Comparison of the Time Course of Return to Work After Stroke Between Two Cohort Studies in Japan

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Abstract: The conditions for stroke rehabilitation such as individual therapeutic procedure and medical treatment system in Japan have drastically changed over the past decade: increasing incidence of ischemic stroke, the use of intravenous recombinant tissue plasminogen activator, hospital specialization, introduction of convalescent rehabilitation wards, and public long-term care insurance. However, it is not known whether these changes have influenced the time course of return to work (RTW) after stroke. In this study we compared the time course of RTW after stroke in Japan that was reported in two cohort studies performed 20 years apart. The cumulative rate of RTW after first stroke was similar in the two studies, even though they were separated by an interval of two decades. This shows that advances in stroke rehabilitation have not impacted RTW, and we suggest that the social security system, particularly sickness benefit, has a strong influence on RTW.

Keywords: stroke, return to work, rehabilitation, sickness benefit.

Introduction

Stroke in young patients is a major socioeconomic issue, as survivors have a longer time to live with any resulting physical impairments. The cost of stroke in young people exceeds that of stroke in older people due to a greater loss in productivity and more psychosocial complications [1]. These complications include stress in the family, institutionalization, return to work (RTW) and future needs [2].

The rehabilitation of young stroke patients presents distinct challenges. RTW is an important goal for young stroke patients who had been working before stroke onset. In industrial nations, approximately 20% of stroke survivors are of working age or younger [3]. Young stroke patients have special needs in rehabilitation, different from the needs of elderly stroke patients. Young patients have a better likelihood of neurological recovery, and they have unique social issues. Institutionalization is infrequent in young stroke patients. The specific vocational issues experienced by young stroke patients are influenced by education, job type, and stroke severity. Vocational needs for RTW after stroke are often neglected during medical rehabilitation [4].

Stroke rehabilitation in Japan has changed drastically over the past decade. The incidence of ischemic stroke has increased [5], the use of intravenous recom-
binant tissue plasminogen activator has been approved [6], and hospital specialization has been influenced by the introduction of convalescent rehabilitation wards and public long-term care insurance. However, it is not known whether these changes have influenced the time course of RTW after stroke. There have been few studies on the time course of RTW after stroke [7].

The aim of this study was to quantify the influence of recent medical innovations for stroke on the time course of RTW after first stroke in Japan. To do this we compared two cohort studies that were performed 20 years apart and performed secondary analyses of the original data.

**Methods**

**Design**

We compared the Kaplan-Meier curves for RTW after first stroke reported in two cohort studies that had reported the cumulative rate or proportion of RTW after first stroke in Japan: Cohort I and Cohort II [8, 9]. Cohort I was a retrospective study on the association between characteristics of stroke patients at admission and RTW after stroke, taking length of follow-up period into consideration [8]. Cohort II was a multicenter, prospective cohort study on the association between characteristics at admission and early RTW after first stroke [9]. Both studies had performed 20 years apart.

**Subjects**

The subjects of Cohort I were patients younger than 65 years who experienced first ever stroke and were working at the time of stroke [8]. They were discharged alive from the University Hospital of Occupational and Environmental Health in Kitakyushu, Japan between 1986 and 1990. Of 703 stroke patients, 183 were included in this cohort based on the following criteria: first stroke, diagnosis of stroke by International Classification of Disease Ninth Revision, working age (18 to 64 years) and competitive employment status at the time of stroke.

The subjects of Cohort II were patients aged 15–64 years who had a first ever stroke and an active employment status at the time of stroke [9]. Of the 464 patients after first stroke admitted to the above Rosai hospitals between 2006 to 2007, 325 were included in this cohort based on the following criteria: first stroke, diagnosis of stroke, age 15-64 years and active employment status.

**Follow-up**

The end point of the study was RTW after stroke, which was defined as 1 month or more of work in active employment after stroke.

After discharge, follow-up questionnaire were sent between 1991 to 1992, which included questions on employment status after stroke in Cohort I study [8]. In Cohort II study, follow-up questionnaire were sent at 18 months after stroke onset [9].

**Statistical analysis**

The Kaplan-Meier method was used to calculate the cumulative rate of RTW after stroke and to plot curves on the same scale for both studies. Data were plotted using JMP® software (SAS Institute Inc., Cary, NC, USA).

**Results**

The two cohort studies are summarized in the Table 1. Patients in Cohort II were older than those in Cohort I. The proportion of patients who had ischemic stroke was higher in Cohort II than in Cohort I. The proportion of patients who were male and the proportion of patients who had a blue-collar job were also higher in Cohort II than in Cohort I. The proportion of patients with successful RTW at final follow up was 58% (mean follow up period, 3.5 years from stroke onset) and 55% (1.5 years) in Cohort I and II, respectively.

For both cohorts, the Kaplan-Meier curve for RTW was non-linear, with one steep rise during the first 3 months (0 – 200 days) after stroke and a second steep rise from 1 to 1.5 years (400 – 540 days) after stroke (Fig.1). The curve of Cohort I was located above that of Cohort II, indicating a higher proportion of RTW. This is reflected in the proportion of successful RTW at final follow-up (58% vs. 55%). The time course of two curves was similar.
The Kaplan-Meier curve of the cumulative proportion of the patients with successful RTW was non-linear for both cohorts. The curves had two steep slopes, one during the first 3 months after stroke (early RTW) and the other from 1 to 1.5 years after stroke (late RTW). The duration of sickness benefits in Japan is generally 1.5 years, and this may have influenced RTW [8]. The patients with early RTW had mild disability from the stroke, and those with late RTW had moderate or severe disability.

The conditions for stroke rehabilitation in Japan have changed drastically over the past decade. However, the time course of RTW after stroke was similar for the two cohorts, as indicated by the similar shape of the Kaplan-Meier curves. This suggests that RTW after stroke may not be strongly influenced by medical factors, which changed dramatically in the time period between the two studies, but may be strongly influenced by socioeconomic factors, particularly sickness benefits, which did not change in the time period between the two studies. Endo et al reported RTW in 382 Japanese stroke survivors using an objective measurement of sickness absence based on data from the occupational health register (clinically certified sickness absence using physician’s certificates) [10]. The cumulative RTW rate was 15.1% at 60 days post stroke, 33.6% at 120 days post stroke, 43.5% at 180 days post stroke and 62.4% at 365 days post stroke. The authors emphasized that organizational RTW support is very important for facilitating RTW after stroke.

It is surprising that the rate of RTW in Cohort II was, at 55%, almost same as that of a study performed 20 years earlier, which reported a rate of RTW of 58% in Cohort I, despite different medico-social backgrounds, subjects, and methods [8, 9, 11]. The stable rate of RTW in spite of the drastic changes in medical and socioeconomic conditions during the past decade in Japan may indicate that the proportion of subjects who are able to return to work has reached its maximum. In this respect, qualitative aspects of RTW, such as promoting early RTW, are important in addition to quantitative aspects.

Vocational issues are important for young stroke patients, but are often neglected in medical rehabilitation. The unique needs of young stroke survivors are understudied [12]. A young patient’s life situation is different to that of an older patient, and it has been assumed that greater focus should be given to psychosocial issues in young stroke patients [2]. The impact that stroke has on a young individual may not be as obvious as it is for an older individual. Invisible disability can lead to both subtle and major social issues, including patients doubting the validity of their own disability [4]. Employers and professionals within the community should try to focus on meeting the needs of stroke survivors and their families in order to facili-
tate participation and independence for stroke patients [13]. A workplace intervention consisting of workability assessments and workplace visits was effective in facilitating RTW for stroke survivors [14], and stroke survivors who received an individualized RTW program were three times as likely to return to work as survivors who received usual care.

Several limitations should be considered when interpreting the results of this study. First, the comparison validity of the target subjects in both cohort studies was not confirmed, because the characteristics of the subjects were different in both groups. Second, the process of RTW is variable between individuals, and can be affected by many factors [15]. The Cohort I study considered potential confounding factors when plotting the Kaplan-Meier curves, but the Cohort II study did not. Therefore, in this study we did not consider potential confounding factors when plotting the Kaplan-Meier curves. Third, both studies were performed in the past, and these data might not necessarily reflect the present status. However, to the best of our knowledge, there have been no other studies that have reported the cumulative rate of RTW after stroke using survival analyses such as Kaplan-Meier curves. Fourth, both hospital-based cohort studies were performed in Japan, and the results therefore may not reflect the situation in other countries, particular those that vary in culture and social background.

Despite these limitations, our comparison shows that the rate of RTW was similar in the two cohorts, and we interpret this as reflecting a strong influence of the social security system, particularly sickness benefits, on RTW after first stroke in Japanese patients. Future research on time to RTW in other countries focusing on the qualitative aspects of RTW is needed [15].

Conflict of Interests

The author has no conflicts of interest to declare.

References

わが国の2コホート研究間における脳卒中後職場復帰の時間経過の比較

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要  旨：わが国の脳卒中リハビリテーションの状況は、近年、個別治療手技および診療システムの劇的な変化がみられた。すなわち、虚血性脳卒中発症率の増加、静脈注射用組織プラスミノーゲンアクチベーターの使用、病院の機能分化、回復期リハビリテーション病棟の導入、介護保険制度である。しかしながら、これらの変化が脳卒中後の職場復帰（復職）の経過に影響を与えているのかどうかは不明である。本研究では、20年以上隔てられて実施された2つのコホート研究－脳卒中後の復職の経過分析－を比較した。両研究は20年以上離れているが、初発脳卒中患者の累積復職率は両研究でほぼ同様であった。この結果は、脳卒中リハビリテーションの進歩が復職に大きな影響を与えない、むしろ傷病手当金などの社会保障システムが復職に大きな影響を及ぼすことを示唆している。

キーワード：脳卒中、職場復帰、リハビリテーション、傷病手当金。

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