Article:
Morton, S, Fitzsimons, C, Hall, J et al. (6 more authors) (2019) Sedentary behavior after stroke: A new target for therapeutic intervention. International Journal of Stroke, 14 (1). pp. 9-11. ISSN 1747-4930

https://doi.org/10.1177/1747493018784505

International Journal of Stroke
Editorial

Title: Sedentary behaviour after stroke: a new target for therapeutic intervention

Authors

Sarah Morton, Claire Fitzsimons, Jennifer Hall, David Clarke, Anne Forster, Coralie English, Sebastien Chastin, Karen M Birch, Gillian Mead

Affiliations

Sarah Morton: Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, UK

Claire Fitzsimons: Physical Activity for Health Research Centre, University of Edinburgh, Edinburgh, UK

Jennifer Hall: Academic Unit of Elderly Care and Rehabilitation, Bradford Institute for Health Research, Bradford Teaching Hospitals NHS Foundation Trust, Bradford, UK

David Clarke: Academic Unit of Elderly Care and Rehabilitation, Leeds Institute of Health Sciences, Bradford Royal Infirmary, Bradford

Anne Forster: Academic Unit of Elderly Care and Rehabilitation, Leeds Institute of Health Sciences, Bradford Royal Infirmary, Bradford

Coralie English: School of Health Sciences and Priority Research Centre for Stroke and Brain Injury, University of Newcastle, Newcastle, Australia

Sebastien Chastin: School of Health, Glasgow Caledonian University; Department of Movement and Sport Sciences, Ghent University

Karen Birch: Faculty of Biological Sciences, University of Leeds, Leeds, UK

Gillian Mead: Geriatric Medicine, Division of Health Sciences, Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, UK

Abstract

Over the last 10 years evidence has emerged that too much sedentary time (e.g. time spent sitting down) has adverse effects on health, including an increased risk of cardiovascular disease incidence and mortality. A considerable amount of media attention has been given to the topic. The current UK activity guidelines recommend that all adults should minimise the amount of time spent being sedentary for extended periods. How best to minimise sedentary behaviour is a focus of ongoing research.

Understanding the impact of sedentary behaviours on the health of people with stroke is vital as they are some of the most sedentary individuals in society. Implementing strategies to encourage regular, short breaks in sedentary behaviours has potential to improve health outcomes after stroke. Intervention work already conducted with adults and older adults suggests that sedentary behaviours can be changed. A research priority is to explore the determinants of sedentary behaviour in people with stroke and to develop tailored interventions.

Editorial

Sedentary behaviours are defined as any waking behaviours characterised by an energy expenditure of ≤1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture [1]. It is important to note the distinction in definition between sedentary behaviours and physically inactivity (defined as: an insufficient physical activity level to meet present physical activity recommendations – e.g. not achieving 150 minutes/week of moderate intensity activity). An individual may be physically inactive but have low levels of sedentary time across their day, or vice versa i.e. could meet physical activity recommendations but also spend considerable time in sedentary behaviours

There is strong evidence supporting the association between prolonged time in sedentary behaviours and cardiovascular disease mortality and incidence in adults [2]. Negative health associations have also been highlighted in relation to disability, including reduced physical function [3], increased symptoms of depression [4] and frailty [5]. There is an ongoing debate as to what level of physical activity (duration/intensity/frequency) can offset the detrimental health consequences of prolonged sedentary behaviour. A recent meta-analysis published in The Lancet [6] showed a relatively high level of moderate intensity activity (60-75 minutes/day) would be needed to counteract the increased risk of death associated with high sitting time (>8 hr/day). People with stroke are highly sedentary (10.9 hr/day versus 8.2 hr/day in sex and age matched controls) and have very low activity levels (4.9 min/day in moderate to vigorous activities in comparison to 38.0 min/day) [7]. Achieving the level of physical activity needed to counteract the health effects of this volume of sitting would be very challenging in this patient group. Focusing on a reduction in total sedentary time presents a promising intervention target. The manner in which sedentary time is accumulated throughout the day is also important, with prolonged uninterrupted sitting events associated with increased metabolic risk [8]. People with stroke remain sedentary up to 1 year after their stroke, even if they make a good functional recovery, and tend to accumulate their sedentary time in longer uninterrupted sedentary events (weighted median 1 hour 42 minutes) [9]. Interventions therefore need to consider both total sedentary time and the pattern of accumulation of sedentary time throughout the day.

Current American Heart Association/American Stroke Association physical activity and exercise recommendations for stroke survivors includes a recommendation to reduce sedentary behaviours [10] for secondary prevention. Encouragingly, it has been demonstrated that sedentary behaviours in the general population are amenable to change. In reviews of interventions with adults which included a sedentary behaviour outcome measure, 34 out of 51 studies [11] and 23 out of 26 studies [12] showing promising results (a reduction in sedentary behaviour) in favour of the intervention group. To inform the development of interventions appropriate for people with stroke, we need to identify the specific determinants of sedentary behaviour at multiple levels (e.g. individual, social, institutional) [13]. Work currently being conducted in the UK, as part of the RECREATE (Reducing Sedentary Behaviour After Stroke) study http://medhealth.leeds.ac.uk/info/641/elderly_care_and_rehabilitation_research/2463/recreate looks to use information about existing practices in stroke care and understand the effects on stroke-relevant health outcomes and impairments. Stroke survivors, caregivers, family/friends and health staff and providers are integral to the research process and will participate in intervention development. Using co-production and behaviour change principles, the intervention(s) will support stroke survivors to reduce and break up sedentary time in a sustainable manner. Timing of the delivery of intervention components will be explored from inpatient settings through to after formal therapy sessions have ceased. Ultimately this research will show if it is feasible to implement an intervention(s) targeting sedentary behaviours in post-stroke care and if the intervention(s) is clinically meaningful and cost effective. Until these results are available, we recommend that staff involved in the care of stroke survivors not only counsel them about the benefits of physical activity, and refer them to exercise after stroke services when these are available [14], but also to consider the impact that sedentary behaviour might have on outcomes.

This paper refers to independent research funded by the National Institute for Health Research (NIHR) under its Programme Grants for Applied Research Programme (RECREATE: Development and evaluation of strategies to reduce sedentary behaviour in patients after stroke and improve outcomes, Reference number RP-PG-0615-20019). The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health

References

1. Tremblay MS, Aubert S, Barnes JD, Saunders TJ, Carson V, Latimer-Cheung AE, Chastin SFM, Altenburg TM, Chinapaw MJM: **Sedentary Behavior Research Network (SBRN) – Terminology Consensus Project process and outcome**. International Journal of Behavioral Nutrition and Physical Activity 2017, **14**(1):75.
2. Biswas A, Oh PI, Faulkner GE, Bajaj RR, Silver MA, Mitchell MS, Alter DA: **Sedentary Time and Its Association With Risk for Disease Incidence, Mortality, and Hospitalization in AdultsA Systematic Review and Meta-analysisSedentary Time and Disease Incidence, Mortality, and Hospitalization**. Annals of Internal Medicine 2015, **162**(2):123-132.
3. Gennuso K, Gangnon R, Matthews CE, Thiraen-Borowski K, Colbert L: **Sedentary Behavior, Physical Activity, and Markers of Health in Older Adults**. Medicine & Science in Sports & Exercise 2013, **45**(8):1493-1500.
4. Teychenne M, Ball K, Salmon J: **Sedentary Behavior and Depression Among Adults: A Review**. International Journal of Behavioral Medicine 2011, **17**(4):246-254.

5. del Pozo-Cruz B, Mañas A, Martín-García M, Marín-Puyalto J, García-García FJ, Rodriguez-Mañas L, Guadalupe-Grau A, Ara I: **Frailty is associated with objectively assessed sedentary behaviour patterns in older adults: Evidence from the Toledo Study for Healthy Aging (TSHA)**. PLoS ONE 2017, **12**(9):e0183911.
6. Ekelund U, Steene-Johannessen J, Brown WJ, Fagerland MW, Owen N, Powell KE, Bauman A, Lee IM: **Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women**. The Lancet, **388**(10051):1302-1310.
7. English C, Healy GN, Coates A, Lewis L, Olds T, Bernhardt J: **Sitting and Activity Time in People With Stroke**. Physical Therapy 2016, **96**(2):193-201.
8. Healy GN, Dunstan DW, Salmon J, Cerin E, Shaw JE, Zimmet PZ, Owen N: **Breaks in Sedentary Time: Beneficial associations with metabolic risk**. Diabetes Care 2008, **31**(4):661-666.
9. Tieges Z, Mead G, Allerhand M, Duncan F, van Wijck F, Fitzsimons C, Greig C, Chastin S: **Sedentary Behavior in the First Year After Stroke: A Longitudinal Cohort Study With Objective Measures**. Archives of Physical Medicine and Rehabilitation, **96**(1):15-23.
10. Billinger SA, Arena R, Bernhardt J, Eng JJ, Franklin BA, Johnson CM, MacKay-Lyons M, Macko RF, Mead GE, Roth EJ et al: **Physical Activity and Exercise Recommendations for Stroke Survivors**. A Statement for Healthcare Professionals From the American Heart Association/American Stroke Association 2014, **45**(8):2532-2553.
11. Martin A, Fitzsimons C, Jepson R, Saunders DH, van der Ploeg HP, Teixeira PJ, Gray CM, Mutrie N: **Interventions with potential to reduce sedentary time in adults: systematic review and meta-analysis**. British Journal of Sports Medicine 2015, **49**(16):1056-1063.
12. Gardner B, Smith L, Lorencatto F, Hamer M, Biddle SJH: **How to reduce sitting time? A review of behaviour change strategies used in sedentary behaviour reduction interventions among adults**. Health Psychology Review 2016, **10**(1):89-112.
13. Chastin SFM, De Craemer M, Lien N, Bernaards C, Buck C, Oppert J-M, Nazare J-A, Lakerveld J, O'Donoghue G, Holdsworth M et al: **The SOS-framework (Systems of Sedentary behaviours): an international transdisciplinary consensus framework for the study of determinants, research priorities and policy on sedentary behaviour across the life course: a DEDIPAC-study**. International Journal of Behavioral Nutrition and Physical Activity 2016, **13**(1):83.
14. Mead G, Bernhardt J: **Physical Fitness Training after Stroke, Time to Implement what we Know: More Research is Needed**. International Journal of Stroke 2011, **6**(6):506-508.