

Evolution of hospital spending with drug-related psychiatric hospital admissions

Evolução dos gastos hospitalares com internações psiquiátricas por drogas

Evolución de gastos con ingresos hospitalarios de psiquiatría por drogas



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ABSTRACT

Objective: To analyse the trend of expenditure on drug-related psychiatric hospital admissions in Maringá, Paraná, Brazil, from 1999 to 2012.

Method: Ecological time series research with secondary data from the hospital information system of the unified health system ("SIH-SUS"). The records of admissions with a main diagnosis of drug abuse were used to calculate average expenditure. Chapter V of the ICD-10 was used to classify the most frequent diagnoses, namely abuse of alcohol, cannabis, cocaine, and psychoactive substances. The trend was expressed using a polynomial regression model.

Results: Average expenditure showed an increasing trend for cocaine and other psychoactive substances, and a decreasing trend for cannabis. Average expenditure for illicit drugs increased significantly.

Conclusion: The scarcity of economic studies on this subject calls for national studies that address expenditure with drug-related hospital admission to promote the implementation of a psychosocial, outpatient and hospital care network in accord with public healthcare expenditure.

Keywords: Hospital information systems. Temporal distribution. Health expenditures. Hospitalization.

RESUMO

Objetivo: Analisar a tendência dos gastos com internações hospitalares psiquiátricas por drogas no município de Maringá-PR, no período de 1999 a 2012.

Método: Estudo ecológico, de séries temporais, com dados secundários do Sistema de Informações Hospitalares do Sistema Único de Saúde (SIH-SUS). Foram calculados os gastos médios mais frequentes por diagnóstico principal de internação por drogas do Capítulo Cinco da CID-10: álcool; maconha; cocaína e substâncias psicoativas. Utilizou-se o modelo de tendência de regressão polinomial.

Resultados: Houve tendência de aumento no gasto médio por cocaína e de outras substâncias psicoativas e tendência decrescente nos gastos médios por maconha. Os gastos médios apresentaram aumento significativo por drogas ilícitas.

Conclusões: Estudos econômicos apresentam-se incipientes, sendo oportunas pesquisas nacionais que abordem os gastos com internações por drogas com a finalidade de promover subsídios para a implantação e implementação da rede de atenção psicossocial, ambulatorial e hospitalar em consonância com o gasto público em saúde.

Palavras-chave: Sistemas de informação hospitalar. Distribuição temporal. Gastos em saúde. Hospitalização.

RESUMEN

Objetivo: Analizar la tendencia del gasto en los ingresos hospitalarios psiquiátricos para las drogas en Maringá-PR, 1999-2012.

Método: Estudio ecológico de series temporales con datos secundarios del Sistema Información Hospitalaria del Sistema Único de Salud (SIH-SUS). Calculado el gasto promedio por diagnóstico de ingreso primario de drogas en Capítulo Cinco de CID-10 fueron frecuentes: alcohol; marihuana; cocaína y sustancias psicoactivas. Se utilizó modelo de tendencia de regresión polinómica.

Resultados: El aumento de la tendencia en el gasto promedio de la cocaína y otras sustancias psicoactivas y la tendencia a la baja en el gasto por marihuana. El gasto mostró aumento significativo de las drogas ilícitas.

Conclusión: Los estudios económicos se presentan incipientes siendo la investigación nacional oportuna sobre gastos de hospitalización de drogas con propósito de promover subsidios para el establecimiento y la aplicación de la atención psicossocial, ambulatorial y hospital de la red, en línea con el gasto público en salud.

Palabras clave: Sistemas de información en hospital. Distribución temporal. Gastos en salud. Hospitalización.

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■ INTRODUCTION

One of the most effective strategies to increase the efficiency of public health services is to know and understand the use of financial resources and assess expenditure. Public expenditure is divided into three categories: (i) government operating expenses and expenses to maintain government activities; (ii) government investment spending, which includes public capital and social capital in the form of projects; and (iii) government funding, intended for financing, transfer operations, and grants, that in the everyday practice of public services eventually become funding or investments for healthcare⁽¹⁻²⁾.

There has been an increase in healthcare spending in Brazil due to several factors, such as the ageing population, greater supply of health professionals, implementation and construction of health services, and technological progress, which concerns the public authorities and health service managers⁽³⁾.

According to the annual 2013 report of the International Narcotics Controls Board (INCB) only one in six drug users worldwide receives treatment, or about 4.5 million people, at an overall cost of around 35 billion US dollars a year. Heroin, marijuana and cocaine are the most commonly used drugs among people who start treatment around the world. The report also states that prevention is a sensible investment option for the authorities because it generates significant savings in healthcare. Every dollar spent on prevention can save up to ten dollars in further financial government resources⁽⁴⁾.

From the perspective of hospital admissions in Brazil, public expenditure with psychiatric admission for mental and behavioural disorders related to alcohol from 2002 to April 2004 was BRL 142,646,007.46 or 83% of the total expenditure, while the remaining 17% were for admissions related to other drugs, according to secondary data of the Department of Informatics of the Unified Health System ("DATASUS")⁽⁵⁾. Psychiatric admissions dropped 39.5% and extra hospital spending increased 404.2% from 2001 to 2009, which shows a significant investment in extra actions⁽⁶⁾, although these investments were not necessarily for drug use prevention.

Data of the United Nations (UN) show that about 230 million people, or 5% of the adult population, used an illicit drug at least once in 2010. Drug users totalled 27 million, or 0.6% of the adult population. Around the world, the use of illicit drugs appears to be stable, although it is still growing in many developing countries. Illicit drugs undermine social and economic development and contribute to increased crime rates, instability, insecurity and the spread of HIV⁽⁷⁾.

In Brazil, since the 1970s, experiments to transform psychiatric care were initiated with the intramural reform of psychiatric institutions and later by the proposition of a community-centred model to replace the specialized hospital model. The regulated replacement of hospital care by outpatient and community-oriented care involves the creation of new services, such as psychosocial care centres ("CAPS"), home therapy service, assistance units and other psychosocial care devices. Currently the largest budgetary resources of the Brazilian ministry of health ("MS") are allocated to the substitute services for drug users and people with mental disorders⁽⁸⁾.

Studies that show the magnitude of the economic impacts of drug use on public healthcare expenditure in Brazil, more specifically hospital admission, are scarce because the current prevailing model of care is centered on outpatient treatment and deinstitutionalisation. Considering the significant increase of financial resources for outpatient services to restructure psychiatric care, it is important to learn more about the spending behaviour for drug-related hospital admissions. Understanding the past trends of drug-related psychiatric hospital admissions can shed light on future possibilities⁽⁹⁾ since drug use and abuse is one of the major public health problems in Brazil and several countries⁽¹⁰⁾, and thus requires financial incentives for outpatient and hospital care. The present study aimed to analyze the expenditure trend of psychiatric hospital admissions for legal and illegal drug use of residents in the municipality of Maringá, Paraná, Brazil, from 1999 to 2012.

■ METHODOLOGY

This is an ecological time series study of the expenditure trend of drug-related psychiatric hospital admissions of residents in the municipality of Maringá, state of Paraná, from 1999 to 2012.

The municipality of Maringá, northwest of the state of Paraná, provides 1314 beds for general hospital admissions. Of these beds, 60.57% are contracted or owned by the SUS. This percentage comprises 268 psychiatric beds in three hospitals, of which 240 are contracted by the SUS and located in a private benchmark institution for the regions and municipalities surrounding Maringá. Another hospital service offers 26 psychiatric emergency beds, of municipal management, at a benchmark institution for the same regions, and yet another general low complexity hospital offers two contracted beds⁽¹¹⁾.

The hospital admissions were selected according to the year covered by the hospital admission authorization ("AIH"). Although the main objective of the AIH is the remu-

neration of hospital admissions and services, it is used to study morbidity because it is the only regular and universal source of hospital information in Brazil. Hospital production data for the study period were obtained from the secondary database of the hospital information system of the unified health system (“SIH-SUS”). The data were tabulated using Tabwin version 3.6, which is public domain software of the Brazilian ministry of health.

The trend was analysed according to the main admissions diagnosis of the Chapter V (Mental and Behavioural Disorders – Codes F00 to F99) of the International Classification of Diseases (ICD-10) tenth edition, from the group of mental and behavioural disorders due to psychoactive substance use – F10 to F19. The four selected and prevailing drug abuse categories were mental and behavioural disorders due to use of alcohol – F10; mental and behavioural disorders due to use of cannabis – F12; mental and behavioural disorders due to use of cocaine – F14; mental and behavioural disorders due to use of multiple drugs and use of psychoactive substances – F19.

The ICD-10 recommends that the category of psychoactive substances (F19) be used when two or more psychoactive substances are involved given the impossibility of identifying which substance contributed most to the disorders. This category is used when the exact psychoactive substance or substances that the user consumed is uncertain or unknown, considering that multiple drug users do not always know precisely what they consume.

Average expenditure on admissions for each diagnostic category was calculated by adding all the expenses and dividing the sum by the number of admissions in each category, as follows:

$$\text{Average admissions expense in the category} = \frac{\text{Total amount paid of admissions in the category}}{\text{Number of admissions in the category}}$$

The spending trend was analysed using the Statistical Package for the Social Sciences (SPSS) version 20.0. First, dispersion diagrams were used to verify the relationship between average spending of the AIH and the study years. The dependent variable (Y) was average spending on admissions by main diagnosis, and the independent variable (X) was years of the trend study. A year-centered variable was used (year minus the midpoint of the study period) (X-2005) because the equation terms of polynomial regression models are correlated to be expressed as an independent variable (X), since a deviation from the average reduces the autocorrelation⁽¹²⁾.

The first tested model was the simple linear regression ($Y = \beta_0 + \beta_1 X$), followed by the higher-order models. In the

second degree, parabolic or quadratic ($Y = \beta_0 + \beta_1 X + \beta_2 X^2$) and in the third degree or cubic ($Y = \beta_0 + \beta_1 X + \beta_2 X^2 + \beta_3 X^3$)⁽⁹⁾. Statistically, the best polynomial model was considered the model with the highest statistical significance (lowest value of p) and residuals without bias. When two models were similar, we opted for the simpler model, that is, of lower order. The trend with the estimated model that obtained $p < 0.05$ ⁽¹²⁾ was considered significant, as proposed in a previous model.

Since the data for this study were obtained from a public domain database of secondary sources without the nominal identification of the subjects, approval of the research ethics committee was not necessary.

■ RESULTS

During the study period, a total of BRL 19,633,373.97 was spent on psychiatric drug-related admissions of residents of the municipality of Maringá. In 1999, the average expenditure was BRL 451.73, and in 2012, expenditure increased to BRL 710.86. The highest average psychiatric admission expense was BRL 720.48, in 2010 (Table 1).

At the beginning of the period, most of the admissions were for mental and behavioural disorders due to use of alcohol – F10 (43.7% in 1999). In 2012, this diagnosis was also the cause of 24.9% of the psychiatric admissions. Admissions for mental and behavioural disorders due to multiple drug use and use of other psychoactive substances – F19 were 2.0% in 1999, at the beginning of the study, and 24.2% on 2012 (Table 2), with a relative increase of 1.110%.

Table 2 also shows an increase in average spending on admissions for mental and behavioural disorders due to use of alcohol – F10; mental and behavioural disorders due to use of cocaine – F14; and mental and behavioural disorders due to use of multiple drugs and psychoactive substances – F19. There was a fluctuation in average spending for admissions for mental and behavioural disorders due to use of cannabis – F12. In spite of the decrease of admissions frequency for mental and behavioural disorders due to use of alcohol – F10, average spending for this category increased during the study period.

Figure 1 shows the scatter plot of the average admissions spending trend by diagnosis. The average admissions spending trends for mental and behavioural disorders due to use of alcohol – F10 showed an increasing curve until the year 2003, a sudden drop in 2004, and a returning growth from 2005. Average spending for mental and behavioural disorders due to use of cannabis – F12 increased steadily until 2003, and subsequently dropped and fluctuated for the remainder of the study period. Admissions for men-

Table 1 – Distribution of drug-related psychiatric admissions and hospital expenses (frequency and average). Maringá – Paraná, 1999 to 2012

Year	Admissions	Expenditure (BRL)	Average expenditure* (BRL)
1999	2503	1,130,685.89	451.73
2000	2356	1,189,727.11	504.98
2001	2425	1,314,041.51	541.87
2002	2142	1,273,704.52	594.63
2003	1859	1,156,890.05	622.32
2004	1535	940,284.33	612.56
2005	2692	1,236,987.69	459.51
2006	2227	1,092,547.45	490.59
2007	2510	1,165,822.05	464.47
2008	2796	1,494,476.36	534.51
2009	2785	1,710,148.85	614.06
2010	2878	2,073,547.02	720.48
2011	2777	1,933,775.28	696.35
2012	2702	1,920,735.86	710.86
Total	34187	19,633,373.97	574.29

Source: Hospital information system of the SUS (SIH/SUS) available at the department of informatics of the unified health system (DATASUS).
* in Brazilian Real

Table 2 – Distribution of drug-related psychiatric admissions and hospital expenses according to diagnosis. Maringá – PR, 1999 to 2012

	Alcohol (F10)			Cannabis (F12)			Cocaine (F14)			Psychoactive substances (F19)		
	Freq.	%*	Average expenditure	Freq.	%	Average expenditure	Freq.	%	Average expenditure	Freq.	%	Average expenditure
1999	1094	43.7	418.29	5	0.2	176.64	1	-	253.88	51	2.0	279.82
2000	991	42.1	472.16	7	0.3	301.27	-	-	-	57	2.4	411.65
2001	1060	43.7	504.89	4	0.2	407.51	4	0.2	400.24	65	2.7	355.9
2002	717	33.5	586.04	3	0.1	390.23	2	0.1	139.98	64	3.0	483.78
2003	532	28.6	648.82	7	0.4	618.31	12	0.6	358.3	75	4.0	549.54
2004	297	19.3	551.02	4	0.3	275.35	5	0.3	357.56	99	6.4	526.71
2005	659	24.5	333.62	4	0.1	199.86	25	0.9	329.43	265	9.8	386.44
2006	521	23.4	324.53	8	0.4	171.14	47	2.1	289.09	273	12.3	447.32
2007	633	25.2	292.95	1	0.0	235.86	120	4.8	214.18	300	12.0	417.53
2008	727	26.0	382.1	2	0.1	174.37	215	7.7	337.19	381	13.6	459.99
2009	732	26.3	476.65	3	0.1	165.72	197	7.1	489.01	368	13.2	556.14
2010	706	24.5	598.09	-	-	-	217	7.5	636.93	410	14.2	662.78
2011	694	25.0	617.49	3	0.1	492.12	112	4.0	699.9	623	22.4	627.42
2012	674	24.9	659.08	3	0.1	131.15	146	5.4	736.73	653	24.2	686.36

Source: Hospital information system of the SUS (SIH/SUS) available at the department of informatics of the unified health system (DATASUS).
* Percentage calculated in relation to the total number of psychiatric drug-related admissions.

tal and behavioural disorders due to use of cocaine – F14 steadily grew during the period, with the exception of 2006 and 2007, when average spending was similar to that of the initial period (year 1999). Between 1999 and 2004, the curve for the average spending on mental and behavioural disorders due to multiple drug use and use of other psychoactive substances – F19 increased until 2004, followed by a decrease in 2005, and steady growth from 2006.

Table 3 shows the spending trend analysis for drug-related admissions. Spending on admissions for mental and behavioural disorders due to use of alcohol – F10 remained steady during this period. There was an increase (+36.48

per year; $p < 0.001$) in average spending for admissions for mental and behavioural disorders due to use of cocaine – F14, and for mental and behavioural disorders due to use of multiple drugs and use of psychoactive substances – F19 (+ 19.17 per year; $p = 0.002$), and a decrease (-22.729 per year; $p = 0.006$) in average spending for admissions for mental and behavioural disorders due to use of cannabis – F12.

The highest average expenditures were for mental and behavioural disorders due to use of alcohol – F10, which totalled BRL 482.36 during the study years. Average spending on admissions for mental and behavioural disorders due to use of cocaine – F14 was BRL 344.15. For mental

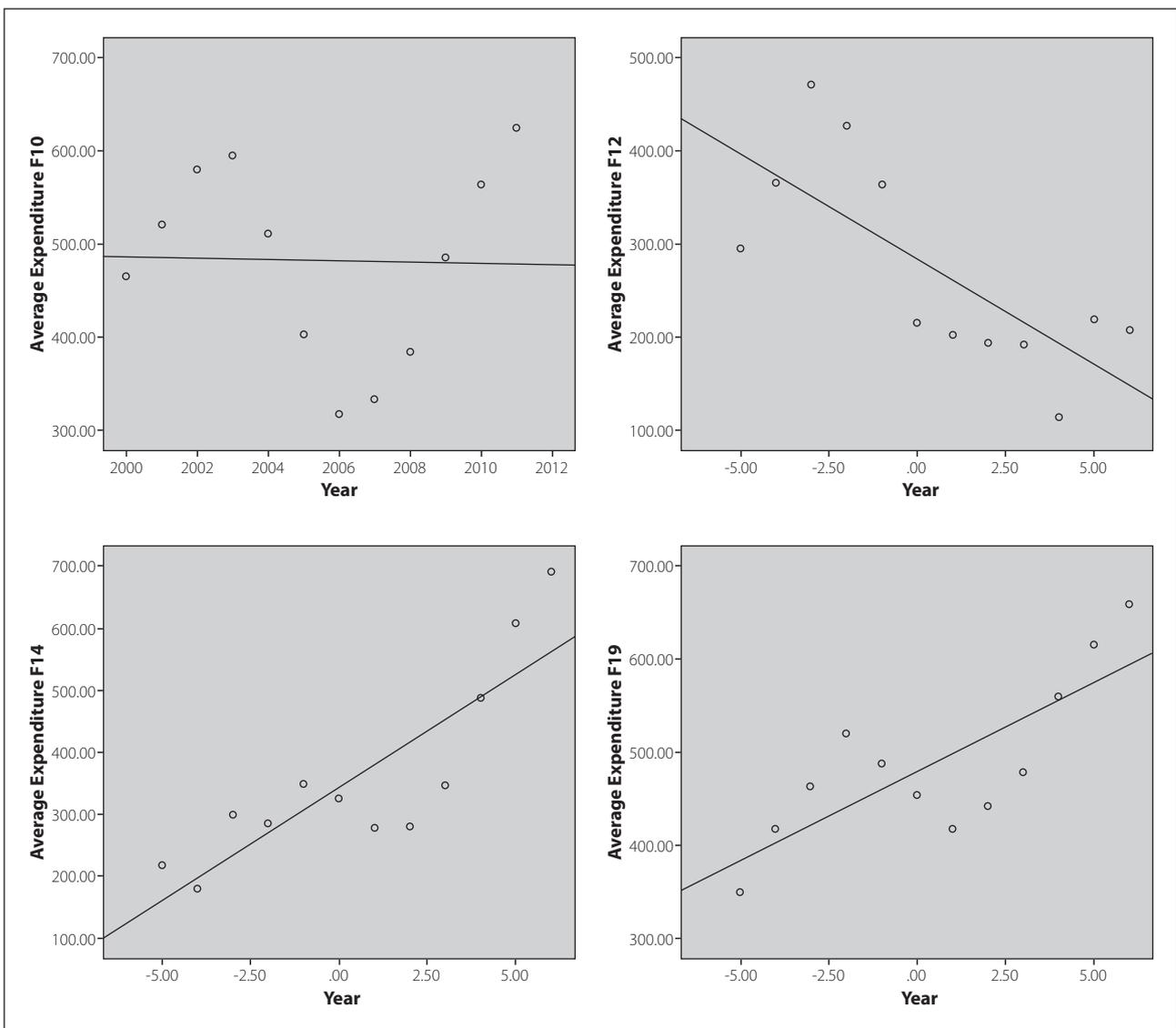


Figure 1 – Scatter plots of average spending for psychiatric drug-related admissions according to diagnosis. Maringá – PR, 1999 to 2012

Source: Research data.

Table 3 – Results of average spending trend analysis for psychiatric drug-related admissions according to diagnosis. Maringá – PR, 1999 to 2012

Medical	Diagnosis	r ²	p	Trend
Alcohol (F10)	y = 482.36 – 0.67x	0.00	0.942	Stable
Cannabis (F12)	y = 283.85 -22.73x	0.54	0.006	Descending
Cocaine (F14)	y = 344.15 + 36.48x	0.72	<0.001	Growing
Psychoactive substances (F19)	y = 478.82 + 19.17x	0.61	0.002	Growing

Source: Research data.

and behavioural disorders due to multiple drug use and use of psychoactive substances – F19, the average spending was BRL 478.82. The lowest average spending in the period was for mental and behavioural disorders due to use of cannabis – F12, totalling BRL 283.85

DISCUSSION

In Brazil, the optimised use of databases generated by the health services is encouraged for the creation of health-care policies and the planning and management of health services⁽¹³⁾. The hospital information system of the unified health system (“SIH/SUS”) has nationwide coverage and was created by the admissions authorisation service (“AIH”), which funds admissions at public and partnered private hospitals that hold agreements with the SUS. It is used as a primary source of information and completed during each admissions that is paid by the SUS. Therefore, even if the data do not fully cover all admissions (private patients and patients with health insurance are not included), coverage can reach 90% of all admissions in some places⁽¹⁴⁾.

During the study period, the cost of the AIH increased from BRL 30.30 in 2001 to around BRL 49.70 today, depending on the number of beds at the partnered hospitals, that is, the higher the number of beds at the specialized hospital, the lower the cost of the AIH⁽⁸⁾.

A study on DATASUS databases for a 10-year period shows that the number of psychiatric beds dropped 41% (3.2 to 5.4 per 10,000 inhabitants), while the number of beds in substitute services such as psychosocial care centres increased nine times (0.004 to 0.037 per 10,000 inhabitants)⁽¹⁵⁾.

The enactment of Law 10.216 in 2001, which defines hospitalisation as a last resort in the treatment of mental disorders and ensures patients the right to be treated preferentially in community-based services, resulted in a new model of care for people with mental and behavioural disorders in territorialised community services, a reduction of the 18,500 beds at psychiatric institutions between 2001

and 2009, and the deployment of hundreds of substitute services⁽⁶⁾, such as day-care centres.

Most of the public healthcare budget funds psychiatric admissions, but in the 1990s the budget was substantially reduces from 95.5% to 49.3% of total funding. Another part of the budget went to the substitute services, and funding for these services grew from 0.8% to 15%. Spending on exceptional psychiatric drugs grew from 0.1% to 15.5%, while other forms of mental healthcare it grew from 3.6% to 20.2%. However, in relation to total expenditure, spending on mental healthcare dropped 26.7%, from US\$ 2.66 to US\$ 1.95, per person⁽¹⁵⁾.

Information provided by the monitoring systems of the ministry of health on the evolution of federal spending of the mental health policy in 2002-2011 reveals that this amount is 2.31% of the total healthcare budget. However, when comparing the current information of 2011 with the previous year, the total expenditures dropped, which could be the result of provisional measure 498 of July 28, 2010, in which an additional budget of BRL 90 million were allotted to the ministry of health and BRL 35 million were allotted to the national drug department for healthcare actions related to fighting crack, cocaine, alcohol and other substance abuse⁽¹⁶⁾.

Between 2002 and 2006, the SUS spent approximately BRL 37 million on treatment for people with problems with alcohol and other drugs in outpatient hospital units, such as the psychosocial alcohol and drug treatment centres (“CAPSad”), and specialized mental health services. Another BRL 4,317,251.59 was spent on hospital admission procedures related to the use of alcohol and other drugs in the same period⁽¹³⁾. Since 2006, there was an inversion of expenditure in the psychosocial care network. The outpatient actions and services network surpassed spending on the hospital network. Of the BRL 969.31 million invested in mental health this year, BRL 44.1 million went to admissions and BRL 55.9 million to the substitute outpatient services. This trend was maintained until 2011⁽¹⁶⁾ due to reduced spending on drug-related admissions also in the municipality of Maringá, PR, from 2006.

In developed countries, like the United States of America, spending on mental health medication and admissions, which was the main health expense in 1986, also dropped drastically. As a result, spending on mental health and substance abuse in 2004 and 2005 decreased and continued to shrink in the following years. However, similar to Brazil and Maringá, PR, total expenditure on mental healthcare from investments in outpatient care grew from 17% in 1986 to 27% in 2002, and to 28% in 2005. Healthcare for substitute services can improve access to treatment for mental disorders and substance abuse, and can further alter spending patterns for outpatient care⁽¹⁷⁾.

A study that predicts spending on mental healthcare and substance abuse in the USA revealed that spending on mental disorders and substance abuse will not grow as fast and overall healthcare expenditure by 2020, and this result is associated with reduced spending on medication due to expired patents, low probability of innovative medication that enters the market, and, above all, the slack spending on hospital treatments⁽⁹⁾, as well as the expected for Maringá, PR and other Brazilian municipalities, where there is a growing network of outpatient services.

Despite the stable spending trend for admissions due to alcohol abuse in Maringá, PR, it should be noted that there are two billion consumers of alcoholic drinks worldwide, of which 76.3 million have been diagnosed with an alcohol-related disorder, and the morbidity and mortality rates for this population are considerable⁽¹⁸⁾. In addition to the association of alcohol consumption with more than 60 types of diseases and injuries⁽¹⁸⁾, car accidents linked to alcohol consumption rank high in the statistics and cause half of the accidents with fatalities⁽¹⁹⁾. They also incur high spending on admissions that may not have a diagnosis that is related to alcohol abuse.

With regard to drug-related hospital and outpatient treatment around the world, it was observed that people generally regard cannabis (marijuana) as a less harmful drug. The number of people seeking treatment of cannabis use in the last decade has increased, particularly in the Americas, Australia, and Europe. However, opiates are still the most widely used drugs among those who seek treatment in Asia and Europe, and cocaine is the most widely used drug among users who seek treatment in the Americas⁽⁴⁾, which justifies the upward trend in spending on admissions related to the consumption of cocaine and other psychoactive substances, also in Maringá, PR.

Substance abuse has become the leading public health problem and has challenged health workers to understand the profile of psychosocial substance users given the difficulties of managing and approaching the problem. In Brazil,

the regional differences of drug abuse are striking, and this includes differences in relation to type and amount of drugs, and the sex and age of users. Cocaine consumption is mostly centred in the southeast and south of Brazil, although it can be very common in some populations and virtually non-existent in others. Alcohol consumption seems to be evenly distributed in the different regions of Brazil⁽²⁰⁾.

Some limitations can influence the results of this study, such as the fact that the re-admissions or transfers of the same patient to other hospitals are not identified, which can cause cumulative counts. However, the study of hospital admissions can help establish the morbidity profile of the population. It should also be noted that no inflation adjustment calculation was used, and that the expenditure is presented in the Brazilian currency during the studied years.

■ CONCLUSION

In Brazil, the funding of psychiatric admissions has slowly decreased, while funding for substitute service, medication, and other mental health expenses has increased. It is important to highlight that the psychiatric reform is not a cost-cutting strategy, and that quality care can only be assured with constantly increasing investments.

Average spending for drug-related psychiatric admissions grew significantly in Maringá, PR during the study period, with a growing trend in admissions for crack/cocaine use. Whereas the public policies of Maringá-PR comply with the same ordinances and laws as the rest of the country to encourage and fund psychosocial care for user of crack and other drugs, these results were also found in other Brazilian cities with similar characteristics. Like Maringá, these cities may also require greater financial incentives for drug-related outpatient and hospital care.

Economic studies in Brazil are still scarce. Nationwide studies that address drug-related admission expenditure should therefore be conducted to support the deployment and implementation of the psychosocial care, outpatient and hospital network in accord with public spending on healthcare. The results presented in this paper may serve as a basis for planning, managing and assessing public policies of the SUS.

The proper use of economic and financial resources is currently a normative attribute for managers and workers of the SUS to reach the goals established by the organizational contract on public action ("COAP") in the three governmental spheres.

In Brazil, in recent decades, there has been increasing interest in expanding the use of secondary databases of the

health services to create health policies and plan and manage healthcare services. Within this context, it is important to analyse spending on hospital admissions to create information that can help determine the priorities of investments in healthcare and monitor the impact of implementing actions and programmes in the healthcare sector.

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