

# Stroke Awareness Is Worse among the Old and Poorly Educated: A Population-Based Survey

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*Background:* This article surveys a representative sample of adults to assess their knowledge of stroke, its vascular risk factors and warning symptoms, illness perception, and attitude toward strokes. *Methods:* A representative sample of the region population was selected using a double randomization design. Previously trained medical students carried out face-to-face interviews using a structured questionnaire with open- and closed-ended questions. *Results:* In all, 2411 subjects were interviewed. Seventy-three percent reported at least 1 correct warning sign of stroke, whereas only 12.2% reported 3. The most frequently mentioned were sudden weakness, dizziness, and headache. Only 59.2% named at least 1 correct risk factor for stroke. Smoking and hypertension were mainly named. Forty percent of the respondents demonstrated adequate knowledge of stroke. Tellingly, prevalence of adequate knowledge was significantly lower in subjects with previous stroke (29.3% [95% confidence interval {CI}, 19.7-40.3],  $P = .049$ ), hypertension (35.0% [95% CI, 31.1-39.1],  $P = .009$ ), diabetes (31.9% [95% CI, 25.9-38.3],  $P = .011$ ), hypercholesterolemia (35.8% [95% CI, 31.8-39.9],  $P = .03$ ), and obesity (28.2% [95% CI, 23.8-33.0],  $P < .001$ ). Illness perception was generally correct. In the final logistic regression model, younger age, urban area of residence, higher educational level, higher family income, normal pressure, normal weight, and family history of stroke were associated with adequate knowledge of stroke. *Conclusions:* Basic knowledge of stroke is insufficient among the general population of Extremadura. There is a discrepancy between theoretical stroke knowledge and illness perception. These findings have implications for public health initiatives for stroke. **Key Words:** Stroke—knowledge—warning signs—risk factors—health promotion—population survey.

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Avoiding delays should be the main objective in the prehospital phase of stroke care to provide the best possible treatment.<sup>1</sup> Management of these patients in

stroke units, use of thrombolytic treatment, and endovascular therapy are available in most regions of Spain.<sup>2</sup> Although past data show that hospital arrival times

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have improved, recent studies have revealed that late arrival times continue to affect stroke patients, many of whom miss the opportunity of receiving effective treatment and thus surviving with fewer sequelae.<sup>3</sup> According to some studies, improving people's ability to recognize stroke symptoms should reduce the time between onset and intervention of emergency services.<sup>4-7</sup>

On the other hand, many reports have shown that stroke prevention is not satisfactory.<sup>8,9</sup> One of the reasons for unsatisfactory prevention could be patients' lack of knowledge about risk factors for experiencing events of stroke, which was suggested as a contributing factor to the lack of compliance with medical advice and treatment.<sup>10</sup>

Research aimed at identifying demographic, social, cultural, behavioral, and clinical factors associated with delays before hospital admission provides targets that are helpful for launching more effective public information campaigns.<sup>11</sup> Education is an effective tool and it should be adapted to the cultural and social context. In this study, we conducted a population-based face-to-face survey to assess current public knowledge of stroke, risk factors, symptoms, responses, information resources, and illness perception.

## Material and Methods

This cross-sectional study was performed using face-to-face structured interviews. Eligible candidates were individuals aged older than 18 years residing in Extremadura who had no cognitive impairment and were willing to participate in the study. The census districts in Extremadura provided the information used in participant selection. District information is available in the database kept by Spain's National Statistics Institute and our study used data corresponding to January 1, 2008. This region contains 966 census districts, called population units, each of which had the same likelihood of being selected. A simple random sample was taken that included 10% of the population units. The same number of interviews was assigned to each population unit. For every census district, we took a second random sample; this one was neighborhood-specific and each neighborhood had the same likelihood of participating. This process yielded a selected street and an alternate street. Each interviewer started at the first house on his or her list and interviewed the individual who opened the door if that person met eligible criteria. If no one was home, the interviewer returned to the same house at least 2 times on the same day but during different time slots. If the resident was confirmed absent or unwilling to participate that individual was substituted by another resident of the same district and neighborhood.

The procedure we chose for collecting information was the face-to-face interview because of this method's flexibility, lower nonresponse rates, and the potentially higher

quality of the data it provides. Medical students from the University of Extremadura conducted the interviews after being trained in the method by our research group. Interviews were scheduled in a period spanning 4 consecutive months, from July to October 2009, to lessen the effect of seasonal changes in morbidity and use of health care services.

### *Main Outcome Measures*

The survey instrument was a questionnaire designed to assess information about stroke. It was pretested using a sample of 33 individuals. Based on results from the pretest, some wording was changed to improve the question clarity. A copy of the final questionnaire may be requested from the corresponding author.

The final questionnaire contained 33 questions divided into 4 sections. The first section collected information about the following sociodemographic factors: sex, age, rural or urban area of residence (population <10,000 or ≥10,000, respectively), educational level (no studies or incomplete primary studies, primary, secondary, or tertiary), income level (<10,000, 10,001-20,000, 20,001-30,000, 30,001-40,000, or >40,000 euros/year), marital status (single, married, widowed, separated, or divorced), professional status (student, employed full-time, unemployed, or retired), and self-rated health status (excellent, good, fair, or poor). The second section contained a series of open-ended questions about stroke, its symptoms, risk factors, and unhealthy habits. Symptoms considered valid were all neurologic warning symptoms similar to intense headache, paralysis, sensory disturbances, vision disturbances, loss of balance, language or speech impairment, or loss of consciousness. Classic risk factors for developing stroke were considered valid: age, hypertension, diabetes mellitus, hypercholesterolemia, atrial fibrillation, arteriosclerosis, and heart disease. Correct answers for unhealthy stroke-promoting habits included smoking, alcohol abuse, drug consumption, sedentary lifestyle, obesity, and high levels of stress. This section also contained closed-ended and specific questions about the implications of each individual risk factor and unhealthy habit. The third section of the questionnaire consisted of an open-ended question regarding the respondent's hypothetical reaction on identifying signs of a stroke or transient ischemic attack (TIA) in a family member or himself/herself. For purposes of analysis, these answers were codified as 7 possibilities: calling the general practitioner or family physician, going to the general practitioner or family physician's office, going directly to the hospital, calling the emergency telephone number (112), waiting and then seeking medical assistance, doing nothing, or do not know. The questionnaire included questions about the individual's perception of stroke severity and how stroke severity compares with that of other vascular diseases, such as acute myocardial

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