaviour was independent of stroke survivors' mobility levels and did not improve spontaneously – even in those able to walk independently. These surprising new findings highlighted the need to develop novel behaviour change interventions specifically to reduce sedentary behaviour after stroke.

Taken together, insights from this body of work were instrumental for designing novel, evidence-based educational resources and services to address important evidence gaps affecting service users and providers.

3. References to the research

- [R1] Pollock A, Hazelton C, Henderson CA, Angilley J, Dhillon B, Langhorne P, Livingstone K, Munro FA, Orr H, Rowe FJ, Shahani U. Interventions for visual field defects in patients with stroke. Cochrane Database of Systematic Reviews 2011, Issue 10. Art. No.: CD008388. https://doi.org/10.1002/14651858.CD008388.pub2. This review, part of a suite of four Cochrane systematic reviews addressing visual problems in stroke, was the first to systematically identify, appraise and meta-analyse the data relating to interventions for this population, addressing an important gap in the literature – a gap, known to be a barrier to clinicians' ability to provide evidence-based care. Using Cochrane methods, internationally known for their rigour, this review has been used to underpin national stroke guidelines in the UK, USA and Australia. It is very widely read, with an attention score within the top 5% of all research outputs (Altmetric, 11.12.20). This review has provided evidence for the most promising treatment approaches to use with stroke survivors with visual field loss – specifically scanning training approaches.

- [R2] Pollock A, Hazelton C, Brady M. Visual problems after stroke: a survey of current practice in UK stroke inpatient settings. Topics in Stroke Rehabilitation 2011; 18: 643–651. https://doi.org/10.1310/tsr18s01-643. This robust survey study, which achieved a 90% response rate through the use of evidence-based survey design principles, was the first to address service provision for those with visual problems after stroke across Scottish inpatient clinical settings. It provided the first evidence of assessment methods, their frequency of use and the management approaches across the spectrum of different post-stroke visual impairments. By focussing on Occupational Therapists based in all the acute stroke wards, it provided a ground-breaking and comprehensive picture of clinical practice. The survey identified important variations and gaps in care provision after stroke (especially in relation to eye movement disorders). Importantly, it also enabled us to identify the main

barriers to improving care, which included the lack of clinical guidance and poor access to specialist training.

- [R3] Lawrence M, Pringle J, Kerr S, Booth J, Govan L, Roberts NJ. Multimodal secondary prevention behavioral interventions for TIA and stroke: a systematic review and meta-analysis. PLoS One 2015; 10: e0120902. https://doi.org/10.1371/journal.pone.0120902. This review and meta-analysis made a significant contribution to the evidence base for stroke secondary prevention lifestyle interventions, an under-researched area. The work was conducted using contemporaneous evidence synthesis methods internationally acknowledged as being of the highest quality.

- [R4] Lawrence M, Pringle J, Kerr S, Booth J. Stroke survivors' and family members' perspectives of multimodal lifestyle interventions for secondary prevention of stroke and transient ischaemic attack: a qualitative review and meta-aggregation. Disability & Rehabilitation 2016 38(1):11-21 https://doi.org/10.3109/09638288.2015.1031831. This ground-breaking evidence synthesis, employing rigorous review methods, was the first to be conducted on the topic and as such makes a unique contribution to the evidence base for stroke secondary prevention lifestyle interventions. The review is complemented by contemporaneous quantitative review work [R3]. The review work was conceived to establish a robust and rigorous evidence base to underpin subsequent primary and secondary research, and clinical practice.

- [R5] Nicholson SL, Sniehotta F, van Wijck F, Greig CA, Mead GE. A systematic review of perceived barriers and motivators to physical activity after stroke. International Journal of Stroke 2013 Jul 8(5): 357-64. https://doi.org/10.1111/j.1747-4949.2012.00880.x. This comprehensive and methodologically robust systematic review made an original contribution to the field of physical activity after stroke, as it was the first to synthesise quantitative and qualitative evidence on psychosocial, physical and environmental barriers and facilitators to post-stroke physical activity. Its contribution was significant as this area was poorly understood and this evidence gap limited the ability of healthcare and exercise professionals to take into consideration a wide range of factors, including stroke survivors' perceptions, when designing person-centred physical activity interventions. Findings from this review made an important contribution to our insight into a wide range of stroke-specific factors that need to be addressed to better engage stroke survivors in physical activity.

- [R6] Tieges Z, Mead GE, Allerhand M, Duncan F, van Wijck F, Fitzsimons C, Greig C, Chastin S. Sedentary behaviour in the first year after stroke: a longitudinal cohort study with objective measures. Archives of Physical Medicine and Rehabilitation 2015 Jan 96(1): 15-23. https://doi.org/10.1016/j.apmr.2014.08.015. This observational study made an original contribution to our understanding of enduring sedentary behaviour patterns after stroke, as it was the first to follow a cohort of stroke survivors for 12 months– the longest follow-up period investigated at the time. Utilising state-of-the-art objective activity monitoring devices, this rigorously conducted repeated measures study provided an essential point of reference in the field, by demonstrating not only the amount, fragmentation and diurnal time curve of sedentary behaviour, but also its lack of change over time in the largest cohort of stroke survivors investigated at the time. These findings generated the insight that novel lifestyle interventions after stroke were needed that specifically targeted sedentary behaviour patterns after stroke.

Peer-reviewed grants awarded to team for stroke rehabilitation research:

- [G1] Royal National Institute of Blind People (RNIB). Evidence of effectiveness of interventions for visual problems after stroke: a series of systematic reviews, 2009 - 2013: £67,166 to Pollock.
- [G2] Stroke Association Senior Research Training Fellowship: A family-centred approach to the management of lifestyle risk factors for recurrent stroke, 2012-2016: £139,989 to Lawrence.

- [G3] Edinburgh and Lothian Health Foundation, 2013-2014: £21,284 to Chastin (co-PI), van Wijck (co-I)

4. Details of the impact

Our research has been instrumental in the development of novel educational resources for the benefit of healthcare professionals (including nurses, therapists, psychologists, GPs, paramedics, optometrists), social care workers and specialist exercise professionals, and people affected by stroke within the UK, Ireland, Australia, New Zealand, Canada, US, India, Brazil, and the Philippines. These resources have raised educational standards and enabled the development of innovative, evidence-based stroke rehabilitation and recovery support services. The need for high-quality stroke workforce education is highlighted in the Scottish Government's Stroke Improvement Plan, the European Stroke Organisation's Action Plan for Stroke in Europe 2018-2030 and the World Stroke Organisation, as specialist education is essential for delivering stroke-specific care to improve outcomes.

Impact 1: Resource and service development for professionals: evidence-based practice

Vision rehabilitation after stroke

Based on the systematic review by Pollock et al. (2011) [R1], Hazelton was invited to contribute to the Stroke Training and Awareness Resources 'Vision' module, an innovative online professional education resource hosted by Chest Heart Stroke Scotland and commissioned by the Scottish Government as part of their Stroke Education Pathway. Over the impact period, an average of 395 module completion certificates per year were issued to health and social care professionals across the UK, North America, Australia, and the Middle East [C1].

Evidence from the Cochrane review [R1] and UK-wide practice survey [R2] also inspired a new GCU-led collaboration between Hazelton, GCU Vision Science faculty (Seidel) and low vision service providers (Visibility UK), which initiated the UK's first specialist Optometry Neuro-Vision Rehabilitation clinic at GCU in 2017. Providing specialist assessment, diagnosis and rehabilitation post-stroke, it has seen approximately 50 people from across Scotland [C2].

Hazelton's survey [R2] was also instrumental in initiating and informing the first Best Practice Statement for stroke-related visual impairment in Scotland (2013) [C3]. Alongside evidence-based recommendations [R1], this Statement underpinned a new Stroke and Vision Pathway in NHS Lanarkshire in 2015 [C3]. This subsequently led to post-stroke visual impairment being recognised as a clinical priority in the Scottish Government's Stroke Improvement Plan (2019), which requires specialist services to be available to all people with post-stroke visual impairment across NHS Scotland and audits their delivery [C3].

Physical activity after stroke

Research by Tieges, Chastin, van Wijck on post-stroke physical activity and sedentary behaviour [R5-6] has been embedded in the Exercise after Stroke Specialist Instructor Course, the first Higher Education Institution-validated course of its kind in the UK, led by van Wijck and delivered by Later Life Training (LLT). LLT provides evidence-based specialist training for health and exercise professionals. A total of 401 LLT professionals have been qualified since the inclusion of R5 in course updates (of which 383 since the inclusion of R6), to deliver novel, evidence-based exercise after stroke services across UK communities [C4]. LLT-qualified professionals were selected by the Stroke Association to deliver their new Moving Forward after Stroke service in 2017, which was rolled out to 9 sites across the UK, reaching over 800 stroke survivors [C6]. This service resulted in perceived benefits in physical recovery, mental health and confidence [C5-6]. Attendees reported engaging in moderate exercise on 5 days on average, compared to 3 days per week before the programme, and many joined a gym following the programme [C5-6].

Impact 2: Resource development for people affected by stroke: evidence-based self-management

Secondary stroke prevention

Based on her programme of research on family-centred secondary stroke prevention [R3-R4, G2], Lawrence was invited in 2014 as a topic expert on the Steering group of SelfHelp4Stroke,

the first free, online self-management resource hosted by Chest, Heart and Stroke Scotland to support people affected by stroke. This innovative resource, developed in collaboration with the Interactive Content Team at the University of Edinburgh, was highly commended in the British Medical Association Patient Information Awards 2016. Lawrence led the multi-professional team that developed the content for the stroke secondary prevention module 'Keeping Well', and contributed subject expertise to the 'Getting Started' module [C1]. Based on her research on barriers and motivators to post-stroke physical activity [R5] and sedentary behaviour [R6], van Wijck was also invited in 2014 to contribute to SelfHelp4Stroke. This research was instrumental in designing the 'Being Active' module, which encouraged stroke survivors to be less sedentary, and to address their barriers to progress to a more active lifestyle [C1]. From launch in 2015 to May 2020, more than 21,000 people affected by stroke from 134 countries (including the UK, Ireland, Australia, New Zealand, Canada, US, India, Brazil, the Philippines) have used SelfHelp4Stroke to support them in their self-management [C1].

5. Sources to corroborate the impact

- [C1] Testimonial (Jan 2021) from Chest Heart Stroke Scotland e-Learning Manager regarding, (1) Stroke Training and Awareness Resources and (2) SelfHelp4Stroke: "Taken together, thousands of people affected by stroke as well as professionals in stroke care from around the world have benefited from educational resources, based on the evidence contributed by the scientists from Glasgow Caledonian University named above. Being able to provide these online resources has contributed to the ability of our organisation to meet its strategic aim of addressing the unmet needs of people affected by stroke through better-informed care and self-management."

- [C2] Testimonial from Visibility Scotland Acting CEO (Dec 2020): "I cannot say strongly enough how positive the experience was and how important it was to improving the state of my mental health – feedback from a service user (stroke survivor) who has been supported both by GCU and Visibility Scotland."

- [C3] Testimonial (Jan 2021) from NHS-Lanarkshire Stroke Physician and Geriatrician, and Scottish Stroke Care Audit Lead Clinician and Chair confirming the incorporation of GCU research in the following strategies, (1) NHS Lanarkshire Stroke and Vision Pathway and (2) Scottish Government's Stroke Improvement Plan 2019 (page 60): "…their 2011 Cochrane Review … was important in creating the Best Practice Statement for Screening, Assessment and Management of Vision Problems in the First 30 Days after an Acute Stroke, and this was key to underpinning the Stroke Vision Pathway within NHS Lanarkshire...research at Glasgow Caledonian University… has clearly been essential in raising awareness of the need for vision rehabilitation after stroke, and enabling the development of evidence-based stroke rehabilitation services for people with visual impairment after stroke across Scotland."

- [C4] Testimonial from Later Life Training Directorate (Jan 2021): "…we pride ourselves on keeping the course up to date and research from Professor Frederike van Wijck at Glasgow Caledonian University has been instrumental in ensuring this."

- [C5] Moving Forward After Stroke: programme evaluation. Stroke Association (2019).

- [C6] Testimonial from Stroke Association Associate Director Systems engagement (Jan 2021): confirming incorporation of GCU research in [C5]. "On behalf of our charity, I am writing to confirm that research undertaken at Glasgow Caledonian University on physical activity and sedentary behaviour after stroke… has played a key role in enabling our charity to develop and deliver an evidence-based physical activity programme for people affected by stroke in the community. A programme known as Moving Forward after Stroke."