

# Acute care and one-year outcome of Mexican patients with first-ever acute ischaemic stroke: the PREMIER study

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**Introduction.** Information on acute care and outcome of Mexican patients with ischaemic stroke is lacking. The aim of this report is to provide results of a first step stroke surveillance system and outcome at one year of follow-up.

**Patients and methods.** In the PREMIER study 1,376 patients from 59 Mexican hospitals were included from January 2005 to June 2006. Of these, 1,040 (52% women, mean age 67.5 years) with first-ever cerebral infarction are here analyzed. Five visits were completed during the one year follow-up.

**Results.** Main risk factors were hypertension (64%), obesity (51%) and diabetes (35%). Total anterior circulation stroke syndrome occurred in 19% of patients, partial anterior in 38%, lacunar in 26% and posterior stroke syndrome in 17% cases. In 8% the stroke mechanism was large-artery atherosclerosis, in 18% cardioembolism, in 20% lacunar, in 6% miscellaneous mechanisms and in 42% the mechanism was undetermined, mainly due to a low use of diagnostic resources. Although 17% of patients arrived in < 3 h from stroke onset, only 0.5% had IV thrombolysis. Only 1% received endarterectomy or stenting. The 30-day case fatality rate was 15%. At one-year of follow-up, 47% had a modified Rankin score 0-2 (independent), 23% had 2-5 (dependent) and 29% died. One-year acute ischaemic stroke recurrence rate was 8%.

**Conclusion.** In Mexico a significant proportion of patients arrive on time for thrombolysis, but very few receive this therapy. There is a low use of diagnostic resources to assign aetiology. Thirty-day case fatality rate doubles at 1-year after acute ischaemic stroke.

**Key words.** Acute care. Cardiovascular risk. Mexico. OCSF. Outcome. Prognosis. Quality of care. Risk factors. Stroke. TOAST.

## Introduction

Stroke is a growing health problem in countries living the epidemiological transition, so that by the year 2005, 85% of deaths attributed to stroke around the world occurred in low- to middle-income countries [1]. In Mexico the scarce published information on cerebrovascular diseases is mainly derived from a few third-level centres focusing in some particular topics [2-4]. In order to increase the knowledge on acute stroke care in this emerging economy, the *Asociación Mexicana de Enfermedad Vasculares Cerebrales* (AMEVASC) created the PREMIER registry (*Primer Registro Mexicano de Isquemia Cerebral*). The main goal of this effort is to describe the current clinical practice in diagnosis, treatment, and prevention of acute ischaemic stroke (AIS) and transient ischaemic attack (TIA), as well as to analyse the one-year outcome. The present report focus on patients with first-ever AIS, with the aim to describe: 1) relative frequency of vascular risk factors;

2) clinical and aetiological subtypes of AIS; 3) use of diagnostic procedures and acute treatment strategies; 4) use of secondary prevention at hospital discharge; and 5) clinical outcome in the first 12 months after AIS. This study represents the first multicentre report on hospital-based acute care of AIS performed in Mexico. This is the first of the PREMIER series.

## Patients and methods

The PREMIER study is a prospective, hospital-based multicentre registry on consecutive patients with AIS or TIA in Mexico. All members of AMEVASC working in second- and third-care level hospitals from different geographic regions of Mexico were invited to participate. The registry included 77 physicians (91% neurologists and 9% trained internists on cerebrovascular disease) from 59 urban centres of different types: 39 public and 20 private

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### Conflicts of interest:

This registry received unrestricted funds from Sanofi-Aventis.

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hospitals. Public hospitals included 32 second-level and 7 third-level hospitals, which serve areas of 0.5 to 10 million inhabitants and are the main health care providers for stroke patients in their regions. The PREMIER neurologists represented 15% of the total certified Mexican neurologists, and participating centres corresponded to 10% of the public and 15% of the private hospitals in Mexico; respectively. Investigators were asked to provide the number of AIS patients they see per year and who could follow for at least one year with complete and accurate information. Thus, a quota of 15 patients minimum was set, and with a maximum of 25 patients per investigator, in order to assure completeness and accurate description of the follow-up events. As a result, 11 centres originally invited were excluded as a participating site. Then, new centres were invited and additional training workshops were held.

### Recruitment period and data collection

Consecutive patients were included in the registry if they were  $\geq 18$  years of age, with clinical ischaemic stroke syndromes confirmed by neuroimaging (head CT or MRI), and who received medical care (either hospitalised or as outpatients) within 7 days of stroke onset. Patients were excluded if complete information could not be obtained. As practiced in other registries [5], a pilot recruitment started in 7 third-level academic centres to verify the feasibility of the computerised database and then it was extended to the public and private community hospitals; after reviewing, amendments and improvements were applied. Using a standardised structured questionnaire outlined in a procedure manual, prospective data were collected. In this manual, definitions of study variables were clearly described to ensure consistent information. A three-day workshop was organised before enrolment, addressing a review of stroke guidelines, exercises on strokes subtypes –TOAST and Oxfordshire Community Stroke Project (OCSP) classifications– [6] and video training on use of the National Institutes of Health Stroke Scale (NIHSS) and modified Rankin scale (mRS) scorings. Information registered was about demographics, time elapsed from stroke onset to hospital arrival, vascular risk factors, NIHSS score at admission to emergency room, in-hospital diagnostic and treatment procedures, medical complications, and use of secondary stroke preventive measures. The patients were evaluated at hospital discharge and at 30 days; as well as 3, 6, 12 and 18 months after AIS. Outcome variables included the mRS, Folstein's mini-mental state examination, lab-

oratory tests, neuroimaging studies, new hospitalisations, and vascular recurrences. Deaths were recorded as related to stroke, other vascular, unrelated to stroke, and of unknown cause. Syndromic and aetiological stroke classifications were validated by members of the Steering Committee (CCB, JLRS, LMB, ECh).

Hypertension, diabetes, past or current smoking habit, sedentary life style and alcohol abuse were defined following international standards, as previously reported [3,4]. Medical complications occurring during follow-up were registered based on criteria prevailing in each centre, at investigator's discretion. All data were recorded in an electronic file at the sites and were sent to a data management centre (Contract Research Organisation, CRO: Innoval Co.), where information was rechecked for completeness and plausibility. Missing or implausible data were referred to the treating clinician for clarification. Data quality was assured by periodic reports and clinical site visits by CRO monitors (10% of the participating centres were randomly audited). A central Institutional Review Board and the local Committee of Ethics of each participating centre approved the protocol.

### Statistical analysis

Parametric continuous variables are expressed as geometric means and standard deviations (SD), or minimum and maximum. Non-parametric continuous variables are expressed as medians and interquartile range. Categorical variables are expressed as percentages. To compare quantitative variables distributed between two groups, Student *t* test (ANOVA test when  $> 2$  variables) and Mann-Whitney *U* test (Kruskal-Wallis test when  $> 2$  variables) were performed in distributions of parametric and non-parametric variables, respectively. Chi-square statistics (i.e., Pearson's chi-square or Fisher's exact test, as corresponded) were used to compare nominal variables in bivariate analyses. Kaplan-Meier survival estimates and Cox proportional hazard regression model at 12 months were constructed to find determining independent variables of AIS outcome. All *p* values are two-sided and regarded as significant when  $p < 0.05$ . SPSS v. 13.0 software was used for all statistical calculations.

### Results

From January 2005 to June 2006, 1431 consecutive patients with acute cerebral ischaemia were recruit-

**Table I.** Demographic data and vascular risk factors in patients with first-ever ischaemic stroke (*n* = 1.040).

	Total	Women ( <i>n</i> = 543)			<i>p</i>	Men ( <i>n</i> = 497)			<i>p</i>
		≤ 55 <i>n</i> = 121 (22.3%)	56-75 <i>n</i> = 200 (36.8%)	≥ 75 <i>n</i> = 222 (40.9%)		≤ 55 <i>n</i> = 115 (23.1%)	56-75 <i>n</i> = 236 (47.5%)	≥ 75 <i>n</i> = 146 (29.4%)	
<b>Hospital admission, %</b>									
Not hospitalised	9.3	6.6	7.5	8.6		13.0	11.0	9.6	
Private hospital	17.8	19.0	19.0	18.9	0.97	13.9	16.5	19.5	0.82
Public hospital	72.9	74.4	73.5	72.5		73.0	72.5	71.9	
<b>Educational level, %</b>									
Analphabet/read and write only	36.3	13.2	40.5	54.5		15.7	30.1	48.6	
Elementary school	32.8	35.5	33.0	32.4	< 0.001	29.6	33.1	32.9	< 0.001
High-school or more	30.9	51.2	26.5	13.1		54.8	36.9	18.5	
<b>Risk factors, %</b>									
Hypertension	63.9	38.0	73.5	77.9	< 0.001	42.6	69.5	58.9	< 0.001
Diabetes	35.0	21.5	46.5	34.2	< 0.001	24.3	43.6	26.0	< 0.001
Current smokers	18.5	13.2	5.5	6.8	0.03	47.0	27.1	21.9	< 0.001
Sedentary life style	73.4	61.2	76.0	80.6	< 0.001	64.9	71.8	78.2	0.06
BMI > 27	50.8	44.6	56.5	50.0	0.10	53.0	53.0	43.8	0.17
Abdominal obesity	50.7	62.0	70.0	65.3	0.32	30.4	39.8	26.0	0.01
Dyslipidemia	20.6	9.1	22.0	20.7	0.009	20.9	28.0	15.8	0.01
Alcohol use (> 2 drinks per day)	24.6	8.3	5.0	6.8	0.49	48.7	47.5	36.3	0.06
Coronary heart disease	12.1	5.8	9.5	15.3	0.01	6.1	16.5	13.7	0.02
Congestive heart failure	8.9	8.3	10.5	13.1	0.38	3.5	6.8	8.9	0.21
Atrial fibrillation	10.4	6.6	13.5	18.9	0.007	1.7	5.1	11.6	0.003
Peripheral vascular disease	5.2	2.5	4.0	7.2	0.11	2.6	6.4	6.2	0.31
Previous TIA	10.7	11.6	12.0	10.8	0.92	11.6	12.0	10.8	0.93

BMI: Body Mass Index; TIA: transient ischaemic attack.

ed (either TIA or AIS). Fifty-five patients were excluded due to missing information. Of the remaining 1376 patients, a total of 130 (9.4%) TIAs and 206 (15%) recurrent strokes were excluded. Thus, 1040 cases of first-ever AIS were analysed for the present report: 543 (52.2%) women and 497 (47.8%) men, with a mean ± SD age of 67.5 ± 15.9 years. A total of 943 (90.7%) were hospitalised either in public (*n* = 758, 72.3%) or private institutions (*n* = 85, 17.8%). Only 97 (9.3%) patients received medical care as outpatients. Table I shows relevant characteristics of the cohort at inclusion in the registry, by gender and age. The proportion of women was much higher than that of men in the oldest group (40.9% vs 29.4%; *p* < 0.001). The most important vascular risk factors were hypertension, obesity and diabetes. In the older ages hypertension was more common among women than in men. Obesity was highly prevalent in the total cohort (> 50%), partic-

ularly in women. More current smoking habit (30.2% vs 7.7%; *p* < 0.001) and alcohol abuse (44.5% vs 6.4%; *p* < 0.001) occurred in men than in women, especially in the youngest group. Conversely, congestive heart failure (11.0% vs 6.6%; *p* = 0.01) and atrial fibrillation (14.2% vs 6.2%; *p* < 0.001) were significantly more common in women.

Of the 943 patients who were hospitalised, 163 (17.3%) arrived within 3 h of stroke onset and 165 (17.5%) in 3-6 h. At hospital admittance, NIHSS was determined in 926 patients: 343 (37%) had NIHSS of < 8 points, 360 (38.9%) had 9-18 points and 223 (24.1%) had NIHSS of > 18 points. Table II describes the diagnostic procedures used during the acute care of patients. Remarkably, there was a very low use of diagnostic resources to establish AIS mechanisms. A lipid profile was obtained in 57% of patients in the first visit, while a carotid ultrasound was practiced in only 20% and echocar-

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**Table II.** Diagnostic procedures and in-hospital complications in patients with first-ever ischaemic stroke ( $n = 1.040$ ).

	Total	Women ( $n = 543$ )			$p$	Men ( $n = 497$ )			$p$
		$\leq 55$ $n = 121$ (22.3%)	56-75 $n = 200$ (36.8%)	$\geq 75$ $n = 222$ (40.9%)		$\leq 55$ $n = 115$ (23.1%)	56-75 $n = 236$ (47.5%)	$\geq 75$ $n = 146$ (29.4%)	
<b>Diagnostic procedures, %</b>									
Computerised tomography scan	78.2	76.0	76.5	80.2	0.56	73.0	77.5	84.2	0.08
Magnetic resonance image	23.6	42.1	18.5	18.0	< 0.001	34.8	23.3	11.1	0.001
Carotid ultrasound	19.9	10.7	19.5	22.5	0.02	9.6	26.3	21.9	0.001
Echocardiography	14.7	18.2	14.0	15.8	0.60	13.9	13.1	14.4	0.93
Transcranial Doppler	2.4	3.3	2.5	1.4	0.47	0.9	3.4	2.7	0.37
Cerebral angiography <sup>a</sup>	8.8	18.2	3.5	6.3	< 0.001	9.6	8.5	11.6	0.59
Electrocardiogram	32.0	17.4	35.0	38.7	< 0.001	20.9	31.8	39.0	0.007
Lipid tests	56.6	58.7	51.0	55.9	0.36	59.1	60.2	56.2	0.73
<b>In-hospital complications, %</b>									
Severe hypertension <sup>b</sup>	6.3	0.8	7.0	6.3	0.04	8.7	9.3	3.4	0.08
Epilepsy	7.1	10.7	7.5	5.0	0.13	7.8	5.1	9.6	0.23
Pneumonia	16.8	6.6	11.0	26.1	< 0.001	12.2	13.1	28.8	< 0.001
Urinary tract infection	13.1	11.6	13.5	19.4	0.10	7.0	9.7	14.4	0.13
Cardiac diseases <sup>c</sup>	11.3	5.0	11.0	21.2	< 0.001	2.6	7.6	15.1	0.001
Others <sup>d</sup>	23.1	18.2	21.5	35.6	< 0.001	11.3	17.8	28.1	0.002
<b>Length of hospital stay</b>									
Median (interquartile range)	7 (4-11)	8 (5-13)	7 (4-12)	8 (5-12)	0.36	7 (5-11)	7 (4-11)	7 (5-10)	0.85
> 10 days, %	29.1	35.4	28.3	33.5	0.37	28.0	25.8	24.2	0.81

<sup>a</sup> Angio-MRI, angio-CT, or digital subtraction angiography; <sup>b</sup> Systolic blood pressure  $\geq 190$  mmHg on admission; <sup>c</sup> Arrhythmias, heart failure, acute coronary syndromes; <sup>d</sup> Include acute gastrointestinal bleeding, sepsis, acute renal failure, metabolic disturbances.

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diography in 15% of patients. The median hospital stay was 7 days, being higher in women than in men (> 10 days in 32% vs 25.9%;  $p = 0.03$ ), but without differences across age groups. Medical complications during hospitalisation were frequent (34.5%), and patients who had in-hospital complications more commonly had a hospital stay > 10 days (56.2% vs 29.8%;  $p < 0.001$ ).

Table III shows demographics, stroke severity, and short-term outcome by stroke subtypes, according to OCSF and TOAST classifications. Total anterior circulation stroke syndrome occurred in 18%, partial anterior in 38%, lacunar in 26% and posterior stroke syndrome in 17% of cases. AIS mechanisms according to TOAST criteria were as follows: 8% large-artery atherosclerosis, 18% cardioembolism, 20% lacunes, 6% miscellaneous mechanisms and 42% undetermined. Cardioembolism was particularly common in elderly women (62%), associated with a high NIHSS (in 32% > 18 points) and with a worse 30-day outcome (mRS 4-5: 29%, mRS 6: 23%). Stroke of undetermined cause was also

associated with a poor 30-day outcome (mRS  $\geq 4$ : 58%). As expected, lacunar strokes were associated with a better short-term prognosis (mRS  $\leq 3$ : 91%). Notably, among cardioembolic AIS cases, 30% corresponded to a total anterior, and 58% to partial anterior circulation syndromes.

Table IV describes the acute therapeutic interventions in the whole cohort and secondary preventive measures that were prescribed to survivors. Of the 1040 patients, 27 (2.6%) received either intravenous ( $n = 5$ ; 0.5%) or intra-arterial ( $n = 22$ ; 2.1%) thrombolysis. Moreover, IV thrombolysis was practiced in only 6.8% of the 231 patients having a hospital arrival in < 3 h. Other off-label, non-approved acute medications (*i.e.*, steroids and other drugs) were prescribed in 9% of patients. Carotid endarterectomy or stenting was performed in < 1% of patients.

The median follow-up was 358 days (mean 245.3 days, range 0 to 691 days). A total of 219 (21%) patients were lost by the last follow-up visit. The in-hospital case fatality rate was 13.5%. Long-term clin-

**Table III.** Demographics, stroke severity and short-term outcome by stroke subtypes, in first-ever ischaemic stroke.

	Etiological subtypes (TOAST classification)						Syndromic subtypes (OCSF classification)			
	LAA <i>n</i> = 84 (8.1%)	Lacunar <i>n</i> = 213 (20.5%)	CE <i>n</i> = 188 (18.1%)	Mixed <i>n</i> = 52 (5.0%)	Other <i>n</i> = 61 (5.9%)	UND <i>n</i> = 442 (42.5%)	TACI <i>n</i> = 196 (18.8%)	PACI <i>n</i> = 398 (38.3%)	LACI <i>n</i> = 273 (26.3%)	POCI <i>n</i> = 173 (16.6%)
<b>Gender, %</b>										
Female	46.4	44.4	61.7	57.7	62.3	50.9	57.5	57.5	48	50.9
Male	53.6	55.6	38.3	42.3	37.7	49.1	42.5	42.5	52	49.1
<b>Age, median (IQR), years</b>	74 (64-78)	69 (58-75)	74 (59-82)	76 (68-85)	48 (34-64)	70 (56-79)	74 (60-83)	71 (56-80)	69 (57-76)	68 (53-74)
<b>NIHSS score, %<sup>a</sup></b>	<i>n</i> = 84	<i>n</i> = 207	<i>n</i> = 184	<i>n</i> = 51	<i>n</i> = 57	<i>n</i> = 439				
≤ 8	51.2	70.5	32.6	43.1	42.1	29.4	1.0	42.3	59.6	57.7
9-18	34.5	27.5	35.9	35.3	40.4	41.5	25.5	47.2	34.8	28.6
> 18	14.3	1.9	31.5	21.6	17.5	29.2	73.5	10.6	5.6	13.7
<b>OCSF classification, %</b>										
TACI	16.7	0.0	30.3	3.8	16.4	25.6	–	–	–	–
PACI	35.7	11.3	58.5	34.6	42.6	43.0	–	–	–	–
LACI	17.9	83.1	0.0	44.2	13.1	20.1	–	–	–	–
POCI	29.8	5.6	11.2	17.3	27.9	20.1	–	–	–	–
<b>30-day outcome, %</b>										
mRS: 0-1	25.0	35.2	19.7	23.1	36.1	18.6	0.5	27.6	31.1	30.6
mRS: 2-3	35.7	55.9	27.7	32.7	26.2	24.2	5.1	34.4	50.2	32.9
mRS: 4-5	29.8	6.1	29.3	36.5	26.2	37.8	45.9	29.4	16.8	24.3
Death	9.5	2.8	23.4	7.7	11.5	19.5	48.5	8.5	1.8	12.1

IQR: interquartile range; mRS: modified Rankin scale; CE: cardioembolism; LAA: large-artery atherosclerosis; UND: undetermined; OCSF: Oxfordshire Community Stroke Project; TACI: total anterior circulation infarcts; PACI: partial anterior circulation infarcts; LACI: lacunar anterior circulation infarcts; POCI: posterior circulation infarcts. <sup>a</sup> Data were missed for 23 patients.

ical outcome is pictured in figure 1. A funnel effect is evident at one year of follow-up, so that around one third of patients had mRS: 0-1 (excellent recovery), another third had mRS: 2-5 (moderate to severe disability) and the other third died. Figure 2 shows Kaplan-Meier survival estimates at 1-year follow-up, according to relevant demographics, stroke syndromes, aetiological subtypes and 30-day Rankin scale. Survival was lower among the older patients, in those with high NIHSS at hospital admittance and in patients with a worse mRS at 30 days. One-year case fatality rate was not modified by gender or AIS subtypes.

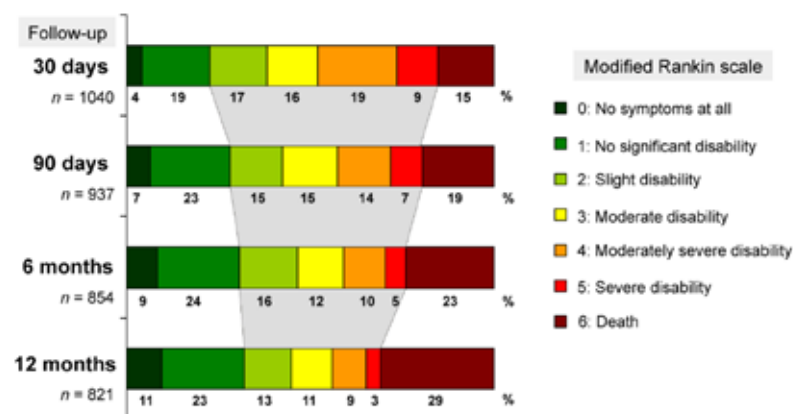
## Discussion

In the last four decades the incidence of stroke has decreased in developed countries, while it has doubled in low- to middle-income nations [1,7]. In Mex-

ico, it is estimated that more than 27 000 deaths occur each year as a consequence of stroke [8]. Here we report that largely modifiable risk factors are responsible for AIS in Mexico, with important differences between age groups and genders. Some vascular risk factors present in Mexican patients with AIS are similar to other stroke registries in Latin America [9,10]. Mexicans present a higher frequency of diabetes, but a lower relative frequency of smoking, coronary heart disease and atrial fibrillation, than in some European stroke registries [9,11,12]. Considering that the Mexican population has changed its age pyramid towards an expanded longevity, it is estimated that an increase in the incidence of cardiovascular and cerebrovascular diseases will take place during the next decades [13,14].

Worryingly, even when a fifth of patients arrived on time for IV thrombolysis, less than 1% of the patients who arrived early received this treatment, compared to other studies, in which rtPA treatment

**Figure 1.** Functional outcome at 30 days, 90 days, 6 months, and 12 months of follow-up as assessed by the modified Rankin scale in patients with first-ever ischaemic stroke.



among all AIS admissions range from 1.6% to 17.2% [15-18]. As described in other developing countries [19], this is partially due to high costs of rtPA, limited access to specialised medical care to obtain accurate and timely diagnosis, limited specialised personnel (i.e. either general or stroke neurologists) in some hospitals or lack of organised stroke teams in emergency rooms.

Most AIS were classified as undetermined due to a limited availability of diagnostic resources. Compared to other world registries, this represents a very low use of complete diagnostic procedures to assign ischemic stroke aetiology [11,12,20,21]. As a consequence, only 8% of events were classified as due to large-artery atherosclerosis, whereas up to 42% were undetermined events. Similar findings were observed in another predominantly Hispanic Mestizo population, in a community-based setting in Chile, where the proportion of undetermined events was 38% [22]. The low frequency of large-artery atherothrombotic first-ever AIS among Mexican patients could be explained by under-ascertainment of AIS mechanisms, as for example, only 20% of patients had practiced a carotid Doppler ultrasound, and < 10% had an intracranial vascular assessment. Indeed, when we analysed the subgroup of patients classified as undetermined, we found that around 40% of them had two or more large-artery risk factors and also had evidence of atherosclerosis in other vascular territories (i.e., coronary, aortic and lower-limb peripheral arteries). Therefore, we could speculate that most of these patients actually correspond to large-artery disease aetiology.

**Table IV.** Early therapeutic interventions in patients with first-ever ischaemic stroke.

<b>Acute therapeutic interventions (n = 1040)</b>	
Intravenous thrombolysis	0.6%
Intra-arterial thrombolysis	2.0%
Mechanical ventilation	9.5%
Craniectomy	2.1%
<b>In-hospital antithrombotic treatment (n = 1040)</b>	
Aspirin alone	37.1%
Other antiplatelets alone	13.5%
Combined antiplatelets	35.2%
Unfractionated heparin	9.9%
Low-molecular-weight heparins	25.0%
<b>Secondary prevention measures (n = 888)</b>	
Aspirin alone	30.9%
Other antiplatelets alone	17.8%
Combined antiplatelets	36.2%
Oral anticoagulation	12.7%
Antihypertensives	71.1%
Angiotensin-converting enzyme inhibitors	46.1%
Diuretics	13.4%
Calcium-channel blockers	26.6%
Angiotensin receptor blockers	13.0%
Statins	32.9%
Carotid endarterectomy	0.1%
Carotid stenting	0.5%

On the other hand, this registry shows a preponderance of stroke due to cardioembolism in women, whereas men showed more cases of large-artery atherosclerosis and lacunar strokes. Similar to other studies, we found that cardioembolic mechanism was commonly associated with TACS syndrome (i.e., large infarcts) and with a high case fatality rate and functional disabilities [23,24]. A precedent study with a similar methodology was the ReNaCer registry conducted in Argentina [25]. Similar figures are seen between our study and the Argentinian registry with respect to some risk factors, access to thrombolysis and medical complications.

Acute case fatality is high and it doubles at one year after AIS. The number of medical complications (especially infections) recorded in this registry is distressing, as a high rate of in-hospital deaths could be attributed mainly to this potentially preventable factor. Improving general nursing care and reducing the number of complications would probably decrease this scenario [25]. Case-fatality rate is increasing with time and higher than that observed

in other stroke registries. For comparison, in the SORCan study stroke case fatality was 7%, 13%, and 24%, at 7 days, 30 days, and 1 year; respectively [23].

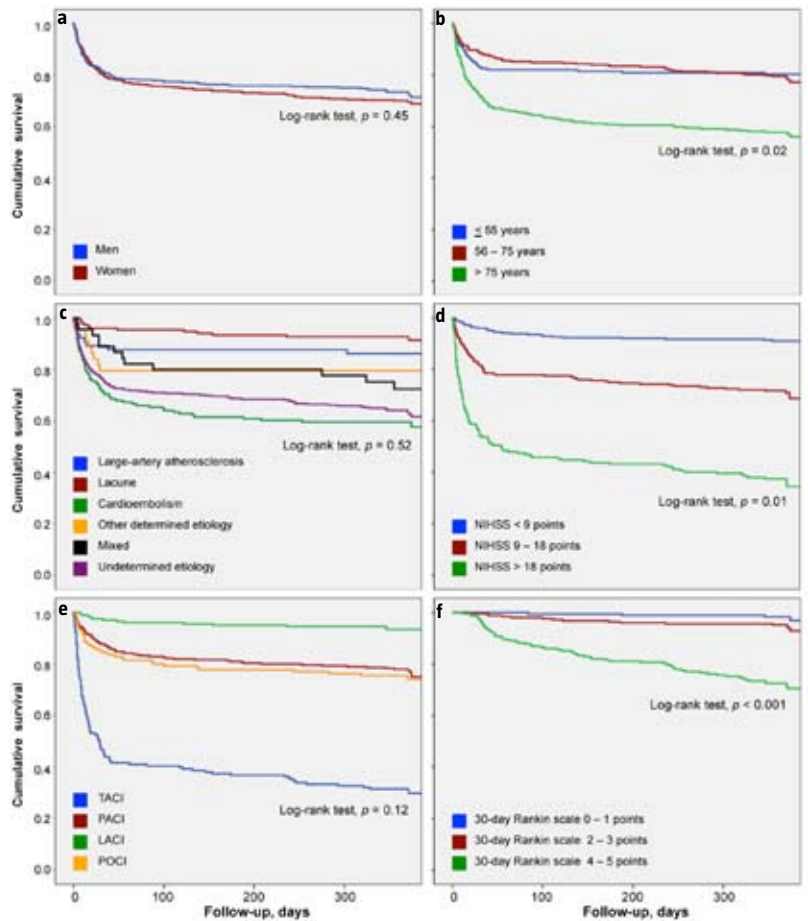
Secondary prevention strategies showed deficiencies according to current evidence-based guidelines [26,27]. The rate of patients on secondary prevention with antithrombotic drugs at discharge was high. Around 97% of patients were prescribed antiplatelet agents or oral anticoagulants. However, the proportion of patients receiving antihypertensives and statins seems rather low, in virtue of the frequency of dyslipidemia and current evidences on their benefit in atherothrombosis prevention [28-30]. The applied methodology in this registry could not determine whether observed deficiencies in secondary prevention could be attributed to either patient factors or poor clinician compliance to guidelines, or both. Similar to other registries [26], our 1-year recurrence rate was 8%.

Stroke surveillance requires systematic collection to generate the knowledge to establish and assess health policies and interventions. Disparities are observed on resource allocation in developing countries, mainly when economical support to medical care is based on the importance of diseases as causes of death [19]. Therefore, there is an urgent need for an active participation of scientific societies in leading joint efforts with government and industry for properly planning and action. Population should be informed on risk factors, clinical manifestations, preventive measures of cerebrovascular diseases and the importance of medication compliance [31].

Our study has several limitations that should be addressed. This is not a population-based study, ascertainment of AIS mechanisms was limited and follow-up is relatively short, considering current standards. Nonetheless, considering that consecutive patients from public and private hospitals from almost all geographical regions of Mexico have been included, and the fact that this registry is primarily a surveillance of current practice [32], we believe that this registry pictures real-life hospital care of AIS in a nation.

In conclusion, PREMIER is the first nation-wide hospital-based registry in collecting data on acute care and outcome of AIS in Mexicans. There is an opportunity to improve quality of stroke care by implementing specific measures and *ad hoc* treatment guidelines [26,27,30]. Economical and socio-cultural factors affecting infrastructure and technical support could impose barriers to delivering the best acute and long-term care. Deficiencies and limitations to accurately classify and treat a stroke

**Figure 2.** Kaplan-Meier estimates of the 12-month mortality for patients with first-ever ischaemic stroke ( $n = 1040$ ), as a function of gender (a), age group (b), ischaemic stroke mechanisms (c), NIHSS at admission (d), Oxford Community Stroke Project classification (e) and 30-day Rankin score (f).



in a timely manner could have significantly influenced the outcome of Mexican patients with first-ever AIS.

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## Manejo agudo y pronóstico a un año en pacientes mexicanos con un primer infarto cerebral: resultados del estudio multicéntrico PREMIER

**Introducción.** Se carece de información sobre el cuidado agudo y pronóstico de mexicanos con infarto cerebral. El objetivo de este informe es proveer los resultados de un sistema multicéntrico de vigilancia hospitalaria en ictus isquémico agudo.

**Pacientes y métodos.** En el estudio PREMIER se incluyeron 1.376 pacientes de 59 hospitales entre enero de 2005 y junio de 2006. De éstos, se analizaron 1.040 (52% mujeres; edad promedio: 67,5 años) con un primer infarto cerebral. Cinco visitas se completaron durante un año de seguimiento.

**Resultados.** Los principales factores de riesgo fueron hipertensión (64%), obesidad (51%) y diabetes (35%). Un 19% de los pacientes se presentó con un síndrome de circulación anterior total, un 38% de circulación anterior parcial, un 26% lacunar y un 17% de circulación posterior. En el 8%, el mecanismo del ictus fue aterotrombosis de grandes arterias, el 18% fue cardioembólico, el 20% lacunar, el 6% misceláneo y el 42% indeterminado. Aunque un 17% de los pacientes llegó en menos de tres horas de ocurrido el ictus, sólo al 0,5% se le realizó trombólisis intravenosa. Se practicó endarterectomía o colocación de endoprótesis arterial en el 1%. La mortalidad a 30 días fue del 15%. Al año de seguimiento, un 47% tuvo una puntuación en la escala de Rankin modificada de 0-2 puntos (independiente), un 23% tuvo 2-5 (dependiente) y un 29% falleció. La tasa anual de recurrencia fue del 8%.

**Conclusión.** En México, una proporción significativa de pacientes llega en tiempo para trombólisis, pero muy pocos la reciben. Existe un bajo uso de recursos de diagnóstico para asignar la etiología del infarto cerebral. La tasa de fatalidad a 30 días se duplica un año después del ictus.

**Palabras clave.** Calidad de la atención. Cuidado agudo. Enfermedad cerebrovascular. Factores de riesgo. Ictus. Infarto cerebral. Pronóstico. Riesgo cardiovascular. TOAST.