

Factors that facilitate and hinder the return to work after stroke: an overview of systematic reviews

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ABSTRACT

Background: Stroke is one of the leading causes of death and disability in the industrialized world and a large part of stroke survivors is of working age. A very important goal for these people is to return to work after stroke as it facilitates independent living and guarantees a high level of self-esteem and life satisfaction. **Aim:** To find the main factors that facilitate and hinder the return to work (RTW) in people who suffered from stroke through an overview of systematic reviews. **Methods:** A systematic search using keywords and medical subject heading terms was conducted in January 2022, three electronic databases were searched: Medline (PubMed), Scopus and ISI Web. The articles that address the question of returning to work or maintaining employment of people of working age after stroke were included in the systematic review, as well as studies describing factors that facilitate and/or hinder RTW after stroke. Only systematic reviews written in English language were included in this overview. **Results:** The search revealed 180 records after removing duplicates, but only a total of 24 systematic reviews were included in the overview. This research shows that in people who have suffered from a stroke, individual abilities, socioeconomic factors, healthcare factors, and disabilities resulting from the stroke itself are the most critical factors influencing the RTW. **Conclusion:** Future research should focus on cognitive disabilities, as main RTW hindering factor, and vocational rehabilitation, as the more suitable factor for improving the RTW in stroke survivors.

1. INTRODUCTION

Stroke is a vascular origin cerebral disease that causes damage of part of the brain; the extent of this damage is extremely variable and depends to a multitude of factors, including: the type and severity of stroke, the location of the brain damage, age of patient, sort, and timeliness of therapeutic intervention.

The WHO defines stroke as “a clinical syndrome consisting of rapidly developing clinical signs of focal (or global) disturbance of cerebral function lasting more than 24 hours or leading to death with

no apparent cause other than a vascular origin” [1]. Cerebral stroke is the second leading cause of death and the third leading cause of disability worldwide and the leading cause of disability in the elderly [2, 3]. Each year, almost 800,000 people experience a new or recurrent stroke [4]. Stroke is a very important cardiovascular event whose outcomes often lead to very serious clinical conditions. Despite improvements in the treatment, many individuals face cognitive, emotional, and physical impairments and the death rate of this syndrome is estimated between 10% and 50%, and about 5 million people survive with residual disability every year [5]. Moreover, this

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disease involves a considerable cost in health care services and associated community supports [6,7].

There are two main types of stroke: the ischemic stroke and the haemorrhagic stroke. The ischemic stroke, that represents the 80% of cases [3], is caused by the occlusion of one or more cerebral arterial vessels, which produces an ischemia and a consequent infarction of the brain area sprayed by those arteries. Neurological deficit may or may not be associated with neuroradiological evidence of ischemic injury [5]. The haemorrhagic stroke consists in suffering and consequent brain damage after the rupture of a cerebral vessel, in most cases affected by a previous aneurysm, due to the pressure exerted by the blood on the brain itself. Many risk factors have been identified that increase the chance of get hit by a stroke. These include: (i) hypertension, (ii) diabetes, (iii) obesity, (iv) hypercholesterolemia, (v) atrial fibrillation (AF), (vi) smoking, (vii) alcoholism, (viii) sedentary lifestyle, (ix) age, (x) gender [5]. Although the risk of stroke increases with age, a large part of stroke survivors is of working age [4, 8].

Return to work (RTW) can be considered a fundamental pillar in a set of workplace processes that has the aim, using a tertiary prevention approach, of facilitating workplace reintegration of employees, who experienced a reduction in their work capacity after occupational or non-occupational diseases or injuries. Thus, RTW is a coordinated effort that puts the attention on job retention in preventing early exit from working life [9]. Moreover, according to the Young *et al.* definition, we can consider RTW as “an outcome (e.g., the event of resuming work)”, but also a “process beginning with the initial steps of functional recovery and concluding with achieving full vocational potential” [10].

RTW after stroke is a very important goal, as it guarantees a high level of self-esteem and life satisfaction, and it provides psychosocial comfort, facilitating independent living and supplying a spirit of social identity. Furthermore, RTW is a young stroke patients’ recovery indicator and represents a very important rehabilitation goal, as it guarantees a high level of self-esteem and life satisfaction [11, 12]. This overview of systematic reviews aimed to find the main facilitating and hindering factors related the RTW after stroke.

2. METHODS

2.1. Identification of relevant studies

This overview was carried out according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [13]. The following PICO framework was used:

- Population: working population after stroke;
- Intervention: any intervention aiming to support a return to professional activities;
- Comparator: any;
- Outcome: return to work.

In January 2022, the electronic databases Medline (PubMed), Scopus and ISI Web were searched using the following search algorithm: “(return to work) AND (stroke) AND (review)”. Two independent researchers (FF, MC) selected suitable studies through a multi-step approach (title reading, abstract and full-text assessment). Disagreements between the two researchers were solved with a third researcher (LL).

2.2. Study selection and definition of eligibility criteria

Search results were entered into the reference management software JabRef (Version 4.3.1., <https://www.jabref.org/>) and a first selection was performed by eliminating duplicate articles. Then, two researchers (FF, MC) independently fulfilled a preliminary titles and abstracts’ check, before executing an accurate review and assessment for eligibility of all the potentially pertinent articles’ full texts. The articles that addressed the issue of returning to work or maintaining employment of people of working age after stroke were included, as well as studies describing factors that facilitate and/or hinder RTW after stroke. Only systematic reviews in English were included. No limits were applied regarding publication date. Any disagreement between the two reviewers (FF, MC) was solved through a consensus session with a third reviewer (LL).

2.3. Data extraction and quality assessment

Studies which finally met all eligibility criteria were analysed by two different reviewers (FF, MC)

who extracted data. Any disagreement was solved by a consensus session with a third reviewer (LL). A table was created to insert the various characteristics examined. The following items were collected: first author and year of publication, reviewer's title, study design of the articles included in the review, facilitating factors, hindering factors, main results, conclusions.

The "Assessing the Methodological Quality of Systematic Reviews" (AMSTAR) was used to assess the quality of the included systematic reviews [12], consisting of an 11-item questionnaire. For each item to which the reviewer answers yes, 1 point is assigned to the review. The minimum score is 0, while the maximum is 11. The tool provides three distinct levels of quality: high quality for 8–11 score; average quality for 4–7 score; low quality for 0–3 score. Disagreements about quality were solved with

a third researcher. The correlation between the AMSTAR score and the year of publication was studied with the Spearman rho coefficient, using the SPSS software, release 26.0.

3. RESULTS

The electronic search initially resulted in 180 studies after removing duplicates. After screening titles and abstracts, 80 articles met the inclusion criteria and were analysed on the basis of full text: 38 articles were excluded because they were off topic, 13 articles because of their study design, 2 articles because they were not in English language and 2 articles because the full text couldn't be found. Finally, 24 systematic reviews were included.

Figure 1 shows the flowchart of studies' selection. Among these articles, 5 studies focused on facilitat-

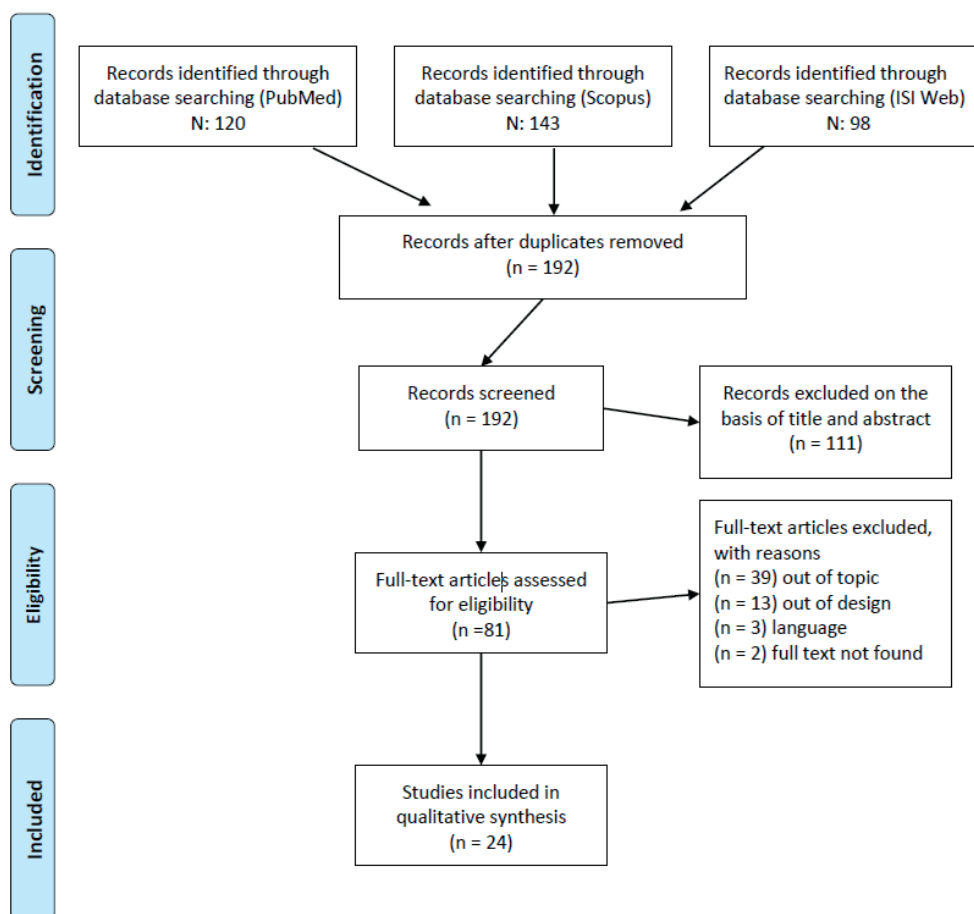


Figure 1. Flow chart of the overview of systematic reviews.

ing factors to RTW after stroke [8, 15-18], 5 studies analysed hindering factors [19-23], and 14 analysed both factors [4, 11, 12, 24-34]. The quality assessment scored a minimum value of 2/11 and a maximum value of 10/11, with an average value of 7/11 on the AMSTAR score.

3.1. Influencing factors of RTW

The studies included in this overview discussed the effects of stroke on individuals of working age and which factors influence the chance of these people to get an adequate RTW, i.e. fully reintegration of their previous job, partial reintegration (less hours), reintegration of the previous job with different activities and responsibilities, or even new job. These factors can be divided in two categories: those which facilitate RTW and those which hinder it. Table 1 summarizes all the final reviews included articles with their main characteristics and data, focusing on the reported factors that influence return to work.

3.1.1. Factors that facilitate RTW

The first category comprehends factors that have shown evidence of positive influence on RTW. In order to better combine the data resulting from all the different articles, these factors were assorted in specific groups, synthesized in Table 1. According to this synthesis, healthcare, socioeconomics and ability/disability related factors were the most predictors of RTW after stroke. Among the healthcare related factors, “vocational rehabilitation” was considered an essential facilitating factor by 6 studies [11, 12, 25, 27-29], but the median AMSTAR score of these reviews were 7.5/11 (average quality), with 50% of the reviews of high quality.

“External support from family, employers/managers/supervisors, colleagues and society” may be another major facilitating factors within socioeconomic factors group; it was mentioned by 8 articles [8, 16-18, 25, 29-31, 34] and their median AMSTAR score was 7/11, with 37.5% of the reviews of high quality. Furthermore, “independently performed ADLs”, (n.d.r. ADLs, Activities of Daily Living)

belonging to ability/disability related factors group, was indicated as one of the main facilitating factors of return to work by 5 reviews [4, 12, 29, 31, 32] and their average AMSTAR score was 8/11 (high quality). Regarding this factor, it was found in a high-quality review [12], which was evaluated 10/11 on AMSTAR score, that “better cognitive ability and fewer neurological deficit” help patients returning to work stroke. The type of work that people did before the stroke was also described from many authors as a very important influencer of RTW post-stroke. In fact, “non-manual work”, “skilled job” and “managing role” were described as facilitating factors of RTW [4, 12, 28, 33].

3.1.2. Factors that hinder RTW

Similarly to the previous paragraph, factors functioning as barriers for return to work were divided in category groups. The complete list of hindering factors in synthesized in Table 1. Most of the included studies focused on factors classifiable as disabilities, further classified as physical disabilities, cognitive disabilities, and functional disabilities.

The main physical disability considered as factor that negatively influence RTW after stroke was “post-stroke fatigue”, reported in 8 studies [4, 11, 19, 27, 28, 30, 33]. Schwarz et al. described “Severe and minor impairments” as individual related barrier to RTW in their high-quality review [27] assessed 9/11 on the AMSTAR score, whereas other non-specific physical disabilities were mentioned as hindering factors by 3 articles [11, 12, 26] with an average AMSTAR score of 10/11. Cognitive disabilities are also widely considered to be related to RTW failure by many authors. Moderate evidence correlating “aphasia” [21, 28] and “sleep disturbance” [19] to failure to return to work after stroke can be found in some reviews rated as medium quality overall (average score AMSTAR 5/11). However, most studies examining cognitive disabilities [4, 11, 12, 22, 24, 29, 33] did not identify a specific unfavourable disability but confirmed that cognitive disabilities in general represent a barrier for RTW. Possible barriers to RTW also include some factors related to health care, such as “inadequate rehabilitation” [11, 23, 27] and “length of hospital stay” [32] which

Table 1. Characteristics of the included articles.

Authors and year	Title	Study design	Facilitating factors	Hindering factors	Main results	AMSTAR Score
Al-Khindi et al. [19]	Cognitive and Functional Outcome After Aneurysmal Subarachnoid Haemorrhage.	Peer-reviewed research articles. Case studies were excluded.	None.	Post-stroke depression (PDS). Anxiety. Post-stroke fatigue. Sleep disturbance. Left hemisphere lesions from aneurysmal subarachnoid haemorrhage.	Cognitive deficits after an aSAH can be caused by macroscopic changes in brain structure. This also affects brain function at a microscopic, synaptic level, to such an extent that patients who have made a "good recovery" continue to experience deficits in memory, executive function, and language many years after aSAH. Patients cannot return to work, and their quality of life (QoL) is reduced.	6
Alves et al. 2020 [33]	What characterises work and workplaces that retain their employees following acquired brain injury? Systematic review.	11 longitudinal, 1 cross-sectional and 1 randomised controlled trial (RCT).	Skilled workers. Managing role. Non-manual work.	Post-stroke fatigue. Other cognitive disability. Emotional problems. Manual work.	Moderate evidence of manual work's negative relationship with work retention, limited evidence for a U-shaped relationship between workload and complete RTW at 6 months, and no relationship between workload and complete RTW at 12 months.	10
Ashley et al. [4]	Return to Work Among Stroke Survivors.	7 cohort, 3 cross-sectional, 5 prospective cohort, 2 longitudinal, 1 secondary analysis RCT 1 retrospective.	Lower stroke severity: no to slight disability on Modified Rankin Scale (mRS). Younger age (Age ≤ 65). Male gender. Skilled job. Caucasian ethnicity. Independently performed ADLs. Higher levels of education and income. Shorter hospitalization.	Post-stroke depression (PSD). Post-stroke fatigue. Other cognitive disability. Dependence on others for activities of daily living (ADLs). High severity stroke. Old age. Negroid ethnicity. Female Gender. Manual work.	Stroke survivors with a lower socioeconomic status are less likely to RTW in comparison with individuals with higher education and incomes, even when severity of stroke is similar.	6
Brannigan et al. [11]	Barriers and facilitators associated with return to work after stroke: a qualitative meta-synthesis	Not declared.	Proactive healthcare professionals, communicating and cooperating. Vocational rehabilitation.	Post-stroke fatigue. Other physical disability. Other cognitive disability. Inadequate rehabilitation.	The elements of the preparatory environment from the initial healthcare context to the workplace setting could be barriers or facilitators to RTW post stroke.	9
Brouns et al. [24]	Interventions to promote work participation after ischaemic stroke: A systematic review.	1 single-centre retrospective, 1 single-centre controlled before-after study.	Intravenous thrombolysis.	Mood disorders. Other cognitive disability.	A low-quality vocational therapy resulted in RTW for about 30% of patients after 3 months. 30% of patients who received the thrombolytic therapy returned to work, compared to 15% of patients who did not.	10

Table 1. Characteristics of the included articles.

Authors and year	Title	Study design	Facilitating factors	Hindering factors	Main results	AMSTAR Score
Dalemans et al. 2008 [21]	A description of social participation in working-age persons with aphasia: A review of the literature.	12 quantitative studies and 6 qualitative studies.	None.	Aphasia.	Decrease in employment after stroke and RTW at a different level or to another job with less demanding tasks. Unclear how different demands of jobs are related to reintegration in employment activities, or how aphasia impacts on job activities in comparison to physical problems or other neurophysiological problems.	8
Daniel et al. 2009 [25]	What are the social consequences of stroke for working aged adults? A systematic review.	2 randomized control trials, 11 uncontrolled case series.	Lower stroke severity. External support from family, employers/managers/supervisors, colleagues and society. Vocational rehabilitation.	Post-stroke depression (PDS). High severity stroke.	There is some evidence that those who are not able to RTW after a stroke have greater levels of unmet financial need and poor psychosocial outcomes such as detrimental effects on family life and deterioration of sexual life.	6
Donker-Cools et al. 2016 [8]	Effective return-to-work interventions after acquired brain injury: A systematic review.	5 RCT, 6 prospective cohort, 1 retrospective.	External support from family, employers/managers/supervisors, colleagues and society.	None.	Combination of work directed interventions (coaching/education and/or skills training) represents an effective intervention and has the potential to facilitate RTW.	9
Donker-Cools et al. 2016 [31]	Prognostic factors of return to work after traumatic or non-traumatic acquired brain injury.	RCT, case-control, prospective and retrospective cohort.	Caucasian ethnicity. Independently performed ADLs. Left hemiplegia. Higher levels of education and income.	Dependence on others for activities of daily living (ADLs). Living alone. Negroid ethnicity.	Independence in ADL is positively associated with RTW.	8
Edwards et al. 2018 [12]	Return to work after young stroke: A systematic review.	2 RCT, 2 cross-sectional and 25 longitudinal cohort.	Non-manual works. Male gender. Independently performed ADLs. Better cognitive ability and fewer neurological deficit. Vocational rehabilitation. Graded RTW and work trials, adaptations, job re-placements. Intravenous thrombolysis.	Other physical disability. Other cognitive disability.	Frequency of RTW ranged from 7.3% to 74.5%. Independence in ADL, cognitive ability, and neurological deficits are the most commonly reported predictors of successful RTW.	10
Garreif et al. 2015 [26]	Return-to-work in patients with acquired brain injury and psychiatric disorders as a comorbidity: A systematic review.	5 prospective cohort, 1 prospective case-control surveillance and 1 retrospective analysis.	Vocational rehabilitation. Adequate treatment of comorbid psychiatric disorders.	Generic psychiatric disorders. Other physical disability.	Negative impact of psychiatric disorders and scarcity of adequate psychiatric treatment on RTW. If comorbid psychiatric disorders are diagnosed and treated adequately, this might improve the RTW process of patients with acquired brain injury (ABI).	9

Table 1. Characteristics of the included articles.

Authors and year	Title	Study design	Facilitating factors	Hindering factors	Main results	AMSTAR Score
Harris 2014 [28]	Return to work after stroke: a nursing state of the science.	9 prospective cohort 3 consecutive patients 1 prospective longitudinal.	Non-manual works. Younger age (Age \leq 65). Caucasian ethnicity.	Generic psychiatric disorders. Post-stroke fatigue. Aphasia. Dependence on others for activities of daily living (ADLs). Other functional disabilities.	Age is not a significant predictor in RTW for different age groups under the age of 65 years.	3
Jellema 2016 [30]	Role of environmental factors on resuming valued activities post-stroke: A systematic review of qualitative and quantitative findings.	Qualitative studies (interviews, focus group), cross-sectional, cohort.	External support from family, employers/managers/supervisors, colleagues and society.	Lack of money.	Incorporating environmental influences into stroke disability models in order to facilitate rehabilitation professionals to better understand what helps or hinders stroke survivors to resume their activities.	8
Jellema 2016 [16]	What environmental factors influence resumption of valued activities post stroke: a systematic review of qualitative and quantitative findings.	cross-sectional, cohort, case control, RCT.	Graded RTW and work trials, work adaptations, job re-placements. Higher levels of education and income. External support from family, employers/managers/supervisors, colleagues and society.	None.	Each type of valued activity, such as mobility or work, had its own pattern of environmental influences, social support was a facilitator to all types of activities. Attitudes, behaviour, and knowledge related to stroke were considered important for re-engagement but were not studied quantitatively.	5
Lawrence 2010 [23]	Young adults' experience of stroke: a qualitative review of the literature.	qualitative studies.	None.	Inadequate rehabilitation.	Stroke has a devastating impact on young adults and their families. Many of its effects have significant impact on the ability to RTW. Young adults should be referred to young adult support groups.	4
Liaset and Lorås 2016 [15]	Perceived factors in return to work after acquired brain injury: A qualitative meta-synthesis.	All type except review, book, PhD theses.	Self-awareness. Empowerment. Motivation. Facilitation.	None.	The employer is considered the provider of a certain degree of facilitation in the workplace, affecting stroke survivors' motivation to RTW.	6

Table 1. Characteristics of the included articles.

Authors and year	Title	Study design	Facilitating factors	Hindering factors	Main results	AMSTAR Score
O'Keefe et al. 2019 [17]	A Systematic Scoping Review of Work Interventions for Hospitalised Adults with an Acquired Neurological Impairment.	3 prospective 2 retrospective cohort, 4 RCT, 6 case reports, 1 assessment protocol, 6 descriptive, 2 observational, 1 triangulation, 1 grounded theory and 1 guideline.	Higher levels of education and income. External support from family, employers/managers/supervisors, colleagues and society. Shorter hospitalization. Self-awareness.	None.	Delaying return to work may reduce stroke survivors' own self-belief in their RTW ability. It is feasible to integrate work interventions into an inpatient setting when working with brain impaired people after stroke.	6
Ponchel et al. 2015 [20]	Factors Associated with Poststroke Fatigue: A Systematic Review.	Observational studies.	None.	Post-stroke fatigue.	A greater incidence of post-stroke fatigue (PSF) in women and in elderly patients that is strongly linked to psychological and life factors such as depression, anxiety, poor quality of life and it is generally associated with infrequent return to employment.	4
Schwarz 2018 [27]	Meta-synthesis of qualitative research on facilitators and barriers of return to work after stroke.	Peer-reviewed original papers.	Graded RTW and work adaptations, job re-placements. Strong worker role, high job satisfaction, and passion for a job. Vocational rehabilitation.	Severe and minor impairments. Post-stroke fatigue. Inadequate rehabilitation. Low satisfaction of work, poor significance with a job. Bad work climate and relationships.	RTW after stroke depends on three basic principles: adaptiveness, purposefulness, and cooperativeness, that ideally guide the thinking and acting of all involved stakeholders.	9
Turi et al. 2017 [22]	A literature review of psychosocial comorbidities related to working capacity after aneurysmal subarachnoid haemorrhage.	Observational studies.	None.	Post-stroke depression (PDS). Anxiety. Post-traumatic stress disorder. Other cognitive disability. Negative psychosocial outcomes.	The majority of evidence suggests that poor psychosocial outcomes are associated with reduced working capacity post aneurysmal subarachnoid haemorrhage (aSAH).	5
van Velzen et al. 2009 [32]	Prognostic factors of return to work after acquired brain injury: A systematic review.	Longitudinal.	Independently performed ADLs.	Longer length of hospital stay.	Strong evidence was found that variables (disease/disorder, functions and structures, activities, external factors, personal factors) either had no association or a negative association with RTW.	8

Table 1. Characteristics of the included articles.

Authors and year	Title	Study design	Facilitating factors	Hindering factors	Main results	AMSTAR Score
Walsh et al. 2015 [18]	Factors associated with community reintegration in the first year after stroke: a qualitative meta-synthesis.	Qualitative studies.	External support from family, employers/managers/supervisors, colleagues and society. Proactive healthcare professionals.	None.	Individual's perseverance, adaptability and ability to overcome emotional challenges can facilitate reintegration into the community despite persisting effects of their stroke.	8
Wei et al 2016 [29]	Outcomes of return-to-work after stroke rehabilitation: A systematic review.	1 RCT, 1 single group clinical trial, 4 retrospective & 4 prospective cohort studies.	Independently performed ADLs. External support from family, employers/managers/ supervisors, colleagues and society. Vocational rehabilitation. Self-efficacy.	Post-stroke fatigue. Other cognitive disability. Right hemiplegia.	Functional independence, neurological status and cognition status were strongly related to RTW in stroke survivors of working age. Limited evidence was found to support vocational rehabilitation alone in facilitating RTW for stroke survivors.	9
Wolfenden and Grace 2009 [34]	Returning to work after stroke: a review.	19 articles/reports including review of records, 1 issue-focused article, 2 review articles, 2 case study reports and 5 information guides.	External support from family, employers/managers/supervisors, colleagues and society. Managing fatigue.	Bad work climate and relationships at workplace.	Appropriate rehabilitation would include specific preparation for RTW, education within the workplace to facilitate return to work, participation by the stroke survivor in all aspects of the management of their RTW, and an ongoing role for a stroke educator/ workplace advocate.	2

*RTW = return to work.

reach 7/11 and 8/11 respectively on the AMSTAR score. The category of psychiatric disorders also included some factors that hinder RTW and there are many reviews dealing with this topic. However, only one study [24], which reported “mood disorders” as an RTW barrier, had good quality (10/11 on the AMSTAR score). Among the factors that hinder the job, the most important is the “manual work” meaning the type of work done before the stroke, described only by 2 reviews [4, 33] with average quality of 8/11 on AMSTAR score.

3.1.3. Overall quality assessment

Considering all the reviews included in the overview, we found a median of the AMSTAR score of 8 over 11, and a sufficient score (over or equal to 6) in 75% of the reviews. Interestingly, a significant positive correlation (Spearman $\rho=0.478$; $p=0.018$) was found between the AMSTAR score and the year of publication of the review (Figure 2).

4. DISCUSSION

RTW is considered by many authors to be a fundamental aspect for people daily living and it is indispensable to assess the quality of life in stroke survivors. Professional reintegration after stroke is a major societal problem as the work environment, offering a social context, promotes well-being and a sense of purpose and those who do not resume their professional activities cannot benefit by this positive influence. Besides, these people have an increased risk of recurrent stroke or other cardiovascular disease, depression, isolation, poor coping skills and higher mortality rates [4, 24]. There is some evidence that those who are not able to return to work after a stroke have greater levels of unmet need and poor psychosocial outcomes [25].

An improved life satisfaction was described in stroke survivors who resume their job and identified work as something that,

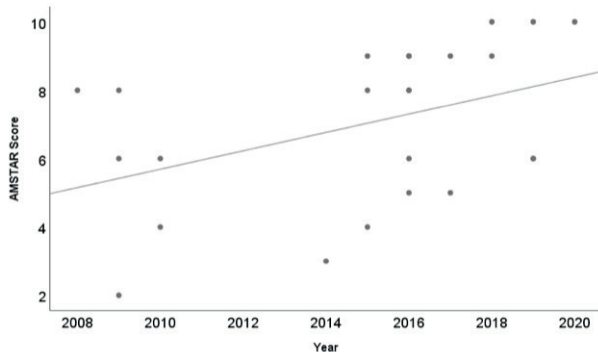


Figure 2. Correlation between AMSTAR score and year of publication.

fulfilling basic needs, is critically important to a person's financial, psychological, and emotional well-being, as well as playing a role in developing a person's self-esteem, social status, and their personal sense of achievement, independence, freedom, and security [35].

In support of this, some results showed that those who are not able to return to work after a stroke have greater levels of unmet need and poor psychosocial outcomes [25]. A directly proportional relationship was found between increased cognitive ability and RTW in the 6 months after stroke. In addition, the factors that had an influence on this relationship were possibly associated with speech impairment in stroke survivors with right hemiplegia [29]. Moreover, a better cognitive ability facilitates and encourages patients to independently providing to their own needs and there is strong evidence that independence in ADL is positively associated with RTW [31].

Behaviour is a function of the person and person's environment. They suggest incorporating environmental influences into stroke disability models in order to facilitate rehabilitation professionals to better understand what helps or hinders stroke survivors to resume their activities [30]. Vocational therapy represents a good instrument for stroke survivors to recover their abilities e consequently having more chances to return working. It emerged that a low methodological quality vocational therapy, providing twice-weekly treatment, resulted in a RTW for about 30% of patients after 3 months. Another relevant finding was the effect of intrave-

nous thrombolytic therapy in patients with moderate to severe acute ischaemic stroke, where 30% of patients who received the thrombolytic therapy returned to work, compared to patients who were not treated with thrombolysis of which only 15% reached RTW [24]. One good quality study showed the negative impact of psychiatric disorders and of adequate psychiatric treatment's scarcity on RTW [20]. Moreover, adequate diagnosis and treatment of comorbid psychiatric disorders could improve the RTW process of patients with acquired brain injury.

Great influence on RTW has been attributed by many authors to the type of work that stroke survivors did before they fell ill. A moderate evidence of manual work's negative relationship with work retention was found. Another disclosure was that workers who have a managerial role are more likely to return to work than people with a non-managerial role [26].

Due to the importance that the kind of previous work has on RTW after stroke, some authors suggested that employers consider the carrying out of some interventions adapting the workplace to stroke survivors' new abilities, in order to facilitate their job reintegration and improve their efficacy on work [30].

One study has proposed to regard job placements and, thereby, improving RTW outcomes with work practice, work-related skills training and providing information [8]. Studies included in this review found that elements of the preparatory environment from the initial health setting to the work setting could be barriers or facilitators to RTW after a stroke [11]. Furthermore, delaying return to work can reduce stroke survivors' self-confidence in their ability to return to work. It is possible to integrate work interventions in a hospital setting when working with people with brain disabilities after a stroke [17].

Another element to take into consideration is the economic aspect which plays an important role in RTW. Indeed, stroke survivors with lower socioeconomic status are less likely to have RTW than individuals with higher education and income, even when stroke severity is similar [4]. Socioeconomic factors have an important role as well in returning to work after stroke, considering external support

from family, work managers, colleagues and society a facilitator of RTW. The main physical disability, resulting from this review, that negatively influences RTW after stroke is post-stroke fatigue, while no strong evidence for a specific cognitive disability hindering return to work was found. Anyway, cognitive disabilities in general can be considered the main obstacle to RTW as reported by numerous reviews (7 out of 26 total) and the high average score on the AMSTAR scale of 8/11.

The services offered by healthcare are closely related to disabilities. Among these, the strongest factor that facilitates the RTW of patients after suffering from stroke is vocational rehabilitation.

4.1. Role of the occupational physician

There is evidence that the occupational physician needs to help both patients and employers to put in place return to work activities [36-38]. In the field of acquired brain injury this health professional needs to consider the perspectives of patients and employers regarding return to work, including little understanding of limitations resulting from these conditions, as well as work-related aspects hindering RTW (i.e., high job demand) and barriers due to health conditions of the patient including cognitive limitations and fatigue [39].

As pointed out by Donker-Cools, the role of the occupational physician can be related to the implementation of the most effective interventions for RTW of stroke patients, including tailored approach and early intervention. The involvement of patient and employer in this field by the occupational physician could be really crucial and could include work or workplace accommodations, as well as the work practice of social and work-related skills, such as coping and emotional support [8].

In this field, the Centers of Occupational Health and Education (COHEs) developed a structured intervention for reorganizing the delivery of occupational health care. The aim is to support effective secondary prevention in the first 3 months following injury, that includes the following steps [40]:

1. Submit a timely and complete Report of Accident to ensure claims are opened quickly;
2. Complete an Activity Prescription Form during

the first office visit, or when patient restrictions change, so that the worker, employer, and claim manager understand the treatment plan and recovery expectations;

3. Discuss return-to-work options with the employer when the worker has restrictions;
4. Identify barriers to recovery and solutions to those barriers with each worker;

An injured worker that follows the COHEs intervention has a 30% reduction in the risk of experiencing long-term work disability (Odds Ratio=0.70) [41].

4.2. Study limitations

The main limitations to this overview of systematic reviews depend on the great heterogeneity among the reviewed studies in terms of definition of work, returning to work and factors facilitating or hindering the return to work. Many authors did not define specific RTW influencing factors, but just generic factors (e.g. cognitive disabilities, without specifying which specific disabilities). Moreover, another limitation is related to the lack of a much more detailed description of the job activity performed before the stroke and its comparison with that one put in place after the stroke episode, for assessing whether or not limitations were adopted. Finally, little information is given on the availability of workplace support made from peers of employers.

5. CONCLUSIONS

Among the most important factors influencing the return to work, in people who have suffered from stroke, there are individual abilities, socioeconomic factors, healthcare factors and disabilities resulting from the stroke itself. Independently performed activities of daily life and better cognitive abilities act as RTW predictors in stroke survivors, representing the main individual skills on which it is suggested focusing future studies and rehabilitation interventions. Future studies should consider to better analyze which cognitive dysfunctions operate as barriers to RTW in stroke survivors and how vocational rehabilitation can help these people to reduce their disability level, improving the rate of RTW.

Healthcare services need new incitement and new evidences that suggest how to set up and structure an improved vocational rehabilitation and how to train healthcare professionals to apply this rehabilitation using the most suitable tools for encouraging early RTW in stroke survivors. For this reason, it's recommended to focus the research on two most important aspects: the identification of specific cognitive disabilities that limit the working skills of patients who have suffered a stroke and an in-depth analysis on which techniques of vocational rehabilitation are more suitable for improving the rate of return to work in stroke survivors.

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REFERENCES

1. Ketaki VM, Suvarna SG. Quality of Life in Patients with Stroke. *J Yoga & Physio*. 2017; 3(1): 555-605
2. Ovbiagele B, Goldstein L, Higashida R, et al. Forecasting the Future of Stroke in the United States: A Policy Statement From the American Heart Association and American Stroke Association. *Stroke*. 2013; 44(8):2361-2375.
3. Rosi A, Limbucci N, Nappini S, et al. Terapia endovascolare dell'ictus ischemico acuto. *G Ital Cardiol*. 2019; 20(9 Suppl 1):50S-62S.
4. Ashley KD, Lee LT, Heaton K. Return to Work Among Stroke Survivors. *Workplace Health Saf*. 2019; 67(2):87-94.
5. Di Meo C, Di Cioccio L. Il paziente con ictus cerebrale. *Geriatrics*. 2010;22(3):79-86.
6. Belagaje SR. Stroke Rehabilitation. *Continuum (Minneapolis)*. 2017; 23(1):238-253.
7. Legg L, Langhorne P. Rehabilitation therapy services for stroke patients living at home: systematic review of randomised trials. *Lancet*. 2004; 363:352-355.
8. Donker-Cools BHPM, Daams JG, Wind H, Frings-Dresen MHW. Effective return-to-work interventions after acquired brain injury: A systematic review. *Brain Inj*. 2015;30(2):113-131.
9. Figueredo JM, García-Ael C, Gragnano A, Topa G. Well-Being at Work after Return to Work (RTW): A Systematic Review. *Int J Environ Res Public Health*. 2020 Oct 15;17(20):7490.
10. Young AE, Roessler RT, Wasiak R, McPherson KM, van Poppel MN, Anema JR. A developmental conceptualization of return to work. *J Occup Rehabil*. 2005 Dec;15(4):557-68.
11. Brannigan C, Galvin R, Walsh ME, et al. Barriers and facilitators associated with return to work after stroke: a qualitative meta-synthesis. *Disabil Rehabil*. 2016; 39(3):211-222.
12. Edwards JD, Kapoor A, Linkewich E, Swartz RH. Return to work after young stroke: A systematic review. *Int J Stroke*. 2017;13(3):243-256.
13. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Int J Surg*. 2010;8(5):336-41.
14. Shea BJ, Grimshaw JM, Wells GA, et al. Development of AMSTAR: A measurement tool to assess the methodological quality of systematic reviews. *BMC Med Res Methodol*. 2007;7(1):10.
15. Liasset IF, Lorås H. Perceived factors in return to work after acquired brain injury: A qualitative meta-synthesis. *Scand J Occup Ther*. 2016;23(6):446-457.
16. Jellema S, van Hees S, Zajec J, van der Sande R, Nijhuis-van der Sanden MW, Steultjens EMJ. What environmental factors influence resumption of valued activities post stroke: a systematic review of qualitative and quantitative findings. *Clin Rehabil*. 2016; 31(7):936-947.
17. O'Keefe S, Stanley M, Adam K, Lannin NA. A Systematic Scoping Review of Work Interventions for Hospitalised Adults with an Acquired Neurological Impairment. *J Occup Rehabil*. 2018;29(3):569-584.
18. Walsh ME, Galvin R, Loughnane C, Macey C, Horgan NF. Factors associated with community reintegration in the first year after stroke: a qualitative meta-synthesis. *Disabil Rehabil*. 2014;37(18):1599-1608.
19. Al-Khindi T, Macdonald RL, Schweizer TA. Cognitive and Functional Outcome After Aneurysmal Subarachnoid Hemorrhage. *Stroke*. 2010;41(8):e519-e536.
20. Ponchel A, Bombois S, Bordet R, Hénon H. Factors Associated with Poststroke Fatigue: A Systematic Review. *Stroke Res Treat*. 2015; 2015:1-11.
21. Dalemans RJP, De Witte LP, Wade DT, Van den Heuvel WJA. A description of social participation in working-age persons with aphasia: A review of the literature. *Aphasiology*. 2008; 22(10):1071-1091.
22. Turi E, Conley Y, Stanfill AG. A Literature Review of Psychosocial Comorbidities Related to Working Capacity After Aneurysmal Subarachnoid Hemorrhage. *J Neurosci Nurs*. 2017;49(3):179-184.
23. Lawrence M. Young adults' experience of stroke: a qualitative review of the literature. *Br J Nurs*. 2010;19(4):241-248.
24. Brouns R, Valenzuela Espinoza A, Goudman L, Moens M, Verlooy J. Interventions to promote work participation after ischaemic stroke: A systematic review. *Clin Neurol Neurosurg*. 2019;185:105458.
25. Daniel K, Wolfe CDA, Busch MA, McKeivitt C. What Are the Social Consequences of Stroke for Working-

- Aged Adults? *Stroke*. 2009;40(6):e431-e440.
26. Garrelfs SF, Donker-Cools BHPM, Wind H, Frings-Dresen MHW. Return-to-work in patients with acquired brain injury and psychiatric disorders as a comorbidity: A systematic review. *Brain Inj*. 2015;29(5):550-557.
 27. Schwarz B, Claros-Salinas D, Streibelt M. Meta-Synthesis of Qualitative Research on Facilitators and Barriers of Return to Work After Stroke. *J Occup Rehabil*. 2017;28(1):28-44.
 28. Harris C. Return to Work After Stroke: A Nursing State of the Science. *Stroke*. 2014;45(9):e174-e176.
 29. Wei X, Liu X, Fong KNK. Outcomes of return-to-work after stroke rehabilitation: A systematic review. *Br J Occup Ther*. 2016;79(5):299-308.
 30. Jellema S, van der Sande R, van Hees S, Zajec J, Steultjens EMJ, Nijhuis-van der Sanden MW. Role of Environmental Factors on Resuming Valued Activities Poststroke: A Systematic Review of Qualitative and Quantitative Findings. *Arch Phys Med Rehabil*. 2016; 97(6):991-1002.e1.
 31. Donker-Cools BHPM, Wind H, Frings-Dresen MHW. Prognostic factors of return to work after traumatic or non-traumatic acquired brain injury. *Disabil Rehab*. 2015;38(8):733-741.
 32. Van Velzen JM, van Bennekom CAM, Edelaar MJA, Sluiter JK, Frings-Dresen MHW. Prognostic factors of return to work after acquired brain injury: A systematic review. *Brain Inj*. 2009;23(5):385-395.
 33. Alves DE, Nilsen W, Fure SCR, et al. What characterises work and workplaces that retain their employees following acquired brain injury? Systematic review. *Occup Environ Med*. 2020;77(2):122-130.
 34. Wolfenden B, Grace M. Returning to work after stroke: a review. *Int J Rehabil Res*. 2009;32(2):93-97.
 35. Baldwin C, Brusco NK. The Effect of Vocational Rehabilitation on Return-to-Work Rates Post Stroke: A Systematic Review. *Top Stroke Rehabil*. 2011;18(5):562-572.
 36. Steenstra IA, Lee H, de Vroome EM, Busse JW, Hogg-Johnson SJ. Comparing current definitions of return to work: a measurement approach. *J Occup Rehabil*. 2012 Sep;22(3):394-400. Doi: 10.1007/s10926-011-9349-6. PMID: 22415602
 37. La Torre G, Paoletti S, Petronzi F, Sestili C. L'uso del Disability Management in contesti internazionali: revisione sistematica di revisioni. *G Ital Med Lav Ergon*. 2021 Dec;43(4):357-368.
 38. Tanzi C, Moderato L, Magnani F, et al. Cardiopulmonary exercise testing for personalized job reintegration after acute cardiovascular attacks: a pilot cross-sectional study. *Med Lav*. 2020 Apr 30;111(2):107-115.
 39. Donker-Cools BHPM, Schouten MJE, Wind H, Frings-Dresen MHW. Return to work following acquired brain injury: the views of patients and employers. *Disabil Rehabil*. 2018 Jan;40(2):185-19.
 40. Wickizer TM, Franklin G, Fulton-Kehoe D, et al. Improving quality, preventing disability and reducing costs in workers' compensation healthcare: a population-based intervention study. *Med Care*. 2011 Dec;49(12):1105-11.
 41. Wickizer TM, Franklin GM, Fulton-Kehoe D. Innovations in Occupational Health Care Delivery Can Prevent Entry into Permanent Disability: 8-Year Follow-up of the Washington State Centers for Occupational Health and Education. *Med Care*. 2018 Dec;56(12):1018-1023.