Stroke Units Necessity for Patients, Web-Based "SUN4P" Registry: Descriptive Characteristics of the Population

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Abstract. The aim of this study was to present the descriptive characteristics of the Stroke Units Necessity for Patients (SUN4P) registry. **Methods:** The study population derived from the web-based SUN4P registry included 823 patients with first-ever acute stroke. Descriptive statistics were used to present patients' characteristics. **Results:** The vast majority of patients (80.4%) had an ischemic stroke, whereas 15.4% had a hemorrhagic stroke. Hypertension was the leading risk

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factor in both patients. The patients with ischemic stroke had higher prevalence of traditional cardiovascular risk factors such as diabetes mellitus, dyslipidemia and smoking and most commonly cryptogenic stroke (39%). National Institutes of Health Stroke Scale (NIHSS) was higher among patients with hemorrhagic in comparison to those with ischemic stroke (10.5 vs 6 respectively). Moreover, all patients had similar rate of disability prior to stroke, as shown by Modified Rankin Scale (mRS=0). **Conclusions:** These data are in accordance with current evidence and should be thoroughly assessed in order to ensure optimal therapeutic management of stroke patients.

1. Introduction

Stroke is one of the most prominent causes of death and the leading cause of disability in adults worldwide [1]. Aging of the population and projected trends in risk factors are expected to heighten the prevalence of stroke as the latter increases with advancing age in both genders [2]. Given the high rate of mortality and disability in patients suffering from stroke, there is emerging need to optimize current medical treatment, ameliorate the quality of care and identify preventable risk factors that could significantly mitigate the burden of stroke on healthcare systems. The aim of Stroke Units Necessity for Patients (SUN4P) study is to provide essential data on acute stroke management that will contribute to achievement of the aforementioned issues. Herein, we present the descriptive characteristics of the population of SUN4P registry.

2. Methods

The study population derived from the web-based "Improving Stroke Care in Greece in Terms of Management, Costs and Health Outcomes- (SUN4P)" registry (ClinicalTrials.gov, NCT04109612). SUN4P is an ongoing observational non-invasive prospective cohort multicenter study of patients with first-ever acute stroke, hemorrhagic and ischemic, admitted to seven public hospitals [3]. Descriptive statistics were used in order to present patients' characteristics. The SUN4P design was based on the European General Data Protection Regulation (GDPR) and aligned with the Declaration of Helsinki.

3. Results

The study population consisted of 823 patients admitted from July 2019 to July 2021. The vast majority of patients (80.4%) had an ischemic stroke, whereas 15.4% had a hemorrhagic stroke, as demonstrated in Table 1. Hypertension was the leading risk factor in both patients with ischemic (67%) and hemorrhagic stroke (66%). Of note, the patients with ischemic stroke had a higher prevalence of other traditional cardiovascular risk factors such as diabetes mellitus (27% vs 17%), dyslipidemia (37% vs 28%) and smoking (26% vs 20%) in comparison with patients hospitalized for hemorrhagic stroke. Furthermore, in these patients, cryptogenic stroke (39%) followed by cardioembolic stroke except for patent foramen ovale (29%) were the most frequent. Notably,

prevalence of atrial fibrillation was comparable between patients with ischemic and hemorrhagic stroke, being present at almost one fourth of subjects (25% vs 27% respectively). Moreover, all patients had similar rate of presence of symptoms at their daily activities prior to stroke, as shown by Modified Rankin Scale (mRS) (median mRS= 0 in both patients with ischemic and hemorrhagic stroke). Nonetheless, patients with hemorrhagic stroke were substantially more impaired than those with ischemic stroke in the acute phase given the higher NIHSS (median NIHSS=10.5 vs 6 in patients with hemorrhagic and ischemic stroke respectively). Baseline demographic and clinical characteristics of the study's population are shown in detail in Table 1.

Table 1. Descriptive characteristics of the SUN4P population (n=823)

	Ischemic stroke (n=662)	Hemorrhagic stroke (n=127)	Non-classified (n=34)
Gender (male)	328 (50%)	73 (57%)	20 (59%)
Age (mean± SD)	75.2 (13.7)	75.6 (13.2)	80.3 (10.2)
Self-employed	571 (86%)	113 (89%)	19 (56%)
mRS prior to admission	0 (0-1)	0 (0-1)	0 (0-1)
NIHSS at admission	6 (3-10)	10.5 (4-22)	4 (2.5-10.5)
Body mass index (kg/m^2)	27.64 (5.0)	27.86 (5.4)	27.0 (5.4)
History of:			
Hypertension	443 (67%)	84 (66%)	17 (50%)
Diabetes mellitus	178 (27%)	21 (17%)	5 (15%)
Dyslipidemia	248 (37%)	35 (28%)	13 (38%)
Smoking	174 (26%)	25 (20%)	2 (6%)
Coronary artery disease	81 (12%)	16 (13%)	5 (15%)
Atrial fibrillation	164 (25%)	34 (27%)	15 (44%)
Valve replacement	21 (3%)	3 (2%)	11 (32%)
Heart failure	47 (7%)	6 (5%)	2 (6%)
Symptomatic PAD	16 (2%)	1 (1%)	2 (6%)
Active malignancy	35 (5%)	4 (3%)	1 (3%)
Alcohol addiction	55 (8%)	13 (10%)	1 (3%)
Carotid artery disease	16 (2%)	3 (2%)	4 (12%)
Transient ischemic attack	57 (9%)	15 (12%)	2 (6%)
Modified Ischemic TOAST classification			
Large-artery Atherosclerosis (≥50%)	19%		
Cardioembolic (except for patent foramen ovale)	29%		
Lacunar stroke	11%		
Other rare conditions	3%		
Cryptogenic stroke	*39%*		
ESUS	9%		
Multiple causes	6%		
Incomplete investigation	24%		

Notes: Continuous variables are presented as mean (SD) and nominal as count (absolute percentages). For NIHSS and mRS, median values with interquartile ranges are provided.
*Percentages do not add up to 100% as in case of some patients multiple reasons existed.
Abbreviations: mRS, Modified Rankin Scale; PAD, peripheral artery disease; SD, standard deviation; NIHSS, National Institutes of Health Stroke Scale; ESUS, embolic stroke of undetermined source.

4. Discussion

Preliminary results of SUN4P cohort, the first multicenter stroke registry in Greece, demonstrate that patients presented with acute ischemic and hemorrhagic stroke in a similar rate to existing data from other registries [2]. Moreover, stroke prevalence was almost equal between male and female patients, in accordance with current evidence

corroborating that the disparities in prevalence of stroke among younger patients tend to diminish at oldest age groups, especially at patients over 75 years old [4]. Among patients with ischemic stroke, cryptogenic and cardioembolic stroke were the most prevalent, congruent with current literature [5]. Notably, in our study the NIHSS at admission was markedly higher among patients with hemorrhagic stroke; this comes in accordance with previous data reporting higher relative frequency of hemorrhagic stroke with increasing stroke severity [6].

5. Conclusions

In conclusion, the present study demonstrates that our data are in accordance with existing evidence, with a significant proportion of SUN4P patients presenting with ischemic stroke. These patients had higher rate of traditional cardiovascular risk factors, whereas patients with hemorrhagic stroke had more severe clinical presentation on admission. Given the prevalence of traditional cardiovascular risk factors at our registry, it can be concluded that a significant proportion of strokes could have been prevented, highlighting the current gaps in primary prevention of these patients. These data should be thoroughly assessed in order to ensure high value care and optimal therapeutic management during not only the acute phase of stroke patients but also for effective secondary prevention.

Acknowledgments

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