CHANGES IN CASE-FATALITY RATES AND CAUSES OF DEATH OVER TWO DECADES IN A POPULATION-BASED STROKE REGISTRY

R ORNELLO[1], C TISEO[1], D DEGAN[1], A C LANDI[1], F PISTOIA[2], A CAROLEI[1], S SACCO[2]

[1]Department of Neurology and Stroke Unit, Avezzano Hospital, University of L'Aquila, L'Aquila
[2]Department of Neurology, University of L'Aquila, L'Aquila

OBJECTIVES. We assessed case-fatality rates (CFRs) and causes of death of first-ever strokes (FESs) over two decades in a prospective population-based study.

MATERIALS AND METHODS. Cases of incident FESs were recorded over a two-year period (2011-2012) from multiple sources in the district of L'Aquila, central Italy. Included patients were followed up to 1 year after the event to ascertain CFRs and causes of death. Current data were compared with those recorded from 1994 through 1998.

RESULTS. We included 858 patients (417 men; 48.6%) with a FES over the years 2011-2012 and 4,353 patients over the years 1994-1998. Mean age±SD was similar in the two registries (75.5±13.2 vs 74.8±11.4 years; P=0.147). The 2011-2012 30-day CFR was 26.0%, very similar to that of 1994-1998 (25.9%; standardized mortality ratio [SMR] 0.94, 95% confidence interval [CI] 0.83-1.08), while the 1-year 2011-2012 CFR was 33.7%, lower than the 37.9% of 1994-1998 (SMR 0.84, 95% CI 0.75-0.95). When comparing the 2011-2012 30-day and 1-year CFRs with those recorded in 1994-1998, proportions were lower for cerebral infarction and were stable for subarachnoid hemorrhage and for intracerebral hemorrhage (Tables 1 and 2). At the 1-year follow-up, 289 patients died, 187 (64.7%) from cerebral causes, 55 (19.0%) from cardiac causes, 3 (1.1%) from new fatal stroke, 38 (13.1%) from non-vascular causes, and 6 (2.1%) from unknown cause. The distribution of the causes of death recorded in 2011-2012 was similar to that found in 1994-1998 at 30 days, while between 30 days and 1 year new fatal strokes occurred in a lower proportion of patients in 2011-2012 compared to 1994-1998 (1.5% vs 11.6%) (Tables 3 and 4).

DISCUSSION. The reduction of CFRs for ischemic stroke possibly depended on improved treatments in the acute phase whereas CFRs for hemorrhagic stroke did not change. The decreased number of new fatal strokes over time may have depended on improved secondary prevention measures.

CONCLUSIONS. Despite the achievements in stroke prevention over the last two decades, further efforts are needed to globally reduce the CFRs, mostly for hemorrhagic stroke.

Stroke type	1994-1998			2011-2012				
	Dead/cases	CFR	95% CI	Dead/cases	CFR	95% CI	SMR	95% CI
Subarachnoid hemorrhage	41/118	34.7%	26.2-43.3	12/39	30.8%	16.3-45.3	0.79	0.45-1.39
Intracerebral hemorrhage	283/588	48.1%	44.1-52.2	73/159	45.9%	38.2-53.6	0.84	0.67-1.05
Cerebral infarction	763/3594	21.2%	19.9-22.6	112/634	17.7%	14.7-20.7	0.79	0.66-0.95
Ill-defined events	40/53	75.5%	63.9-87.1	26/26	100%	-	1.27	0.87-1.87
All	1127/4353	25.9%	24.6-27.2	223/858	26.0%	23.1-28.9	0.94	0.83-1.08

CFR indicates case-fatality rate; CI, confidence interval.

Table 1. 30-day case fatality rates

Stroke type	1994-1998			2011-2012				
	Dead/cases	CFR	95% CI	Dead/cases	CFR	95% CI	SMR	95% CI
Subarachnoid hemorrhage	53/118	44.9%	35.9-53.9	15/39	38.5%	23.2-53.8	0.83	0.50-1.37
Intracerebral hemorrhage	339/558	57.7%	53.7-61.6	83/159	52.2%	44.4-60.0	0.82	0.66-1.01
Cerebral infarction	1214/3594	33.8%	32.2-35.3	165/634	26.0%	22.6-29.4	0.74	0.64-0.86
Ill-defined events	45/53	84.9%	75.3-94.5	26/26	100%	-	1.16	0.79-1.70
All	1651/4353	37.9%	36.5-39.4	289/858	33.7%	30.5-36.9	0.84	0.75-0.95

CFR indicates case-fatality rate; CI, confidence interval.

Table 2. 1-year case fatality rates

Cause	1994-1998 (n=1127)		2011-2012 (n=223)		P value for distribution
	n	%	n	%	
Cerebral	894	79.3	173	77.6	
Cardiac	136	12.1	33	14.8	
New fatal stroke	9	0.8	2	0.9	0.772
Non vascular	64	5.7	12	5.4	
Unknown	24	2.1	3	1.3	

CFR indicates case-fatality rate; CI, confidence interval.

Table 3. Dead at 30 days

Cause	1994-1998 (n=524)		2011-2012 (n=66)		P value for distribution
	n	%	n	%	
Cerebral	71	13.5	14	21.2	
Cardiac	165	31.5	22	33.3	
New fatal stroke	61	11.6	1	1.5	0.008
Non vascular	155	29.6	26	39.4	
Unknown	72	13.8	3	4.6	

CFR indicates case-fatality rate; CI, confidence interval.

Table 4. Dead patients between day 31 and 1 year