

New View on the Canadian Burden of Stroke: Productivity Loss in Adults Who Return to Work

Theodore Wein, Johanna Mancini, Raina M. Rogoza, Louisa Pericleous

ABSTRACT: An often overlooked facet of the indirect costs affecting working-age stroke survivors is the challenges experienced by those who return to work. This study quantified the productivity loss in 20 stroke survivors who returned to work which amounted to 53.0 missed work days and an average indirect cost of \$10,298 (CAD) in the year following a stroke. Despite the quantified productivity loss, 75% of patients reported no significant disability and a high proportion were self-employed compared to the Canadian population, indicating that socioeconomic factors may be driving patient decisions to return to work.

RÉSUMÉ : Nouveau regard jeté sur le fardeau des AVC au Canada et sur les pertes de productivité qu'expérimentent les patients adultes qui retournent au travail. On néglige souvent les difficultés vécues par les survivants d'un AVC qui retournent au travail ainsi que les coûts indirects associés à ce problème de santé. Après s'être penchée sur les cas de 20 survivants à un AVC, cette étude a montré, dans l'année ayant suivi leur AVC, que leurs pertes de productivité se sont élevées en moyenne à 53,0 jours de travail manqués, les coûts indirects atteignant 10 298 \$ (CAD). Malgré ces pertes de productivité, 75 % de ces individus n'ont signalé aucun handicap notable. De plus, si on les compare à la population canadienne d'ensemble, une forte proportion d'entre eux était des travailleurs autonomes, ce qui donne à penser que des facteurs socio-économiques sont peut-être à l'origine de leur décision de retourner au travail.

Keywords: Return to work, Cost of illness, Presenteeism, Absenteeism, Stroke, Work performance

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Due to improvements in the awareness and early management of stroke, 80% of individuals who experience a stroke now survive and live with the effects.¹ Stroke predominantly affects older adults, with 80% of all strokes occurring in those aged 60 years and older.¹ Patients experiencing stroke require immediate emergency medical services and acute inpatient management, which contributes to the resource utilization costs associated with these events.² Yet, managing the immediate and acute aspects of strokes accounts for only a small portion of the disease impediment.

Stroke and its subsequent long-term disability contributes to a significant economic burden including direct and indirect costs on the individual, caregivers, society, employers, and healthcare system.^{3,4} Direct costs (i.e. healthcare system costs) encompass expenditures on medical visits, acute and long-term care prevention, and medications, while indirect costs capture productivity losses, such as work loss, caregiver burden, and reduced productivity due to disease.³

This study, informed by data collected as part of a broader Canadian study on productivity loss in the year following a cardiovascular event including unstable angina, myocardial infarction, or stroke, provides further insight into work presenteeism (being present at work but less productive due to illness) and absenteeism (missing work due to illness) in stroke survivors.

Stroke survivors were approached for inclusion in the study during routine follow-up visits with three stroke neurologists at three different stroke centers across Canada (Hotchkiss Brain

Institute at University of Calgary, AB, Fraser Health Authority, BC, and Montreal General Hospital, QC). Recruitment and data collection began September 1, 2016, with an initial end date of November 30, 2016; however, this was extended to December 31, 2017, to increase the chances of meeting the recruitment goal of 50 patients. To be included in the study, stroke survivors must have met the following criteria: (1) been hospitalized for a stroke and returned for a routine visit four to 18 months after the index event; (2) had paid employment prior to the stroke and had returned to work post-stroke for at least four weeks at the time of recruitment; (3) be under the age of 65 years at the time of recruitment; (4) been diagnosed with dyslipidemia and were taking a lipid-modifying therapy at or as a result of the index stroke; and (5) provided informed consent to participate in the study. Patients participating in a clinical trial at the time of recruitment or with previous evolocumab use were excluded.

Participants were asked to complete a modified version of the Productivity Cost Questionnaire (iPCQ), with a four-week recall period to evaluate (1) absenteeism, (2) presenteeism, and (3) caregiver support using a detailed methodology to estimate the costs of productivity losses.⁵ The iPCQ is a standardized tool for

From the Department of Neurology and Neurosurgery, McGill University, Montreal, QC, Canada (TW); Real World Solutions, IQVIA, Kirkland, QC, Canada (JM); and Value and Access, Amgen Canada Inc., Mississauga, ON, Canada (RMR, LP)

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Correspondence to: Johanna Mancini, MSc, PhD, Real World Solutions, IQVIA, 16720 Trans-Canada Highway, Suite 100, Kirkland, QC H9H5M3, Canada. Email: johanna.mancini@iqvia.com

Table 1: Baseline characteristics and corresponding missed work days in stroke survivors who returned to work

Parameter	n (%)	Mean productivity losses (days)
Stroke survivors that returned to work	20 (100)	53.0
Sex		
Male	16 (80)	49.5
Female	4 (20)	66.5
Age group (years)		
≤50	8 (40)	59.0
>50–65	12 (60)	50.0
Employment type		
Employed (other than by self)	12 (60)	60.0
Self-employed	8 (40)	42.0
mRS*		
≤1	15 (75)	45.5
>1	5 (25)	83.0

*mRS = modified Rankin Scale; For mRS = 0 (no symptoms), n = 3 (15% of patients); mRS = 1 (no significant disability despite symptoms), n = 12 (60% of patients); mRS = 2 (slight disability), n = 2 (10% of patients); mRS = 2 (moderate disability), n = 1 (5% of patients); mRS = 4 (moderate-severe disability), n = 2 (10% of patients); mRS = 5 (severe disability), n = 0 (0% of patients); mRS = 6 (dead), n = 0 (0% of patients).

measuring and valuing productivity losses for use in economic evaluations of healthcare.⁵ Patient clinical characteristics were collected using a physician questionnaire.

The adjusted questionnaire and methodology were tailored to measure productivity losses in adults who return to work, thus allowing quantification and assessment of annual absenteeism and presenteeism.

The human capital approach, which uses patient-reported productivity loss rather than that reported by an employer, was used to calculate the productivity loss cost for the full year post stroke.⁵ To calculate the cost, a patient's annual productivity loss was multiplied with the average expected salary for a person in 2011 in the same age group, sex, and education level, as per Statistics Canada.⁶ The Statistics Canada Consumer Price Index was used to adjust the costs to 2019 CAD dollars.⁷

Our study identified 20 stroke survivors who returned to work and met the other inclusion criteria for this study from across the three study sites. Of the 20 patients, 95% experienced an ischemic stroke and 5% experienced a hemorrhagic stroke; the majority were male (80%, n = 16) and >50 years of age (60%, n = 12). Forty percent of the stroke survivors who returned to work were self-employed. Most (75%) had either no symptoms (modified Rankin Scale (mRS) = 0) or no significant disability despite symptoms (mRS = 1). Mean productivity loss was higher in women compared to men (66.5 vs 49.5 days), in younger age (≤ 50 years) compared to older age (> 50–65 years) (59.0 vs 50.0 days), in employed compared to self-employed workers (60.0 vs 42.0 days), and in patients with more severe disease, i.e., with an mRS > 1 compared to mRS ≤ 1 (83.0 vs 45.5 days) (Table 1).

Overall, the total mean productivity losses among our sample equated to 53.0 work days, with 47.6 days lost due to absenteeism (valued at \$9,048 CAD) and 5.4 days lost due to presenteeism

(valued at \$1,250 CAD) and with a total indirect cost of \$10,298 CAD) (Figure 1).

Our results are consistent with other studies finding lower earnings and employment rates for stroke survivors compared to the general population and matched controls in Canada.^{3,4} In a one-year prospective Canadian study from 2012, the average annual resource utilization costs associated with ischemic stroke were \$74,353 CAD (72% attributable to direct cost and 28% attributable to indirect costs of productivity loss and unpaid caregiving).³ Further, a retrospective cohort study using the Canadian Hospitalization and Taxation Database found that fewer stroke patients were working three years after their incident stroke compared to matched controls (by 19.8 percentage points), with an average earning reduction of \$13,278 during the three-year period for those participants who remained working.⁴

Study investigators were unable to reach the recruitment target of 50 patients despite expanding the recruitment period from 12 months to 18 months as many stroke survivors do not return to work at all. The finding of sample size challenges in this study was important for two reasons: (1) the challenge in identifying stroke survivors who return to work post-stroke for this study is a finding in itself and (2) our analysis provides insights into this understudied population which can direct future research.

Our study on stroke survivors who returned to work found that the majority had no significant disability, with 75% having an mRS of ≤ 1. Not surprisingly, we found that those with ongoing disabilities (mRS > 1) had higher productivity loss compared to those with an mRS ≤ 1 (83.0 vs 45.5 days). Interestingly, patients with an mRS ≤ 1 experienced significant productivity loss at an average of 53.0 days, valued at \$10,298 CAD per patient. The finding that those with few to no symptoms still experienced quantifiable productivity loss is of interest. Further research may be warranted to explore why these seemingly recovered patients

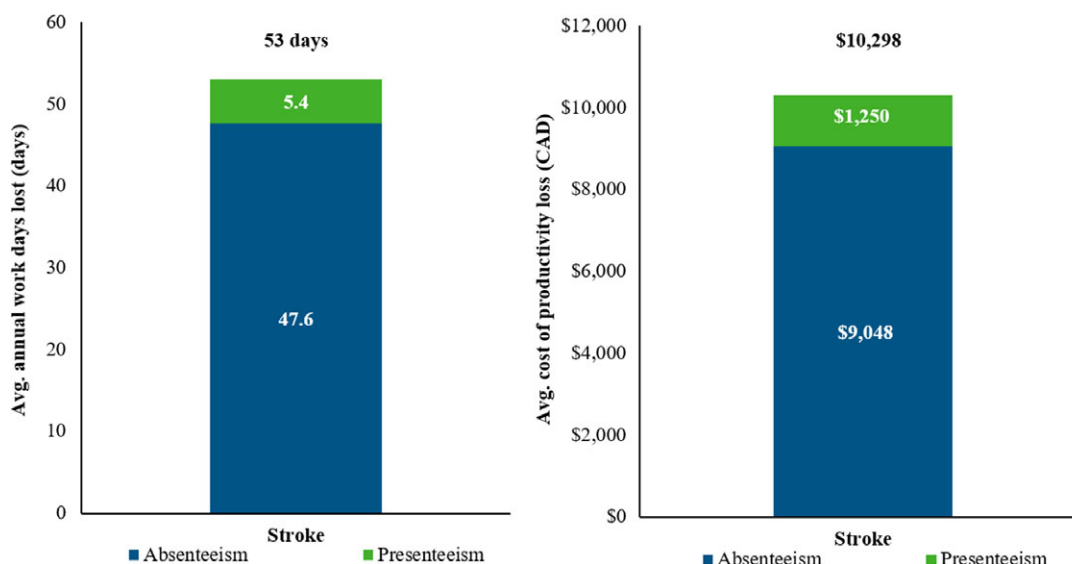


Figure 1: Productivity losses in stroke survivors who returned to work.

continue to experience productivity loss and how to help these type of patients return to fuller productivity.

There may be additional socioeconomic factors compelling stroke survivors who return to work. Our study population had a higher proportion who were self-employed (40%) compared to the overall Canadian population (15.3%),⁸ which may reflect a lack of disability benefits in that group or other factors unique to the self-employed. Further research may identify that these socioeconomic influences are strong drivers of whether a stroke survivor returns to work or not and may identify a need for further support. Relatedly, it could be that a portion of stroke survivors eligible and able to return to work choose to remain out of the workforce as their financial status allows for it.

This study had some limitations in addition to the sample size. The questionnaires used rely on human recall for the collection of data on productivity loss. Human memory is prone to recall bias which was minimized using a validated tool (iPCO) to assess productivity loss over four weeks.

The high prevalence of stroke and its burden on society is generally well understood. While much work has focused on quantifying this overall burden and management of stroke recovery, there may be a gap in understanding post-recovery workforce reintegration. While having a small sample size, our results suggest that in the year following a stroke, survivors who return to work experienced substantial work productivity losses. It also suggests a possible imbalance in the types of individuals who return to work. Based on these findings, the authors of this research recommend further work be done to understand the drivers of stroke survivors returning to work, the current strategies that are effective in helping stroke survivors return to the workforce, and if there are specific strategies needed to help individuals maximize their productivity upon returning to the workforce.

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DISCLOSURES

RMR and LP are employees of Amgen Canada and own Amgen stock options. JM is an employee of IQVIA, which received consulting fees from Amgen Canada to execute the study. TW received fees from Amgen Canada for conducting this study and is the Chair of the Canadian Stroke Best Practice Recommendations.

STATEMENT OF AUTHORSHIP

JM contributed to the acquisition of data, analysis, and interpretation of data. TW contributed to data acquisition and interpretation. RMR and LP provided support during data interpretation. All authors were involved in the writing, review, and approval of the finalized manuscript and agreed to act as guarantors of the work.

REFERENCES

- Heart and Stroke. Different strokes: recovery triumphs and challenges at any age [Internet]. 2017 [cited 2019 Jul 22]. Available at: <https://www.heartandstroke.ca/-/media/pdf-files/canada/stroke-report/strokereport2017en.ashx>
- Canadian Institute for Health Information. Pathways of care for people with stroke in Ontario [Internet]. 2012 [cited 2019 Jul 22]. Available at: https://secure.cihi.ca/free_products/Pathways_of_care_aib_en.pdf
- Mittmann N, Seung SJ, Hill MD, et al. Impact of disability status on ischemic stroke costs in Canada in the first year. *Can J Neurol Sci.* 2012;39(6):793–800.
- Garland A, Jeon SH, Stepner M, et al. Effects of cardiovascular and cerebrovascular health events on work and earnings: a population-based retrospective cohort study. *CMAJ.* 2019;191(1): e3–10.

5. Bouwmans C, Krol M, Severens H, Koopmanschap M, Brouwer W, Hakkaart-van Roijen L. The iMTA Productivity Cost Questionnaire: a standardized instrument for measuring and valuing health-related productivity losses. *Value Health*. 2015;18(6):753–8.
6. Statistics Canada. 2011 Census of Population Program [Internet]. 2011 [cited 2019 Sep 26]. Available at: www12.statcan.gc.ca/census-recensement/2011/dp-pd/index-eng.cfm
7. Statistics Canada. Consumer Price Index, Table 18-10-0005-01 Consumer Price Index, annual average, not seasonally adjusted. [cited 2020 Jun 02]. Available at: <https://doi.org/10.25318/1810000501-eng>.
8. Statistics Canada. Employment by class of worker, annual (× 1,000) [Internet]. 2020 [cited 2020 Mar 25]. Available at: <https://www150.statcan.gc.ca/t1/tb11/en/tv.action?pid=1410002701>