Profile of elderly people hospitalized in general intensive care units in Rio Grande, Southern Brazil: Results of a cross-sectional survey

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Abstract

At the end of the first quarter of this century, Brazil will have the sixth largest population for people aged 60 years or more worldwide. This will increase the demands on health services for this sector. This study aimed at assessing the profile of patients in this age group who were admitted to intensive care units (ICU) in the city of Rio Grande, Southern Brazil. A cross-sectional survey was carried out between April/2007 and March/2008 in the two local hospitals. Family members answered a standardized questionnaire that collected data about demographic and socioeconomic characteristics, household conditions, use of health services and current clinical conditions. Among the 213 elderly people included in this study, 90% came from Rio Grande, were married, aged 70 years or more, had at least five years of schooling, earned two or more minimum wages, were owners of their house and did not have private health insurance; 88% had a medical appointment in the previous six months and 56% were admitted to a hospital in the previous 12 months; half of them were unconscious when they were admitted in the ICU; three quarters of them needed mechanical ventilation and 45% died within the first eight days after hospital admission. This study identified some socioeconomic and environmental characteristics and health care needed by elderly people admitted to the ICU. This information can be used to set up preventive programs and to promote adequate clinical management among this population.

Keywords: Elderly; geriatrics; older patient; hospitalizations; intensive care unit; intensive treatment.

Introduction

The increase in life expectancy has created new public health challenges, especially for developing countries[1]. While the world population grows at a rate of 1.7% annually, the elderly population increases 2.5% per year[2]. In Brazil, between 1991 and 2000, the number of elderly people increased by 35%, whereas the general population increased by 14%. It is estimated that in 2025 the elderly population in Brazil will reach 32 million people, which will give Brazil the sixth largest elderly population in the world.[2, 3, 4].

Considering that chronological age is the strongest predictor of the pattern of morbidity and mortality among the elderly[2], one would assume that this aging Brazilian population will require profound changes, not only in the burden of diseases, but also in the type and quantity of health services offered to this population. In 1998, the annual rate of hospitalization among the elderly reached 14%, and 72% of them had consulted a physician.[3,5] In 1996, public hospital admissions among the elderly accounted for 27% of the total cost of hospitalization in Brazil; and in 2001 this figure was 38%.[6]

With respect to major determinants of health service use among older adults are age, gender and family income. The older the person, the higher the incidence of disease, and disease is more commonly found among males [2,7]. Although health needs are greatest among the poorest, the highest frequency of use is among the highest socioeconomic level [3, 5].

Elderly patients account for 42% to 52% of ICU admissions and consume about 60% of available per diem for hospital admission = **diárias hospitalares.** It is noteworthy that most of these costs are spent immediately before death[8]. The main defined causes of mortality among elderly Brazilians are circulatory diseases (35%), cancer (19%) and respiratory diseases (9%), which represent about 60% of all deaths for both genders.[9]

Despite the growing increase in this population group, there are few studies in Brazil about the elderly, particularly for those hospitalized in ICUs. The objective of this study, therefore, was to determine the socioeconomic profile of elderly patients and to identify the main care that they receive into the Intensive Care Units of Rio Grande, RS

Materials and Methods

The municipality of Rio Grande, located in the far south of Rio Grande do Sul, has about 200 thousand inhabitants. Of these, 8.5% were aged 60 years or more[10], when this survey was carried out. The illiteracy rate was 7% and life expectancy at birth was 68.6 years; the gross domestic product (GDP) per capita was about 10,000 US dollars. The human development index (HDI) of 0.793 was lower than the state average (0.814), but higher than the national average (0.766)[11]. The health service consisted of 32 basic health units, three hospitals with a total of 717 beds, 65% of them belonging to the Unified Health System (SUS), and three adult ICUs, two of them general and one that specializes in cardio-surgery. These ICU had 19 beds for SUS patients, about 1,000 per year of whom were elderly[12].

The study included all individuals who were aged 60 or older by the date of admission, and who had stayed in the hospital for a period of not less than 24 hours, between 01/04/2007 and 31/03/2008, in the general ICUs of the Teaching Hospital at the Federal University of Rio Grande (HU-FURG) and the Association of Charity Santa Casa de Misericórdia of Rio Grande (ACSCMRG). Patients of the cardio-surgical ICU were not included in this study.

The study design was cross-sectional (or prevalence). This design is the most suitable one for studies of demand and population inquiries because it enables the simultaneous measurement of various diseases and exposures to diseases and also because it is quick and relatively low cost[13].

A single, standard questionnaire was applied to the elderly, or a family member when necessary, to obtain information about their demographic characteristics,

socioeconomic conditions, environmental conditions, use of health services and current morbidity. A patient was considered elderly if, at the time of the interview, they had completed 60 years or more. This definition was based on the criteria used by the World Health Organization (WHO) and National Policy for the Elderly, Brazilian Ministry of Health[14].

Although some variables are self-explanatory, others need further clarification. Thus, in order to be considered as having been hospitalized, a patient must have remained for at least 24 at one of the two general ICUs of the municipality; family income refers to the amount received by all members of the household in the month preceding the interview; skin color was defined by the interviewer and classified into three groups: white, mixed-color, and black; possession of a health plan refers to the monthly payment of value to any company that provides health service that includes an ICU stay.

Thirty-four medicine students of the Federal University of Rio Grande (FURG) were trained for 40 hours, and 10 of them selected. Of these, six were allocated to applying the questionnaire, one to review the questionnaire and another to carry out a quality control. The others were responsible for typing. The pilot study that aimed at testing the wording of questions and the logistics of the study was carried out in these same ICU during the month immediately preceding the start of the final collection of data. The interviews were conducted in different shifts and lasted on average 30 minutes each. The questionnaires were coded by their interviewers and delivered to the reviewer at the project's headquarters. The reviewer then sent them to be double-entered into Epi Info 6.04 software[15]. These data were then compared, corrected and transported to the STATA statistical package[16], where consistency analysis was carried out; the variables were categorized and a listing of frequencies and measures of central tendency and dispersion were obtained. Quality control was carried out by repeating parts of 74 simplified questionnaires with part of the original interviews that were randomly chosen. The answers obtained by the interviewers and the person responsible for quality control were compared using the Kappa test, obtaining a good content, which ranged from 0.69 for skin color to 0.88 for patient age.

This study was approved by the Ethics Committee in Health Research of the Association of Charity Santa Casa do Rio Grande. The ethical principles, such as verbal informed consent and confidentiality of information were provided to all participants.

Results

Over the 12 months of daily visits to the general ICU of Rio Grande, 215 patients aged 60 or older were admitted. Information was available for 213 of the patients, a response rate of 99%. Only one in 10 questionnaires was answered by the patient; the rest were answered by a relative.

Table 1 shows that most of the hospitalized elderly came from Rio Grande were male and white. The mean age was 73 years, half of the patients were married and one third were widowed; 17 % were illiterate and the remainder had, on average, 4.6 years of schooling. Around 15% of the sample had a family income that was less than one minimum wage (MW), and just over one third had income higher than three MW. The mean family income was 2.8 MW and there was no substantial difference as to the place of hospitalization or age groups to which they belonged. Just 11% of them were gainfully employed at the time of hospitalization (Table 1).

Table 2 shows that 75% of the elderly lived in a house built of brick, with 11% in the **area of tenure = area de posse**, and the availability of piped drinking water was nearly universal; two thirds of households were connected to the sewerage system and almost all had a flush toilet. The mean number of residents per household was three and two rooms were used for sleeping; 10% of the elderly in the sample lived alone.

Table 1. Socioeconomic and demographic characteristics of elderly people admitted to intensive care units in Rio Grande, RS, Brazil, Apr/07-Mar/08.

Characteristic	ICU Location		Total	P-value
	University Hospital	Santa Casa		
Patients from Rio Grande municiplaity	87.5%	86.4%	86.8%	0.815
Males	54.5%	50.4%	52.1%	0.551
White skin color	82.9%	78.4%	80.3%	0.411
Age groups (in years)				0.138
60 to 69	40.9%	40.0%	40.4%	
70 to 79	30.7%	41.6%	37.1%	
80 or more	28.4%	18.4%	22.5%	
Mean (standard deviation)	73.9 (9.1)	73.0 (7.6)	73.4 (8.3)	0.432*
Marital status				0.643
Single	9.1%	8.8%	8.9%	
Married	47.7%	52.0%	50.2%	
Widowed	32.9%	33.6%	33.3%	
Separated	10.2%	5.6%	7.5%	
Do not know how to write	23.7%	12.0%	16.9%	0.02
Schooling in complete years	(n=77)	(n=106)	(n=183)	0.06
None	23.4%	10.4%	15.8%	
1 to 4	32.5%	36.8%	35.0%	
5 or more	44.2%	52.8%	49.2%	
Mean (standard deviation)	4.14 (3.4)	4.97 (3.5)	4.6 (3.5)	0.114*
Family income in minimum wages				
0 to 0.9	15.9%	15.2%	15.5%	0.844
1 to 1.9	25.0%	21.6%	23.0%	
2 to 2.9	27.3%	25.6%	26.3%	
3 or more	31.8%	37.6%	35.2%	
Mean (standard deviation)	2.7(1.1)	2.9(1.1)	2.8(1.1)	0.483*
Have gainful employment	12.5%	9.6%	10.8%	0.502
Total (n)	100% (88)	100% (125)	100% (213)	

*t-test

Some basic indicators of health service use are presented in Table 3. About 90% of the elderly had visited a doctor in the previous six months. As for the consultations over the previous six months, the most common location was the primary care unit, for about one quarter of all consultations, followed by hospital emergency services and, finally, the outpatient department of the UH. Over half of these elderly people (56%) had been hospitalized in the 12 months preceding the interview.

Table 4 shows that over half of the elderly patients hospitalized in the ICU were referred by hospital wards. The first assistance received by the elderly was mainly from a physician, followed by a relative. Approximately two thirds of the admissions that took place occurred between 13:00 and 23:00 PM.

Table 5 shows that half of the elderly arrived at the hospital still conscious. At least eight of every ten cases were caused by a clinical event, and the respiratory system was responsible for admission in 44% of cases. With regard to interventions received during the hospitalization period, it was found that 90% of the sample received fluid

Table 2. Household conditions for elderly people admitted to intensive care units in Rio Grande, RS, Brazil, Apr/07-Mar/08.

Characteristic	ICU Location		Total	P-value
	University Hospital	Santa Casa		
Home construction type				0.272
Masonry	72.7%	79.2%	76.5%	
Others	27.3%	20.8%	23.5%	
House in area of possession (invasion)	12.5%	11.2%	11.7%	0.772
Possesses piped water	98.9%	98.4%	98.6%	0.777
Home connected to sewerage network	70.4%	64.0%	66.7%	0.325
Home has a flush toilet	98.9%	95.2%	96.7%	0.140
Number of residents at home				0.929
1	10.2%	10.4%	10.3%	
2	39.8%	40.0%	39.9%	
3	19.3%	22.4%	21.1%	
4 or +	30.7%	27.2%	28.6%	
Mean (standard deviation)	2.7(1.0)	2.7(0.9)	2.7(1.0)	0.772*
Number of rooms used for sleeping				0.889
1	26.1%	24.8%	25.3%	
2	51.1%	49.6%	50.2%	
3 or more	22.7%	25.6%	24.4%	
Mean (standard deviation)	2.0(0.7)	2.0(0.7)	2.0(0.7)	0.670*
Total (n)	100% (88)	100% (125)	100% (213)	

*t-test

replacement, 70% underwent mechanical ventilation and 40% were prescribed vasoactive drugs. The highest proportion of elderly people stayed between one and three days in the ICU, and just over one quarter stayed for 11 days or more. The mean stay was about eight days. At the end of this mean time, 45% of the elderly died and the others were discharged or were transferred to other locations.

Discussion

This study shows that the majority of elderly patients hospitalized in general ICUs in Rio Grande, comes from the municipality itself, are white-skinned, 70 years or older, are married, have on average five years of schooling and a family income of three minimum wages. They are outside of the economically active population reside in their own house that is built of bricks, with piped water, a flush toilet. they live with two other people, have no health insurance, but consult a doctor and are frequently hospitalized in hospitals that belong to the public health system. They generally arrive at the ICU from a hospital ward, only half of them are conscious when admitted to the ICU and the respiratory system is the most frequently affected. They usually receive fluid replacement and mechanical ventilation, and they remain in the ICU, for a mean of eight days. Almost half of the patients die and the others are discharged or transferred.

The results might have been affected by some of the limitations of the study, such as: a) because the elderly were seriously ill, 90% of the questionnaires were answered by relatives. This may have led to inaccurate

Table 3. Pattern of utilization of health services among elderly people admitted to intensive care units in Rio Grande, RS, Brazil, Apr/07-Mar/08.

Characteristic	ICU location		Total	P-value
	University Hospital	Santa Casa		
	(n=87)	(n=121)	(n=208)	
Have health insurance	26.1%	41.6%	35.2%	0.02
	(n=83)	(n=120)	(n=203)	0.06
Consulted a physician in the previous six months	93.2%	84.8%	88.3%	
Place where the consultation took place				
Health center	28.4%	26.4%	27.2%	0.75
Santa Casa Hospital Emergency	17.5%	16.8%	16.9%. 11.3%	0.97
Cardiology Hospital Emergency	5.7%	15.2%	8.9%	0.03
University Hospital Emergency	15.9%	4.0%	9.9%	0.00
University Hospital Outpatients	15.9%	5.6%	5.6%	0.03
Santa Casa Outpatients	4.5%	6.4%	0.94%	0.38
Union or company outpatients	1.1%	0.8%	6.1%	0.47
health plan outpatients	5.7%	6.4%	13.1%	0.45
Private practice	15.9%	11.2%	17.4%	0.35
Practice under Health insurance	11.4%	21.6%	1.4%	0.04
Do not know	1.1%	1.6%		0.45
Were hospitalized in the previous 12 months	55.7%	56.8%	56.3%	0.87
Total (n)	100% (88)	100% (125)	100% (213)	

**Exceeds 100% due to the fact that consultation took place at more than one place

Table 4. Health care received by elderly people before admission to intensive care units in Rio Grande, RS, Brazil, Apr/07-Mar/08.

Characteristic	ICU location		Total	P-value
	University Hospital	Santa Casa		
Initial assistance				0.04
Ward/block	60.2%	44.8%	51.2%	
Home	28.4%	32.0%	31.0%	
Other	11.4%	22.4%	17.8%	
First assistance was given by:				0.01
Physician	63.4%	40.0%	49.8%	
Relative	21.6%	24.8%	23.5%	
Nurse	5.7%	10.4%	8.4%	
Other	9.1%	24.8%	18.3%	
Time of Day of admission to the ICU				0.85
0h to 6h	10.2%	10.4%	10.3%	
7h to 12h	28.4%	23.2%	25.3%	
13h to 18h	38.6%	40.8%	39.9%	
19h to 23h	22.7%	25.6%	24.4%	
Total (n)	100% (88)	100% (125)	100% (213)	

personal information, for example, their income. However, this could also happen with the interviewees themselves, since in most epidemiological studies this information is not verified. Regarding the second part of the questionnaire, that contains

Table 5. Clinical conditions of elderly people during admission in intensive care units in Rio Grande, RS, Brazil, Apr/07-Mar/08.

Characteristic	ICU location		Total	P-value
	University Hospital	Santa Casa		
Admitted in the ICU while conscious	50.0%	48.8%	49.3%	0.86
Type of hospitalization:				0.03
Clinical	87.5%	75.2%	80.3%	
Surgical	12.5%	24.8%	19.7%	
System that was reason for hospitalization				
Respiratory	48.9%	40.8%	44.1%	0.24
Central Nervous	11.4%	19.2%	16.0%	0.12
Cardiovascular	13.6%	17.6%	16.0%	0.44
Gastrointestinal	20.4%	11.2%	15.0%	0.06
Genitourinary	3.4%	4.8%	4.2%	0.62
Intervention received				
Fluid replacement	97.7%	87.2%	91.5%	0.01
Mechanical Ventilation	65.9%	71.2%	69.0%	0.41
Vasoactive drugs	42.0%	40.8%	41.3%	0.86
Time of stay in days				0.51
1 to 3	40.9%	39.2%	39.9%	
4 to 10	36.4%	31.2%	33.3%	
11 or more	22.7%	29.6%	26.8%	
Mean (standard deviation)	7.9 (9.9)	8.9 (10.3)	8.5 (10.1)	0.463*
Evolution in the ICU				0.71
Death	46.6%	44.0%	45.1%	
Discharge or transferral	53.4%	56.0%	54.9%	
Total (n)	100%(88)	100% (125)	100% (213)	

*t-test

information on the conditions during the hospitalization period, data were obtained directly from the patient's medical records and the physicians responsible for the care, therefore this limitation was not applicable; b) although the nature of the experimental design prevents inferences about causality, the purpose of this study was merely to describe prevalence. It was therefore not affected by this problem; c) the severity of admissions may have been underestimated because severely ill patients with little prospect of improvement were not admitted to the ICU, mainly due to lack of beds. This is a kind of selection bias, similar to the Berkson bias, but in reverse. The Berkson bias occurs because some individuals end up being hospitalized a lot more because of their poor economic status rather than their clinical status[17].

In the ICUs, mainly because of lack of beds, priority for admission is given to those with the highest probability of recovery, which therefore excludes those in the worse clinical condition, which end up being, in general, those who are oldest and with the worst socioeconomic status. Although not regulated, but widely known, this practice, which serves the logistical and cost limitations of the health system, is slowly gaining ground, due to its seriousness[18]

The fact that the vast majority of elderly people come from the municipality where the hospital is located may be due to the peculiar geographic location of Rio Grande, which is a peninsular state, and therefore slightly off the route of passage of other municipalities. In addition, the nearby munici-

pality of Pelotas, better located, also offers intensive health care. In this study, there was a predominance of male patients and those aged between 60 and 69. This may be due to survival bias, that is, those who are older that generally suffer more serious illnesses, had already passed away[19]. It may also explain the higher incidence of widowhood among women in this study[20].

With the improvement in educational levels among all age groups, especially since the early 1990s, the illiteracy rate has been drastically reduced across the country. Among these elderly, illiteracy was much lower than that observed for Brazil (28%) and identical to that observed in Rio Grande do Sul (17%) [21]. There was a higher proportion of illiteracy among the UH patients (24%) when compared to those staying at Santa Casa (12%) (P<0.02). This can be attributed to the fact that the UH is a hospital whose clientele is predominantly assisted by the public health care system, who are generally the poorest. However, the difference between the patients of these hospitals was not systematic.

In Brazil, 43% of the elderly have a monthly income of up to one (1) minimum wage[22]; in Rio Grande do Sul, the figure is 13% [23], and in Rio Grande, in this group, it is 15%. Regarding mean income, Brazil hides major inequities. Still, the income observed among elderly participants in this study was higher than in population-based studies in other locations[24,25]. Ten percent of these elderly people live on their own. This percentage is very similar to that observed in other studies. Living alone forces the elderly to become more physically active because they have to carry out everyday tasks, which is good. However, for their health, this isolation can be an important risk factor for illness and death, because it facilitates the occurrence of depression and domestic accidents, worsens the supply of care, especially self-care among the most debilitated people; in the case of an emergency the situation is even worse as they might not receive care when it is needed most. Living with relatives, in addition to sorting out these issues, has proved to be a source of income for the family from pensions, especially in the poorest regions of Brazil, such as the North and Northeast[25].

The elderly are frequent users of health services[26]. In this study, approximately 90% had consulted a physician in the previous six months and nearly 60% were hospitalized in the previous 12 months. Two thirds of them were assisted by the public health services (SUS) and the other one third used the private system. These figures are higher than the national mean in recent years, which was 80% and 20%, respectively[27, 28]. A study conducted in São Paulo showed that 83% of the elderly had had at least one consultation during the previous 12 months.

Housing condition is a determinant factor on quality of life. Most of the residencies of the sample were considered of good quality. A house with masonry structure, an appropriate number of rooms, basic sanitation and electricity in almost all of them, determines good habitation conditions and contributes to an increase in the longevity of this population when compared to other regions of the country[25].

More than half of the patients treated in the two ICUs came from wards of the same hospitals that were studied. A study carried out in Fortaleza revealed that three quarters of adult patients came from the same hospital, which suggests the existence of a previous uncompensated co-morbidity[26]. This aspect could be further investigated. Half of the elderly were unconscious at the time of admission to the ICU. No other study was found that assesses this issue for the elderly population, except in very specific morbidities such as post-head trauma, stroke, and heart surgery, among others. In such cases, the criteria used were prognostic indices such as APACHE II (Acute Physiologic and Chronic Health Evolution), and SAPS (Simplified Acute Physiology Score), SOFA (Sepsis-related Organ Failure) and they were compared to equally specific groups .[27]

The admissions were due to clinical issues for 80% of the cases. In Recife, Brazil, this rate was 85% among the elderly with

sepsis[27]. The use of fluid replacement in the ICU is an almost universal practice. In this study, this procedure reached 91% of patients, while mechanical ventilation was used with 70% of them. Studies about this topic - mechanical ventilation - are also scarce in Brazil. A study conducted in Canada showed that 77% of elderly patients admitted to the ICU received mechanical ventilation[28].

The mean ICU stay in this study was 8.5 days. A study conducted at the University Hospital in Recife, found a mean stay for adult patients of 7.5 days. In Brazil, higher mortality is influenced by the lack of available beds at the appropriate time[26]. In general, the older the patient, the shorter the stay and the higher the occurrence of death. This is due, in general, to the greater severity of disease, the presence of comorbidities, the poor general health status and the lower resilience of the elderly.

Lastly, it is worth mentioning that, although it was possible that the patients of the two ICUs could have been very different, for the variables studied, this did not happen. Tables 1-5 show that the significant differences were not systematic, that is, they did not always tend to occur for the same service - see the third column in the table, the p-value. This can, among other factors, be the result of the limited availability of beds or the high cost of such a service in the private sector. This was the reason why the data were presented in this way, without emphasizing the differences between the services, in order to suggest that the data shown here represent the profile and clinical condition on admission in a general ICU patients aged 60 years or more in this municipality In conclusion, due to the significant growth in population and the costs that this will create for the health system, there is a clear need to prioritize care for the elderly at all levels of health care. At the primary level, damages to their health should be reduced and healthy lifestyles should be promoted; at the secondary level, one should seek early diagnosis and appropriately manage diseases in order to avoid complications and hospitalizations; at the tertiary level, one should manage the complications and promote appropriate treatment of sequelae. At all these levels, not only the age should be considered as the main predictor of an unfavorable outcome, but also the gender, socioeconomic status, social dependency, and their clinical condition when they arrive at the health service. There is also an evident need for more studies on this issue in order to provide them with increased survival and improvement in their welfare.

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