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Stroke initial severity and outcome relative to insurance status in a universal health care system in Switzerland

THESE

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par

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Rapport de synthèse

Contexte et but de l'étude :

Le statut socio-économique est suspecté d'avoir une influence significative sur l'incidence des attaques cérébrales (AVC), sur les facteurs de risque cardio-vasculaire, ainsi que sur le pronostic. L'influence de ce statut socio-économique sur la sévérité de l'AVC et sur les mécanismes physiopathologiques sous-jacents est moins connue.

Méthode :

Sur une période de 4 ans, nous avons collecté de manière prospective (dans un registre) des données concernant tous les patients avec AVC aigus admis à l'Unité Cérébrovasculaire du CHUV. Les données comprenaient le statut assécurologique du patient (assurance privée ou générale), les données démographiques, les facteurs de risque cérébrovasculaires, l'utilisation de traitements aigus de recanalisation vasculaire, le délai avant l'admission à l'hôpital, ainsi que la sévérité et le pronostic de l'AVC en phase aiguë, à 7 jours et à 3 mois des symptômes. Les patients avec assurance privée ont été comparés à ceux avec assurance générale.

Résultats :

Sur 1062 patients avec AVC, 203 avaient une assurance privée et 859 avaient une assurance générale. Il y a avait 585 hommes et 477 femmes. Les deux populations étaient similaires en âge. Les facteurs de risque cardio-vasculaire, la médication préventive, le délai d'arrivée à l'hôpital, l'incidence du taux de thrombolyse et l'étiologie de l'AVC ne différaient pas dans les deux populations. Le score de gravité de l'AVC en phase aiguë, mesuré par le NIHSS, était significativement plus élevé chez les patients avec assurance générale. Un pronostic favorable, mesuré par le score de Rankin modifié (mRS), était plus fréquemment obtenu à 7 jours et à 3 mois chez les patients avec assurance privée.

Commentaires :

Un statut socio-économique bas est associé à une incidence plus élevée de maladies cérébrovasculaires ainsi qu'à un plus mauvais pronostic, comme cela a été démontré dans différents pays. Il a été suspecté que l'accès à une prise en charge spécialisée en phase aiguë ou en rééducation soit différent selon le statut socio-économique. Comme la Suisse a un système de santé universel, avec une couverture assécurologique obligatoire pour chaque habitant, il y a là une occasion unique de comparer l'influence de l'aspect socio-économique sur la sévérité et le pronostic de l'AVC. De plus, les patients ont été admis dans la même Unité Cérébrovasculaire et pris en charge par la même équipe médicale.

Conclusion et perspectives :

Le lien entre le statut assécurologique et le statut socio-économique a déjà été prouvé par le passé dans d'autres pays. Nous avons mis en évidence une sévérité plus importante et un plus mauvais pronostic chez les patients avec assurance générale dans la population étudiée. L'étiologie de cette différence dans un système de santé à couverture universelle comme celui de la Suisse reste peu claire. Elle devrait être étudiée à plus grande échelle.

SHORT COMMUNICATION

Stroke initial severity and outcome relative to insurance status in a universal health care system in Switzerland

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Background: Socioeconomic status is thought to have a significant influence on stroke incidence, risk factors and outcome. Its influence on acute stroke severity, stroke mechanisms, and acute recanalisation treatment is less known.

Methods: Over a 4-year period, all ischaemic stroke patients admitted within 24 h were entered prospectively in a stroke registry. Data included insurance status, demographics, risk factors, time to hospital arrival, initial stroke severity (NIHSS), etiology, use of acute treatments, short-term outcome (modified Rankin Scale, mRS). Private insured patients (PI) were compared with basic insured patients (BI).

Results: Of 1062 consecutive acute ischaemic stroke patients, 203 had PI and 859 had BI. They were 585 men and 477 women. Both populations were similar in age, cardiovascular risk factors and preventive medications. The onset to admission time, thrombolysis rate, and stroke etiology according to TOAST classification were not different between PI and BI. Mean NIHSS at admission was significantly higher for BI. Good outcome (mRS $\leq$ 2) at 7 days and 3 months was more frequent in PI than in BI.

Conclusion: We found better outcome and lesser stroke severity on admission in patients with higher socioeconomic status in an acute stroke population. The reason for milder strokes in patients with better socioeconomic status in a universal health care system needs to be explained.

Introduction

Strokes are an important cause of mortality and morbidity, with a major economic impact but high regional differences [1]. Low socioeconomic status is associated with a higher stroke incidence both in countries with low and high standard of living and medical care [2], including Australia [1], Sweden, Netherlands [3,4], Finland [5], Italy [6] or China [7], and poorer outcome and higher mortality after strokes [8]. Better acute care and access to specialized neurorehabilitation services may be responsible [9]. Switzerland has a universal healthcare system, with a mandatory basic health insurance (BI) for all residents and the possibility to add supplementary private insurance (PI) services, including choice of the hospital, of the physician and

room comfort. The access to neurorehabilitation care is the same for all eligible patients. As both BI and PI are admitted to the same stroke units that follow the same treatment guidelines for all patients, there is a unique opportunity to study the influence of socioeconomic status on stroke severity and outcome that is not confounded by acute care services.

Methods

We prospectively collected data from 1062 consecutive patients with acute ischaemic stroke admitted within 24 h of the stroke in a single stroke unit between January 2003 and December 2006. This is the only stroke unit in this region and serves a larger catchment area of about 1250000 inhabitants. All individuals living in Switzerland must subscribe to basic health insurance (universal health care system). Cost is not proportional to income, and people unable to pay are subsidized to obtain BI. Therefore, health insurance coverage is

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virtually 100% and should decrease the effect of socioeconomic status on health care and outcome. About 25% to 40% of the population purchases extra insurance (PI), which costs about twice BI, and essentially allows for being hospitalized either in private hospitals or in separated beds in public hospitals. Given the strong link between socioeconomic status and choice of insurance, we used the latter as an indicator for the socioeconomic status [10,11].

All consecutive ischaemic stroke patients that are admitted to our hospital are included in a stroke registry [12] containing demographic data (insurance, age, gender), onset and type of symptoms, risk factors, stroke mechanisms using the TOAST classification [13], acute intervention (intravenous or intra-arterial thrombolysis), and severity measured by the NIHSS. Stroke recurrence data and functional outcome measured by the modified Rankin scale (mRS) at 7 days

and 3 months are also gathered systematically either in person at the outpatient stroke clinic or by phone by mRS certified medical staff. A mRS of 0–2 is considered a favorable outcome. This register was approved by the local ethics committee (Commission cantonale vaudoise d'éthique de la recherche sur l'être humain). The diagnosis of stroke was made by certified neurologists using clinical information, parenchymal and arterial imaging, continuous monitoring, and echocardiography in most patients.

Statistical analysis

Patients with BI and PI were compared using the univariate logistic regression model. The outcome at 7 days and at 3 months was compared between PI and BI patients using an adjusted logistic regression model. Data analyses were conducted with STATA 10.1

Table 1 Demographic and clinical characteristics of BI and PI patients, and odds-ratio and *P*-value from univariate logistic regression analysis comparing PI to BI

Independent variable	BI, average (SD)	PI, average (SD)	Odds-ratio	*P* value(*)
Age	69.0 (16.4)	68.9 (13.11)	1	0.97
Interval (min) from last well time to hospital arrival (average)	429.3 (392.1)	395.9 (386.4)	1	0.27
NIHSS at admission	9.3 (7.8)	7.8 (7)	0.97	0.01
	BI, *N*(%)	PI, *N*(%)	Odd-ratio	*P* value(*)
Number of patients	859 (80.9)	203 (19.1)		
Gender (male)	459 (53.4)	126 (62.1)	1.43	0.03
Benefit of acute treatment (iv or ia thrombolysis), *n* (%)	157 (18.3)	30 (14.8)	0.77	0.24
Ethnicity				
Caucasian (reference)	829 (96.5)	199 (98)		
Africa	19 (2.2)	0 (0)	–	–
India, Middle East, Asia	10 (1.2)	3 (1.5)	1.2	0.74
South America	1 (0.1)	1 (0.5)	4.17	0.31
Etiology of strokes				
Lacunar (reference)	130 (15.2)	34 (16.8)	–	–
Cardio-embolic	292 (34.1)	51 (25.1)	1.21	0.45
Atherosclerosis	148 (17.3)	47 (23.2)	0.67	0.10
Other	287 (33.5)	71 (34.9)	0.95	0.81
Risk factors				
Hypertension	561 (65.4)	129 (63.6)	0.92	0.62
Diabetes mellitus	132 (15.4)	33 (16.3)	1.07	0.76
Hypercholesterolemia	527 (61.4)	118 (58.1)	0.87	0.39
Smoking	315 (36.7)	73 (35.9)	0.97	0.84
Atrial fibrillation	218 (25.4)	43 (21.2)	0.79	0.21
History of treatment				
Antihypertensive treatment	459 (53.4)	101 (49.7)	0.86	0.35
Statins	169 (19.7)	43 (21.2)	1.1	0.63
Antiaggregation	365 (42.5)	99 (48.8)	1.29	0.11
mRS				
mRS at 7 days (≤2)	465 (54.3)	136 (68.0)	1.79	<0.001
mRS at 3 months (≤2)	532 (63.3)	147 (73.9)	1.63	0.005
Post hoc analysis				
Leukoaraiosis (Blennow grade ≥ 1)	102 (11.9)	28 (13.8)	1.18	0.45
Previous clinical stroke	131 (15.3)	25 (12.3)	0.78	0.29
Silent (radiological) stroke	202 (23.5)	38 (18.7)	0.75	0.14

StataCorp, 4905 Lakeway Drive College Station, TX, USA.

Results

PI patients are coded as 1 and BI as 0 (reference group). Summary data and detailed results can be seen in the Table 1. Both populations were similar in age, risk factors, and cardiovascular preventive medication. Acute stroke care was identical (similar onset to hospital time, rate of acute recanalisation treatments). No differences in stroke etiology were found. The NIHSS at admission was significantly lower in BI than in PI (mean NIHSS 9.3 vs. 7.8 points, $P = 0.01$). Good outcome at 7 days and at 3 months was better for PI, with 68% of PI having a favorable outcome compared to 54.3% in BI ($P < 0.001$ acutely, $P = 0.005$ at 3 months). After adjusting to different cofactors (age, sex, arrival time to the hospital, risk factors and initial NIHSS), favorable outcome was more frequent in the PI group (adjusted OR = 2.07 at 7 days, $P = 0.002$, adjusted OR = 1.66 at 3 months, $P = 0.02$). In a post hoc analysis, there was no difference in previous strokes, leukoaraiosis, or silent vascular lesions between both groups ($P = 0.29$, 0.45, and 0.14).

Discussion

We found better outcome at 7 days and at 3 months in patients with better socioeconomic status in an acute stroke population despite identical care. Our findings are not explained by demographics, ethnicity, stroke etiology, risk factor profile, better cardiovascular prevention, or higher thrombolysis rates.

Today, the importance of the socioeconomic status and the outcome of stroke remain incompletely understood. Several hypotheses can be made around our observation. There could be data that were not collected with influence on stroke severity, like better blood pressure control, different types of medications [9,14], and better compliance before or after onset of stroke. Alternatively, stroke severity may be lower because of higher functional reserve in some patients [15]. We did not measure brain volumes that are associated with cognitive function [16], but our post hoc analysis of three factors that may decrease cognitive reserve (previous stroke, leukoaraiosis, silent strokes) did not reveal a difference in the two populations.

There are some limitations in our study. We only considered insurance status as a marker for socioeconomic status without collecting precise data about income, level of education, highest work achievement, and other behavioral and psychosocial indicators [17]. Second, some patients with minor strokes may have stayed at home or in a longer-term care institution rather than being admitted to hospital. Given that virtually all strokes are hospitalized in Switzerland because of complete health insurance coverage and the high density of hospitals, this bias is unlikely. Lastly, we did not collect data about sleep apnea syndrome [18] and pre-stroke physical activity, which may influence stroke severity and outcome.

In conclusion, our study shows that patients with a higher socioeconomic status have a better short-and intermediate-term functional outcome. These findings were not explained by age, cerebrovascular risk factors, stroke mechanism, and acute stroke management, but probably by lower initial NIHSS. Further studies need to explain these observations.

Disclosure of conflict of interest

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