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Longevity and cost of care: the challenge of a self-managed health plan

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Abstract *This paper aims to analyze the relationship between the cost of health care and the aging of the population assisted by a self-managed plan, reflecting on the ways to address the challenge arising from this conjunction of population demographic changes. This is a descriptive study of the 1997-2016 period based on secondary data from the management operator of the health plan under study and from another administrative database of a self-managing provider with broad nationwide coverage. Older adults (over 60 years) increased 55% during the study period. On the other hand, the so-called "very old" (over 80 years) grew 332.8%. The population above 60 years corresponds to 25.7% of the total, and accounts for 68.8% of expenses. Most of the population covered (84,6%) is located in the State of Rio de Janeiro, which has the highest per capita health care cost in Brazil. We found a relationship between aging of the beneficiary population and increased expenditure. It is imperative to invest in health promotion and disease prevention initiatives as a way of improving the quality of life and financial sustainability of the plan, and define a subsystem that delimits and regulates access to the network and is accepted by the beneficiaries.*

Key words *Prepaid health plans, Health expenditure, Demographic aging*

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Introduction

In Brazil, the Unified Health System (SUS), a public system with universal coverage, is the only care alternative for more than 75% of the population[1,2]. In spite of the "Unified" epithet, the Private Health sector coexists with it, and provides care to part of the population that can afford plans or that, by professional bond, has access to this health care subsystem.

The National Supplementary Health Agency (ANS) is responsible for the regulation and supervision of this sector, and classifies operators regarding their legal status in: Self-management; Medical cooperative; Philanthropy; Group medicine; and Health insurance company[3].

Self-management operators have some characteristics that differentiate them from operators of the remaining segments. Social control, with the possibility of beneficiaries participating in management, is one of them. Another important differential is that they are non-economic associations. Because they are non-profit, they do not pay commissions to brokers and do not spend resources on sales marketing and commercial structure, self-management operators are also notable for providing the best cost-coverage ratio[3].

It should be emphasized that this definition reveals a model of private care organization very unique and typical of Brazil, which hinders international comparison.

Due to resolutions of the regulatory agency, self-management operators' possibilities to expand working scope and the number of lives covered are limited. Their populations are restricted to the branch of activity of the founding sponsor or the professional category of their beneficiaries. The characteristics of the workforce and the nature of the sponsor's activities may influence the sociodemographic profile of the assisted population, with implications for the pattern of illness and use of health services[4].

This curtailed range of action, together with the impossibility of associating with each other, results in a large number of small self-management operators providing care to small populations. Data available from a 2009 ANS survey[5] indicates that 80.2% of the active self-management operators at the time were considered small (less than 20,000 lives covered). This significantly increases the probability of a single medical treatment to unbalance the accounts and even render the financing of care for an entire community unsustainable, because in the health sector, the risk of an event occurring is inversely proportional to the number of lives.

Besides their small size, the self-management operators include populations that are older than the mean of the supplementary health sector, since, as a rule, they continue to provide care to their beneficiaries when they retire, a characteristic observed especially in self-management operators linked to the public sector, including in mixed economy companies[6].

The main consequence of the combination of a population that does not grow, which is slowly renewed (few entries in the first age brackets) and which preserves (does not expel) its retirees is the increased mean age, aging of the population. With aging, chronic-degenerative diseases prevail and require treatment (mainly hospital admissions) and increasingly expensive technologies, for a longer period, a combination that exerts significant pressure on the cost of care[7,8].

Thus, this paper aims to analyze the relationship between the cost of care and the aging of the population assisted by a self-management plan in Brazil, aiming to elicit reflections on how to address the challenge arising from this conjunction of factors.

Methods

This is a descriptive study based on secondary data from a self-management operator that serves professionals from a public health research institution, its dependents and extended members.

We also used the care cost database of another self-management operator, the largest in the country that is present in all the Federative Units. With the expressive number of 705,775 beneficiaries at the time of the study, this operator provides consistent information to measure the cost of care in the country. Thus, data on the per capita cost per Federative Unit of that operator were used. A 20-year period was studied, from 1997 to 2016 (as at 31/12 of each year), in which the population of the plan of interest was relatively and numerically stable.

The characterization of the population of beneficiaries is shown in three groups: principals, dependents and extended members, as well as distribution by gender and age group, showing the percentage distribution in selected years. Given the focus on the effects of aging on expenditure, older adults were stratified into young seniors (60-70), median seniors (70-80) and very old seniors (80 and over)[9].

The per capita cost of the study population by age group was calculated using 2016 as base year, in order to show the percentage impact on the cost of care due to aging. The values obtained were multiplied by the age composition of 2012, 2007 and 1997 (5, 10 and 20 years before the base year). The remaining variables were assumed to be constant, to show only the effect of aging on the cost resulting from the change occurred in the said age compositions of the observed years. Regarding the calculation of the percentage variation, the age profile of the year compared, calculated from the 2016 cost, the following formula was applied [((((cost of the estimated year) – (total cost of the base year – 2016)/Estimated year cost) x100].

Finally, the mean per capita cost of the total care expenses of the reference operator was calculated by state of the Federation.

Based on Resolution 510/2016 of the National Health Council, considering the use administrative data without individual identification and open access databases, the study was not submitted to ethical appreciation because it was understood that all the criteria for the protection of individuals were preserved.

Results

The 7.8% increase in total covered lives for the 1997-2016 period was heterogeneously distributed among the categories of beneficiaries. While there was a 26.0% and 31.4% growth among principals and extended members, respectively, a 17.3% decline was found among dependents. There is a large concentration of study population in the State of Rio de Janeiro (84.6%), with 78.4% in Grande Rio, home of the self-management operator. Women prevail in all the categories, but mainly between principals and extended members. Aging of both principals and extended members was observed during the study period (Table 1).

While an increase in the proportion of young seniors to the detriment of the very old seniors is noted, a more significant increase in the proportion of median and very old seniors among the extended members. In 20 years, there was a negative variation of 30.9% in the general population from 0 to 18 years. Older adults (above 60 years) had a positive variation of 55.5% and the beneficiaries of the range classified as very old seniors (over 80 years) varied 332.8% (Table 1). Figure 1 shows the development of the participation of very old seniors (17.8% in 1997 to 26.1% in 2016) and the decline (27.7% to 17.4%) of younger seniors (0 to 18). At the end of 2016, the mean age of those assisted by the operator was 43 years.

Table 1. Characterization of the beneficiary population of the Self-management operator under study, 1997-2016.

Variables	1997	2002	2007	2012	2016
Principals					
Total	4,333	4,450	4,811	4,827	5,461
Women (%)	52.8	54.5	57.4	58.4	59.8
Age (%)					
0-18	0.2	0.1	0.0	0.0	0.2
19-59	86.1	82.2	77.8	71.7	67.6
60-69	9.7	10.5	12.7	16.7	19.2
70-79	3.5	6.2	7.1	8.0	8.7
80-120	0.5	1.0	2.3	3.6	4.4
State of RJ (%)	88.3	87.7	87.9	88.1	86.2
Dependents					
Total	6,495	6,698	6,017	5,669	5,373
Women (%)	54.0	53.1	52.6	52.1	51.5
Age (%)					
0-18	55.8	49.2	42.7	39.4	39.7
19-59	40.1	45.5	49.4	49.6	46.7
60-69	3.0	3.5	5.3	7.3	8.9
70-79	1.1	1.6	2.1	2.8	3.5
80-120	0.1	0.2	0.5	0.9	1.2
State of RJ (%)	88.8	87.9	87.9	88.1	84.1
Extended members					
Total	3,560	3,808	3,643	3,484	4,677
Women (%)	65.6	62.2	62.1	62.0	59.6
Age (%)					
0-18	10.1	21.1	16.1	11.8	13.0
19-59	42.2	38.0	44.1	49.7	55.0
60-69	24.4	14.9	10.0	7.1	6.6
70-79	17.1	18.7	19.7	16.4	10.7
80-120	6.2	7.3	10.2	15.0	14.7
State of RJ (%)	89.0	88.4	88.6	88.5	83.5
General					
Total	14,388	14,956	14,471	13,980	15,511
Women (%)	56.5	55.9	56.6	56.7	56.8
Age (%)					
0-18	27.7	27.4	21.8	18.8	17.7
19-59	54.5	54.5	57.5	57.4	56.5
60-69	10.3	8.5	8.9	10.6	11.8
70-79	5.8	7.3	8.2	8.0	7.5
80-120	1.7	2.2	3.6	5.3	6.4
State of RJ (%)	88.7	88.0	88.1	88.2	84.6

Source: Self-management database under study, 2017.

The annual cost per beneficiary's age group in 2016 is shown in Table 2. We can observe that older adults (aged 60 and over) correspond to 25.7% of the beneficiaries, accounting for 68.8% of the total costs. Children and young people up to the age of 18, all dependent or extended members, account for only 4.6% of the costs.

Assuming that other structural and situational conditions of the provision of private health care services (characteristics of the plans, network of providers, level of use of technologies) are constant, and considering only the change in the age profile (aging of the assisted population) in the 5, 10 and 20 years' period, the cost of care would be, respectively, 15.8%, 28.4% and 53.4% lower than in 2016 (Table 3).

Given the concentration of the assisted population in the state of Rio de Janeiro, the cost distribution of the largest national self-management plan by federative unit was analyzed. It was found that Rio de Janeiro had the highest per capita cost in the country, 80.4% above the national average (Table 4).

Discussion

Chronic diseases and population aging are related issues and, are therefore increasingly included in the World Health Organization's priority agenda[10]. These themes are intensively studied as they reflect on the design of health systems, the national economies and the well-being of the people.

In the foreword to the publication *World Report on Ageing and Health*, Dr. Margaret Chan, WHO Director-General at the time, said that factors such as climate change and the emergence of new diseases are unpredictable as trends that affect health, but one trend is certain: the accelerated population aging, which will significantly influence people's health and health systems. The work concludes that the recommended approach to building a world favorable to older adults calls for the transformation of health systems – still predominantly defined to provide curative and intensive care – in order to focus on a model that responds to the needs of the aged population[10].

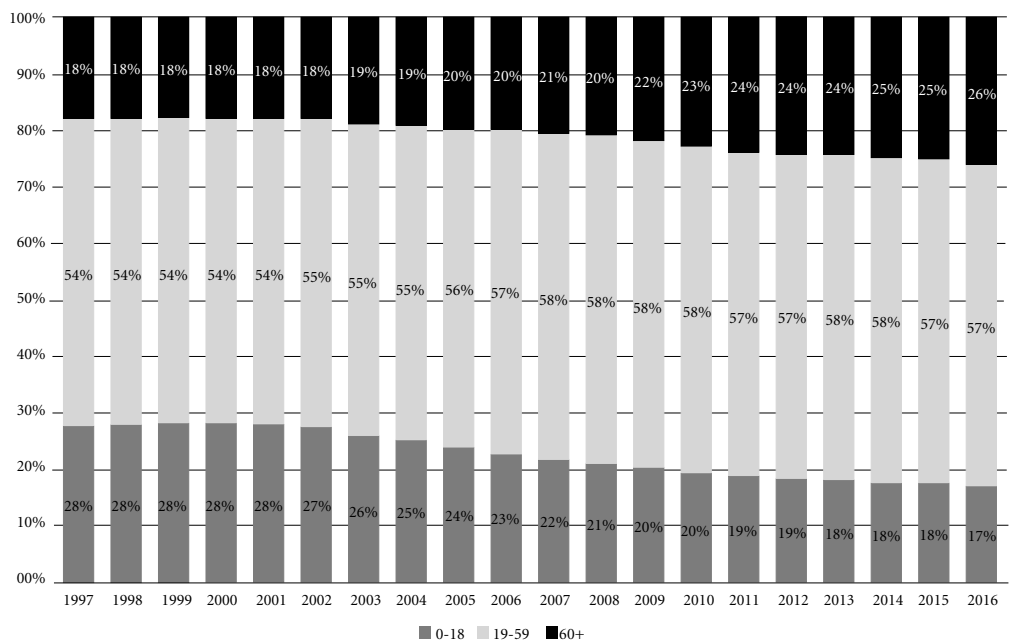

Figure 1. Distribution of beneficiaries by age group. Self-management operator under study. 1997-2016.

Source: Self-management database under study, 2017.

Table 2. Total distribution, percentage and cumulative percentage of the beneficiary population and the cost of care, by age group. Self-management operator under study. 2016.

Age group	Population 2016	% Population	% Aggregate of the population	Cost 2016 (million Reals)	% Cost	% Aggregate Cost
80+	989	6.4	6.4	42.59	34.7	34.7
70-79	1,159	7.5	13.8	20.52	16.7	51.5
60-69	1,835	11.8	25.7	21.21	17.3	68.8
19-59	8,775	56.6	82.3	32.63	26.6	95.4
0-18	2,753	17.7	100.0	5.65	4.6	100.0
Total	15,511	100.0	-	122.60	100.0	-

Source: Self-management database under study, 2017.

Table 3. Monthly cost per age group of the population of beneficiaries of self-management of the study based on the 2016 financial year, applied to the age composition in 2012, 2007 and 1997, respectively, corresponding to the last 5, 10 and 20 years. Self-management operator under study.

Age group	2016		2012		2007		1997	
	Population	Cost (million Reals)	Population	Estimated cost for 2016 (million Reals)	Population	Estimated cost for 2016 (million Reals)	Population	Estimated cost for 2016 (million Reals)
0-18	2,753	5.65	2,593	5.32	3,156	6.47	3,989	8.18
19-59	8,775	32.63	7,989	29.70	8,322	30.95	7,835	29.13
60-69	1,835	21.21	1,537	17.76	1,292	14.93	1,481	17.12
70-79	1,159	20.52	1,066	18.87	1,187	21.02	834	14.77
80+	989	42.59	795	34.24	514	22.14	249	10.72
Total	15,511	122.60	13,980	105.90	14,471	95.51	14,388	79.93
Variation*				-15.8%		-28.4%		-53.4%

*Percentage variation considering the age profile of the year compared, calculated based on the cost of 2016 (base year).
Source: Self-management database under study, 2017.

At the end of 2017, the mean age of those assisted by the operator studied was 43.2 years, and 35.1 for the whole Brazilian supplementary health sector[11]. The elderly population (over 60 years old) represented 26.1% of the total study population in December 2016, more than double the average of the supplementary sector (12.9%)[11]. Analyzed by another indicator, the aging index (percentage ratio between the elderly – over 60 years – and individuals up to 14 years of age) is 66.1% in the supplementary health sector and 198.6% in the self-management operator under study[11].

As most principals are active workforce (it is a public company in which entry is by competition and the age limit is 75 years), the elevation of young seniors may be related (9 competitions from 1998 to 2016, as per the Institution's human resources directorate, to which the beneficiaries are linked).

Several aspects influence health costs, varying by national category of income, more or less poor population strata, lifestyle, health use behavior and access to care resources. However, while it influences less the costs of care than other factors[12], the aging process, in which people spend a long time living with chronic diseases, has great relevance for the financing of both public[13] and private[6] health care.

The WHO states that aging alone does not have a major influence on increasing health costs, also because the poorest sections of the population have difficulty accessing health care, especially in low-income countries[10]. Some studies conclude that the influence of aging is due more to the technology applied to the elderly in hospital admissions, which is determinant for the high cost of treatment of the older populations[12].

In general, especially in middle-income countries and even in some high-income coun-

Table 4. Total health care expenditures, population of assisted lives and mean cost per capita, National Self-Management Plan, 2016.

Federative Unit	Total Cost of Care (Reals)	Population Dec/2016	Monthly mean cost per capita
Rio de Janeiro	503,593,176.20	74,723	561.62
Distrito Federal	480,247,796.85	74,079	540.24
Maranhão	179,465,330.78	27,712	539.67
São Paulo	714,586,547.15	116,761	510.01
Pernambuco	179,810,677.44	32,584	459.86
Bahia	368,379,489.68	69,171	443.80
Rio Grande do Sul	210,209,865.83	39,903	439.00
Ceará	90,772,048.88	19,532	387.28
Sergipe	63,636,066.31	13,963	379.79
Rio Grande do Norte	51,398,197.60	12,130	353.11
Alagoas	40,868,318.56	10,287	331.07
Espírito Santo	43,777,471.11	11,210	325.43
Minas Gerais	232,374,309.69	63,369	305.58
Amazonas	13,701,182.28	3,958	288.47
Paraíba	41,088,251.58	11,957	286.36
Piauí	25,063,965.98	7,728	270.27
Mato Grosso do Sul	27,750,778.08	8,619	268.31
Goiás	54,755,841.44	17,748	257.10
Santa Catarina	65,258,384.90	21,348	254.74
Tocantins	9,038,829.36	3,042	247.61
Paraná	110,893,842.06	38,779	238.30
Mato Grosso	22,162,297.49	8,579	215.28
Pará	28,680,018.51	11,364	210.31
Rondônia	6,010,055.15	3,029	165.35
Amapá	2,716,556.71	1,402	161.47
Acre	2,673,602.80	1,809	123.16
Roraima	1,134,289.18	989	95.58
Brasil	2,636,292,883.93	705,775	311.28

Source: Database of the country's largest self-management operator, 2016.

tries, health systems are designed to address acute episodes, with hospitals seeking to accumulate the maximum technology to respond to these demands, which require significant financial outlays[14]. Although elderly patients represent a smaller proportion of the total population, they are the main occupants of the ICU beds, and are the recipients of the high technology use in the period before their death, evidencing the influence of the medical system on the costs of the system[15].

In an aging world, health systems should be designed to provide care for the elderly, with services that provide ongoing care to someone's health course (prevention, treatment, rehabilitation, control, palliation). Achieving this goal is a challenge for all countries, especially for developing countries, which are rapidly living the aging process and coexist both with infectious diseases and chronic diseases[16].

The link between age and costs is strongly influenced by the health system itself. A study on OECD countries reveals that age-related health cost increases are much higher in Canada and the United States than in Spain and Sweden. This is likely to be due to differences in systems, incentives and intervention approaches of service providers regarding care for older adults, as well as cultural issues, especially those related to end-of-life care[7].

The beneficiaries of the health plan under study have privileged access to medical resourc-

es, with a large number of hospitals, laboratories and diagnostic imaging services and therapies available. The freedom of access to these resources, in particular to hospital resources, allows us to conclude that, in fact, it is not only age, but easy access to available technology that is the reason of the high cost of care provided, especially in older age groups, which, due to chronic diseases, most demand these services.

Although the responsibility for increasing the costs of care is not exclusively attributed to the event of aging, the fact that this population seeks care in a system that favors curative care, centered in hospitals, with high concentration of technology, makes these two associated factors (aging population in a high per capita cost location) exert substantial pressure on costs.

The search for a preventive model that addresses the entire line of care, eliminating to the maximum practical extent occasional and fragmented care, becomes decisive to ensure the continuity of care.

Older adults are particularly hardest hit by the so-called Noncommunicable Chronic Diseases (NCDs), which are long-lasting and with generally slow development. The four major types of NCDs are cardiovascular diseases (such as heart attacks and strokes), cancer, respiratory diseases (such as chronic obstructive pulmonary disease and asthma), and diabetes[17]. NCDs are by far the leading cause of death in the world, accounting for 63% of all annual deaths, taking the lives of more than 36 million people each year. About 80% of all NCD-related deaths occur in low- and middle-income countries[18].

In Brazil, according to the Ministry of Health, NCDs are responsible for 72% of deaths, where 43% of deaths occur due to cardiovascular diseases, 22.6% to cancer, 8% to chronic respiratory problems and 6.9% to diabetes[19].

Given their long course, such diseases usually develop with accumulated comorbidities, impaired physical state, resulting in a higher requirement of technologies and, consequently, financial resources.

The issue of multimorbidity (the concomitant existence of several chronic conditions) is especially relevant, since it has a directly proportional relationship: the greater the age, the greater the probability of multiple chronic diseases[20,21] and, consequently, the greater the search for medical services by the population so characterized[22].

The problem of financing health care is not only Brazilian, but a global dilemma. An analysis of total health expenditure as a percentage of GDP[23] shows that most of countries, of all income groups, had a significant increase in this marker in the 2000-2010 period. In the case of Brazil, this proportion ranged from 7.2% in 2000 to 9.0% in 2010 (growth of 25%). The survey revealed that most of the 194 WHO member countries had an increasing total health expenditure per capita (by the purchasing power parity criterion) in the same period observed. Exceptions are Cape Verde, Eritrea, Guinea-Bissau, Nauru, San Marino, Sao Tome and Principe and Seychelles, which did not show growth in the health expenditures of their populations and are characterized as low-populated and low-income countries.

If health expenditure is an important problem for the macroeconomics of countries, the subsystems are a matter of great concern, as is the case of health plan operators, especially the self-management operators that are funded by the financial resources of workers, as is the case with the self-management operator under study.

A marker created and disseminated periodically by the Institute of Supplementary Health Studies (IESS) revealed a disproportionate elevation in medical and hospital costs when compared to the general inflation rate of the economy[24]. The Medical and Hospital Costs Variation Index (VCMH) calculated by the Institute pointed to a 20.4% increase in the twelve months ended December 2016, while the IPCA variation for the same period reached 6.3%. This has been observed over the years and reveals that health spending grows at an unbearable proportion to the State, companies and workers.

The irrational and uncritical use of new technologies[25], the aging of the population[26] and the epidemiological transition[27] in which no longer infectious diseases but chronic diseases became prevalent are factors that occur concomitantly and recommend changes in the formulation of policies and point to the need to review the way care is provided by health systems and by health plans. This necessarily means prioritizing chronic diseases, since they will be part of people's lives for a long time[28] and will be the main causes of their deaths[18].

In general, health care providers are structured to respond to disease episodes, since services are almost always only sought by the beneficiaries when they face a health problem, and there is in general no demand for preventive actions. The model of work and design of the products (health plans) provided are based on price, network of providers, coverage and rules of use.

Operators are usually only reactive to the use of health services by their beneficiaries. Although there is an intense incentive of the regulatory body, health programs still take a back seat in the way of working of operators[29].

Some authors label current operators as "disease plans" and not "health plans" since they pay for "amputating a gangrenous limb because of diabetes, but do not shell out a cent to sensitize the patient towards the importance of observing treatment to reduce the likelihood of requiring such a tragic and costly medicine"[30].

The sustainability problems of the different modalities of Brazilian private prepaid plans were analyzed in the early days of the effects of the new regulation that was formalized by the establishment of the National Supplementary Health Agency (ANS). Authors such as Ribeiro et al.[31] and Costa and Castro[32] propose political alternatives to self-management plans as analyzed in this paper: (a) to dilute their population into larger ones, which may imply the loss of political control of the sponsoring institution over the plan; or (b) to promote the increase of premiums, co-payments, moderators of consumption and the like; or (c) to adopt broad demand-reducing programs aimed at controlling risks and accompanied by the sustainability issues of such types of strategy.

This essentially curative model – which neglects prevention – shows signs of exhaustion, since it does not result in improved people's health condition and does not answer the dilemma of health system financing. Costs are rising by far more than the economy's normal inflation[33], and excessive expenditure is not reflected in improved health indicators or assisted population's satisfaction. In fact, as far as satisfaction is concerned, there is evidence to the contrary, since health plans hold top positions in the ranking of consumer complaints of Brazilian services. The Brazilian Consumer Protection Institute[34] shows that health plans are champions of consumer dissatisfaction for the third consecutive year (period 2015-2017).

Findings recorded in this study cannot be generalized, especially since the costs of care are directly associated, importantly, to hospitals underpinning the accredited network and the contracting conditions that vary by operator's size. Also, although the per capita cost calculated by Federative Unit was based on a significant number of beneficiaries, it may vary if other factors are considered (age composition and geographic location of the population, greater or lower supply of medical services; regulation of demand and composition of the accredited network, especially hospitals). Furthermore, beneficiaries may use other services such as the SUS, or other plans for which they are beneficiaries as dependents. However, data have high internal validity, since we worked with the total population of beneficiaries.

Final considerations

In a survey comparing the costs of health care in ten OECD countries, the authors already drew attention to the fact that this cost grows in a proportion greater than national GDPs, which would make the cost of care unbearable, especially in the USA[7].

Although long-term care costs are likely to increase with an aging population, the effects on health care costs cannot be attributed solely to the aging process. If appropriate measures are implemented in time, the impact of aging of the population on health care costs can be mitigated. It is necessary to coordinate the care line, avoid unnecessary hospital treatment, reduce risk and invest in people's autonomy. In short, it is necessary to invest in programs that start at middle-age and that are continuous[35].

The combination of the following factors: with a small population (slightly more than 15,000 lives), with 26.1% over 60 years and with 84.7% living in the State of Rio de Janeiro (which has the highest per capita cost in the country), it is imperative to adopt a new way of care, supported by health risk management programs carried out by a multidisciplinary team[36], otherwise the care provided will not be financially supported.

It should be noted that there are other systemic hurdles to be overcome, such as the search for intensive care centers (hospitals) for the solution of chronic diseases; the high cost of hospital admissions characterized by high margins of materials and drugs purchased (which make up more than 50% of the hospital cost), therapeutic obstinacy (dysthanasia)[37] at the expense of the palliative care option, not to mention other wastes and inefficiencies are measured.

For an operator that cares for an affiliated population, with a significant and expressive percentage of older adults, whose beneficiaries have free access to the network of health service providers, the challenge is to build a subsystem that will gain the trust and support of the assisted population, ensuring that the necessary resources

are allocated as closely as possible to the needs (and not the desire or due to oversupply) of each beneficiary.

A fundamental component of this new form of care that is preventive instead of curative, and which can contribute to overcoming the financing challenge, will be a diligent and timely management of the health of the population of major users in the short term and in the high risk/high cost population, in the short and medium term. Structurally, efforts should be directed toward the construction of a care model[38] that is resolutive in primary care, hierarchizes and orients access to the network of specialists, and adopts practices that replace the current situation of fragmented care that does not promote health and barely responds to disease episodes.

However, this work shows the magnitude of this challenge, insofar as in a self-management plan, where, therefore, beneficiaries participate actively in the strategic decisions, a strong impact of aging of the population of beneficiaries on growing expenses was found.

Regardless of the record of these reflections on how to respond to this challenge, further studies should be carried out so that other strategies are designed and other aspects modified, in order to ensure the sustainability of the system and the continuity of care, and that it is not reduced to a small number of privileged people who can afford the costs, which are becoming prohibitive for most of the population.

Collaborations

JAD Oliveira and VL Luiza participated in all stages: conception, design, writing and final review of the article. JM Ribeiro and ICM Emmerick participated in the design and review stages.

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