ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Hospitalizations for primary care-sensitive conditions in Pelotas, Brazil: 1998 to 2012

Hospitalizações por condições sensíveis à atenção primária em Pelotas: 1998 a 2012

Juvenal Soares Dias da Costa[I], Ana Maria Ferreira Borges Teixeira[I], Mauricio Moraes[I], Eliane Schneider Strauch[I], Denise Silva da Silveira[I], Maria Laura Vidal Carret[I], Everton Fantinel[I]

ABSTRACT: *Objective:* To verify the hospitalization trend for primary care sensitive-conditions in Pelotas, Rio Grande do Sul, Brazil from 1998 to 2012. *Methods:* An ecological study compared hospitalizations rates of the city of Pelotas with the rest of state of Rio Grande do Sul. Analysis was conducted using direct standardization of rates, coefficients were stratified by sex and the Poisson regression was used. *Results:* Hospitalizations for sensitive conditions decreased in Pelotas and Rio Grande do Sul. In Pelotas, a 63.8% decrease was detected in the period observed, and there was a 43.1% decrease in the state of Rio Grande do Sul. Poisson regression coefficients showed a decrease of 7% in Pelotas and of 4% in the rest of Rio Grande do Sul each year. *Conclusion:* During the study period, several changes were introduced in the Brazilian Unified Health System ("Sistema Único de Saúde") that may have influenced the results, including changes in administration, health funding, and a complete reworking of primary care through the creation of the Family Health Strategy program ("Estratégia Saúde da Família").

Keywords: Quality assessment in health care. Primary health care. Hospitalization Health services. Ecological studies. Health impact assessment.

[I]Department of Social Medicine, Medical School, *Universidade Federal de Pelotas* – Pelotas (RS), Brazil.
Corresponding author: Juvenal Soares Dias da Costa – Avenida Duque de Caxias, 250, Fragata, CEP: 96030-000, Pelotas, RS, Brasil. E-mail: episoares@terra.com.br

RESUMO: *Objetivo:* Verificar a tendência das taxas de internações por condições sensíveis à atenção primária no município de Pelotas, Rio Grande do Sul, de 1998 a 2012. *Métodos:* Foi realizado estudo ecológico comparando as taxas de Pelotas com as do restante do estado do Rio Grande do Sul. Na análise, fez-se padronização direta das taxas, os coeficientes foram estratificados por sexo e utilizou-se regressão de Poisson. *Resultados:* As internações por condições sensíveis diminuíram em Pelotas e no Rio Grande do Sul. Em Pelotas a redução das taxas no período foi de 63,8%, e no restante do Rio Grande do Sul, de 43,1%. Os coeficientes da regressão de Poisson mostraram diminuição de 7% no município de Pelotas e de 4% nas outras partes do Rio Grande do Sul por ano. *Conclusão:* Durante o período estudado, diversas alterações foram introduzidas no Sistema Único de Saúde (SUS), as quais podem ter contribuído para os resultados encontrados, como modificações na modalidade de gestão, nas formas de financiamento em saúde e na reestruturação da atenção primária mediante a consolidação da Estratégia Saúde da Família.

Palavras-chave: Garantia da qualidade dos cuidados de saúde. Atenção primária à saúde. Hospitalização. Serviços de saúde. Estudos ecológicos. Avaliação do impacto na saúde.

INTRODUCTION

The creation of the Unified Health System (*Sistema Único de Saúde* – SUS) in Brazil has expanded the availability of health care services[1]. The public health system has expanded primarily through the creation of Primary Health Care Service (*Atenção Primária à Saúde* – APS) units, located closer to the population and with lower costs[2]. Despite the undeniable progress achieved since the creation of SUS, health services still present problems related to quality and effectiveness[3]. Since its creation, SUS underwent several modifications such as changes in its organizational structure, funding, primary care models, and the implementation of assorted measures, increasing the need for adequate programs and health actions evaluation[4].

An alternative to primary care evaluation is monitoring the hospitalization rates for primary care-sensitive conditions (HPCSC). Primary care-sensitive conditions are a set of 20 groups of diseases for which treatment at the right time could reduce or eliminate the risk of hospitalization, both by preventing their emergence and by adequately handling the condition[5]. Thus, proper coverage at the primary care level can decrease admission rates as services become more effective. A health care system that could adequately handle diseases prone to ambulatory control would present an appropriate effectiveness level[6,7]. In the same way, studies have shown that primary health care provision can be crucial for improving health condition in the population[8,9].

The Brazilian Ministry of Health (*Ministério da Saúde*) has published a list of primary care-sensitive diseases in Decree n. 221 of April 17, 2008, in which it is proposed that such indicator would evaluate the effectiveness level of the system and/or of hospital care[10], thus acknowledging its importance. Based on this list, several inquiries have analyzed the behavior of HPCSC. An ecological study showed that HPCSC decreased by 24% between 1999 and 2007 in Brazil. Such decrease was also observed when comparing this group of

diseases with hospitalization rates for other reasons[11]. Another research study shows an annual decline of 5% in HPCSC in Brazil between 1999 and 2007, and also demonstrated that the highest rates were observed in private hospitals[12]. In Belo Horizonte, Minas Gerais, trend analysis from 2003 to 2006 indicates a decrease in HPCSC, attributing its cause to the implementation of the Estratégia Saúde da Família program[13].

A 2005 study in Pelotas, Rio Grande do Sul analyzed hospitalization rates for primary care-sensitive conditions[14]. That study observed a decrease in hospital admission rates during the period examined (1995 to 2004), further indicating that the numbers achieved by the city were smaller than those found for the state of Rio Grande do Sul, suggesting a trend towards primary care qualification. However, it did not include all the diseases listed in the aforementioned Ministry of Health decree, as it took place before its release. Furthermore, it included individuals aged from 20 to 59 years, in accordance with international criteria[15].

With the release of the official list by the Ministry of Health, conducting this study presented itself as a good opportunity to monitor the performance of the local health system.

The intention of this article was to analyze the admissions trend for primary care-sensitive conditions in the city of Pelotas and compare it with the rest of the state from 1998 to 2012.

METHODS

With a population of 341,180 people, Pelotas boasts 54 Basic Health Units (*"Unidades Básicas de Saúde"* – UBS), located in urban and rural areas, as well as six hospitals, two of which are university hospitals hosting medical schools.

An ecological study monitored the trend of HPCSC in Pelotas from 1998 to 2012. City rates were compared to those of the rest of the state of Rio Grande do Sul.

Secondary data on the number of admissions according to residence, sex, age, and chapter of the International Classification of Diseases (ICD-10) for Pelotas and other regions in the state of Rio Grande do Sul were collected from the SUS Hospital Information System (*Sistema de Informações Hospitalares*) website (www.datasus.gov.br).

Hospitalizations due to primary care-sensitive conditions as defined by the Ministry of Health list[10] were included in the study.

Census data and demographic estimates according to age and sex were also available at the Hospital Information System website.

Gross HPCSC rates were calculated according to the following formula: [(number of HPCSC per year/resident population per year) × 100,000 inhabitants]. Initially, the main causes of HPCSC were analyzed for each different age group (under 1 year of age; from 1 to 4; 5 to 19; 20 to 49; and 50 or more years).

Subsequently, the analysis was stratified by sex, as there is evidence that female admissions numbers were higher than male ones[14,16]. To remove the influence of the differences on account of age, a direct standardization of the rates was performed, using the population of the state of Rio Grande do Sul in 2000 as reference[17].

HPCSC rates were analyzed through a Poisson regression using Stata software version 9.0. The Poisson regression coefficient showed a variation in rates throughout the period in question.

This research project was approved by the Research Ethics Committee at the Universidade Federal de Pelotas.

RESULTS

Between 1998 and 2012, 246,787 hospitalizations (excluding births) were observed among residents of Pelotas. Of these hospitalizations, 42,284 (17.3%) were classified as HPCSC. The following were the main causes of such admissions: pneumonia; asthma; bronchitis, emphysema and other lung diseases; acute nasopharyngitis/*influenza*, flu; and other skin and subcutaneous tissue conditions.

The age distribution shows that children under one year of age presented the highest rates of HPCSC. High rates were also observed in children between 1 and 4 years of age and in people aged 50 years or older. Between 1998 and 2012, the distribution showed a decrease of HPCSC in all age groups, except that of children under 1(Figure 1).

Pneumonia and asthma were the main causes of hospitalizations until the age of 19; for individuals between 20 and 49 years of age, pneumonia, diabetes *mellitus* and transient ischemic attacks (TIA) were the leading causes, while in individuals aged 50 years or older heart failure, bronchitis, emphysema and other lung diseases were the most relevant causes.
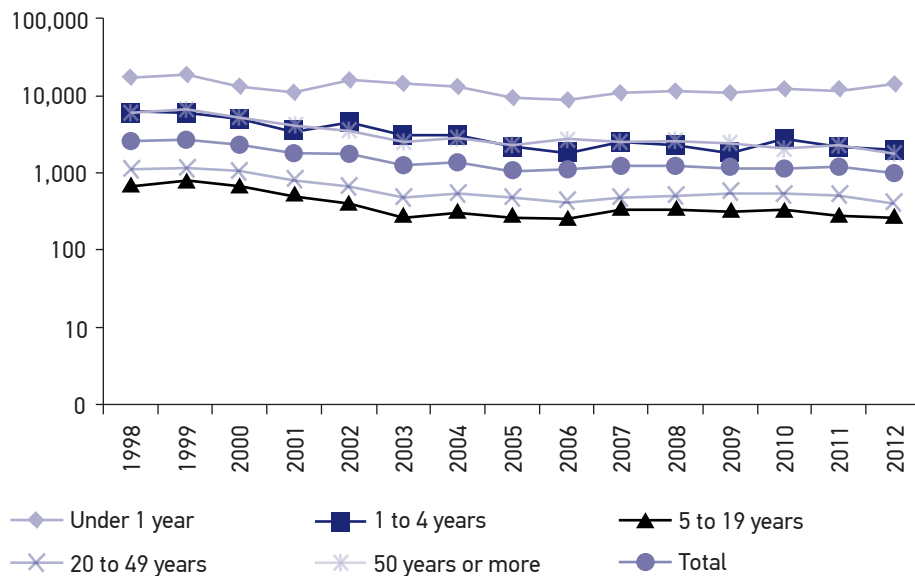

Figure 1. Gross rates of hospitalizations for primary care-sensitive conditions per age group. Pelotas, RS, 1998–2012.

Chart distribution showed that rates of HPCSC in Pelotas were lower than those observed in the rest of the state of Rio Grande do Sul. In all the years analyzed, male admission rates were superior to female ones, both in Pelotas and the state of Rio Grande do Sul (Figure 2). In Pelotas, the highest rate of HPCSC was verified in 1999 (2,695.2 per each 100,000 inhabitants). Admissions then declined until 2005, remaining stable until 2012, when its lowest value was registered (974.9 per 100,000 inhabitants), corresponding to a decrease of 63.8% in the period. At state-level, the rates of HPCSC declined as years progressed. The highest value was in 1998 (3,180.4 per 100,000 inhabitants), and there was a decrease until 2011 (1,803.3 per 100,000 inhabitants) and 2012 (1,809.4 per 100,000 inhabitants), with a total decline of 43.1%.
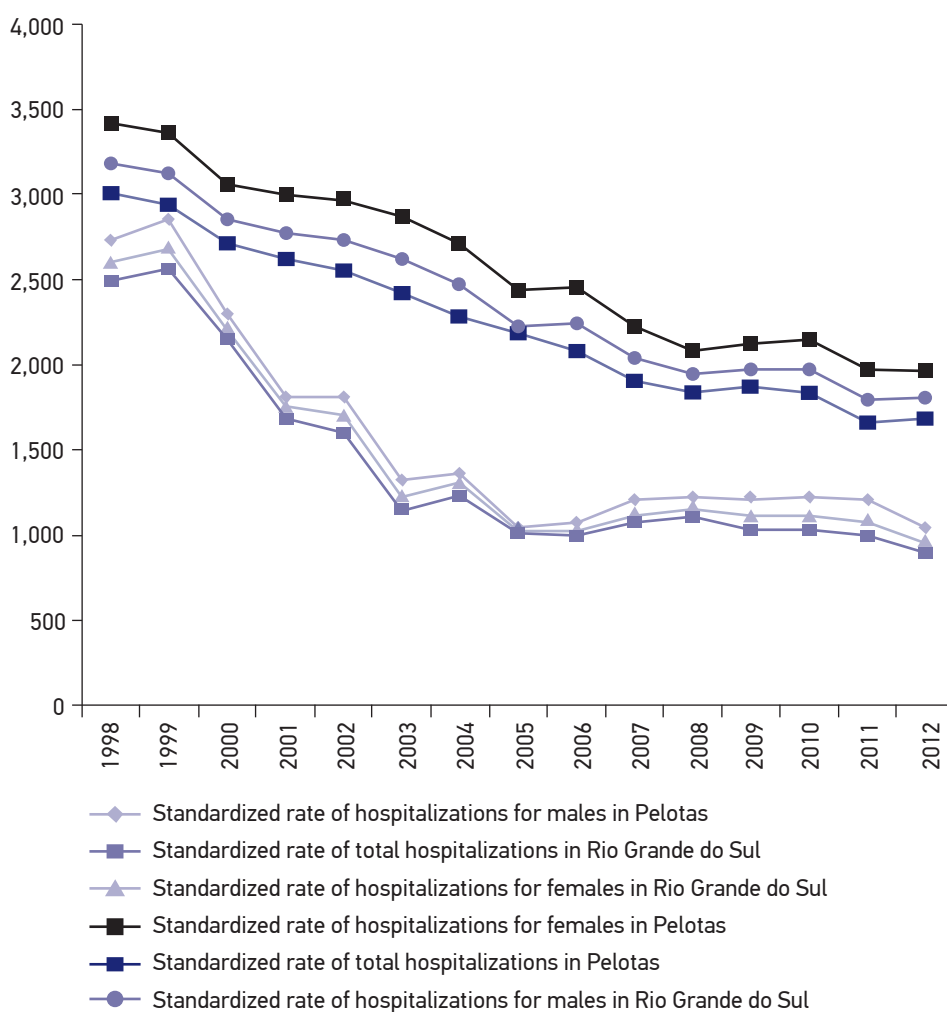

Figure 2. Standardized rates of hospitalizations for primary care sensitive conditions divided by sex. Pelotas, RS, and Rio Grande do Sul state, 1998-2012.

The Poisson regression coefficients showed a reduction in all strata analyzed. The results indicated a reduction of 7% in the city of Pelotas and 4% in the state of Rio Grande do Sul per year examined (Table 1).

DISCUSSION

Chart analysis revealed a significant decrease in HPCSC in Pelotas between 1998 and 2005. After that, the rate of decrease diminished. In Rio Grande do Sul, the reduction of HPCSC was constant throughout the length of time examined. Poisson regression analysis showed an even sharper drop in HPCSC, reflecting an improvement in primary care levels. The rates observed in the state of Rio Grande do Sul were always higher than those of Pelotas. Notably, the lowest rates the state saw in 2012 were still higher than the numbers achieved in Pelotas roughly a decade earlier in 2002 and 2003. For comparison purposes, an ecological study analyzing the trend in HPCSC in Brazil between 1998 and 2009 showed a reduction of rates in all states during the entire time frame. However, the average hospitalization rate was 157.6 for each 10,000 males but 165.1 per 10,000 females, i.e., values lower than those observed in Pelotas in 2012[19]. Nonetheless, admission rates in Pelotas were still lower than those found in the states of Campo Grande, Mato Grosso do Sul[20], and in the Federal District[21].

Analysis by age and causes of admission shows that HPCSC were higher among those under 1 year and points to a decline in other age groups. Respiratory system diseases, represented by pneumonia and asthma, were revealed as the main causes among individuals up to 19 years. In the adult age bracket, conditions such as diabetes *mellitus* and transient ischemic attacks lead the list, while cardiac insufficiency, bronchitis and emphysema are the

Table 1. Poisson regression coefficients with their respective 95% confidence intervals and statistical tests of standardized hospitalizations rates for primary care-sensitive conditions divided by sex, 1998-2012, Pelotas, RS, and Rio Grande do Sul.

	Poisson regression coefficient	Confidence Interval	p-value
Pelotas			
HPCSC Men	0.93	0.91 - 0.95	< 0.001
HPCSC Women	0.92	0.91 - 0.94	< 0.001
HPCSC both sexes	0.93	0.91 - 0.94	< 0.001
Rio Grande do Sul			
HPCSC Men	0.93	0.91 - 0.94	< 0.001
HPCSC Women	0.96	0.95 - 0.96	< 0.001
HPCSC both sexes	0.96	0.95 - 0.96	< 0.001

HPCSC: Hospitalization for primary care-sensitive conditions.

predominant factors of admission for the elderly. The most relevant causes were also found in other studies that also explored the HPCSC[19,22].

During the study period, new vaccines were introduced in the national calendar, most notably, *influenza* for the elderly (1999), human rotavirus (2006), 10-valent pneumococcal (2010), meningococcal C conjugate (2010) and antimony-vaccine for adsorbed diphtheria, tetanus, pertussis, hepatitis B (recombinant) and B-type *Haemophilus influenzae* conjugate (2012)[23]. Furthermore, from the 2000s onward the distribution and availability of anti-hypertensive drugs increased due to the *Hiperdia* program. Subsequently, the same happened with bronchodilators and the Farmácia Popular was implemented in Pelotas. Nonetheless, it should be noted that public health measures do not always have immediate results owing to the complex mechanisms involved in provision, usage, coverage and impact[24] of services.

Over the course of 15 years, other changes were made within SUS that may have influenced rates of HPCSC. Additionally, during this period changes took place in the organizational structure of SUS, in the public health funding mechanisms, and in the restructuring of primary care through the consolidation of the Estratégia Saúde da Família program, all factors that may have contributed to the reduction in hospital admissions.

The SUS organizational structure has undergone numerous changes since its creation. During the 1990s, new organizational arrangements were proposed for states and cities as an attempt to improve the local health systems. The increased complexity of the city-level attributions regarding public health may have aided in the improvement of primary care. However, in the state of Rio Grande do Sul, organizational structure changes aimed at increasing local responsibility and the consequent increase in the complexity of the municipal local health systems has been rather dim. In 2004, only 14 cities in Rio Grande do Sul, Pelotas among them, had taken full control of the local health care system. At the state-level, the percentage of cities adopting the rules delineated by the health pact (”*pacto pela saúde*”) was less than 50%[25] in 2010.

Public health funding in Brazil has been considered a crucial matter in determining the consolidation of the SUS[3]. Notwithstanding the difficulties and uncertainties caused by the delay in enacting Constitutional Amendment no. 29 (regulated by Complementary Law no. 141 in early 2012), public spending in health increased in both Pelotas and the rest of the state of Rio Grande do Sul.

Data from the Information System on Public Budget in Health (Sistema de Informações sobre Orçamentos Públicos em Saúde - SIOPS) show that total direct government spending in Pelotas reached BRL 28,861,226.79 in 2010, rising to BRL 152,338,087.13 in 2012, for a total growth of 81% in that timeframe. In Rio Grande do Sul, the same data also shows that spending reached BRL 1,015,284,831.13 in 2000 and BRL 5,620,237,261.85 in 2012, for a growth of 81.9%.

Studies on public health funding in Brazil have indicated such growth in spending is mainly due to the expansion of the Estratégia Saúde da Família program[26]. Nevertheless, it is still clear that spending on clinics and hospitals remains higher than on primary care,

even though the latter is defined as a priority[1,26,27]. The previous study conducted in Pelotas using a shorter list of primary care-sensitive conditions showed that spending on HPCSC represented 4.8% and 14.6% of hospitalization costs in the city[14]. More recently, Ferreira et al.[28] showed that spending on HPCSC accounted for 17% of all hospitalizations in São José do Rio Preto, São Paulo.

It should be emphasized that the state of Rio Grande do Sul traditionally and notoriously did not fulfill the minimum percentage of 12% of their own revenue in public health[29]. As such, it can be argued that reducing HPCSC is not only a strategic measure given the lack of resources available, but it can also help the health system save money as well as allow for reinvestment in priority sectors[14,28].

The website for the Ministry of Health Office for Primary Care (dab.saude.gov.br) provides the deployment history for the Estratégia Saúde da Família program. In the state of Rio Grande do Sul, 25.5% of the population was estimated to be covered by its services in 2004, a number that rose to 40.3% in 2012, showing an increase of 36.5% between the two years. In Pelotas, this program was implemented in 2002 (15.9%) and reached the estimated coverage of 35.7% in that same year, exhibiting an increase of 35.2%. Although the *Estratégia Saúde da Família* (in English Family Health Strategy) program grew over 30% both in the city and the state, their coverage was insufficient and did not reach 50% of the population. Other studies have shown a reduction in HPCSC with the deployment of the *Estratégia Saúde da Família* program, but with accompanying coverage percentages considerably higher than the ones found in the present study[13,30]. In Belo Horizonte, Minas Gerais, a coverage of 75.5% by the program led to a significant decrease in HPCSC in four years of study[13]. In Montes Claros, Minas Gerais, which has a program coverage of approximately 50%, health care performed outside of the program or admissions requested by physicians working outside the program were both factors that more than doubled the probability of HPCSC[30].

Among the limitations of this study, it is known that ecological studies possess several weaknesses in regards to producing evidence for phenomena as it is impossible to individualize the conclusions found in the analysis, which may lead to the well-known ecological fallacy[31]. However, several ecological studies have been performed and considered adequate for analyzing the trends in hospital admissions due to primary care-sensitive conditions[12,13]. Another possible limitation related to this study refers to the use of secondary data. Although the DATASUS does not allow one to single out hospital readmissions and offers only the primary diagnosis for each admission, there is nonetheless evidence that considers the system as valid and useful for providing health-related information[32].

The analysis was considered adequate. Through the use of the direct standardization method, we eliminated the possibility of interference in the results stemming from differing demographic distributions or from age-related or sex-related differences, as it aided in adjusting for potential confounding factors[17]. The Poisson regression was also adequately used since each hospital admission due to primary care-sensitive conditions was counted independently[33].

CONCLUSION

The present study showed a reduction in HPCSC especially until 2005 in both the state of Rio Grande do Sul as well as in the city of Pelotas, agreeing with the various changes in organizational structure, funding and the implementation of measures that improved assistance.

Ecological studies through secondary data are fast, inexpensive and are able to provide relevant information for the organization of health systems. In Pelotas there are no formal regionalization mechanisms for organizing the flow of patients at the primary care level and on other levels of the system. If territories were organized in the same manner as in e.g. Belo Horizonte[13], district-level analyses would be possible, allowing for more accurate information related to HPCSC. This study confirmed that analyzing the rate of hospital admissions due to primary care-sensitive conditions can be a valuable management tool that should be supported by observational studies incorporating other individual factors that determine the number of hospitalizations.

REFERENCES

1. Paim JA, Travassos CMR, Almeida CM, Bahia L, Macinko J. The Brazilian health system: history, advances, and challenges. The Lancet 2011; 377(9779): 1778-97. DOI: http://dx.doi.org/10.1016/S0140-6736(11)60054-8

2. Mendes ACG, Sá DA, Miranda GMD, Lyra TM, Tavares RAW. Assistência pública de saúde no contexto da transição demográfica brasileira: exigências atuais e futuras. Cad Saúde Pública 2012; 28(5): 955-64. DOI: http://dx.doi.org/10.1590/S0102-311X2012000500014

3. Paim JS. A Constituição Cidadã e os 25 anos do Sistema Único de Saúde (SUS). Cad Saúde Pública 2013; 29(10): 1927-53. DOI: http://dx.doi.org/10.1590/0102-311X00099513

4. Hartz ZMA, Felisberto E, Silva LMV. Meta-avaliação da atenção básica à saúde: teoria e prática. Rio de Janeiro: Fiocruz; 2008.

5. Shi L, Samuels M, Pease M, Bailey WP, Corley EH. Patient characteristics associated with hospitalizations for ambulatory care sensitive conditions in South Carolina. South Med J 1999; 92(10): 989-98.

6. Caminal J, Starfield B, Sánchez E, Casanova C, Morales M. The role of primary care in preventing ambulatory care sensitive conditions. Eur J Public Health 2004; 14(3): 246-51.

7. Saha S, Solotaroff R, Oster A, Bindman AB. Are preventable hospitalizations sensitive to changes in access to primary care? The case of the Oregon Health Plan. Med Care 2007; 45(8): 712-9. DOI: 10.1097/MLR.0b013e318053717c

8. Marmot M. Health in an unequal world. The Lancet 2006; 368(9552): 2081-94. DOI: http://dx.doi.org/10.1016/S0140-6736(06)69746-8

9. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Q 2005; 83(3): 457-502. DOI: 10.1111/j.1468-0009.2005.00409.x

10. Alfradique ME, Bonolo PF, Dourado I, Lima-Costa MF, Macinko J, Mendonça CS, et al. Internações por condições sensíveis a atenção primária: a construção da lista brasileira como ferramenta para medir o desempenho do sistema de saúde (Projeto ICSAP-Brasil). Cad Saúde Pública 2009; 25(6): 1337-49. DOI: http://dx.doi.org/10.1590/S0102-311X2009000600016

11. Dourado I, Oliveira VB, Aquino R, Bonolo P, Lima-Costa MF, Medina MG, et al. Trends in primary health care-sensitive conditions in Brazil: the role of the Family Health Program (Project ICSAP-Brasil). Med Care 2011; 49(6): 577-84. DOI: 10.1097/MLR.0b013e31820fc39f

12. Macinko J, Oliveira VB, Turci MA, Guanais FC, Bonolo P, Lima-Costa MF. The influence of primary care and hospital supply on ambulatory care-sensitive hospitalizations among adults in Brazil, 1999-2007. Am J Public Health 2011; 101(10): 1963-70. DOI: 10.2105/AJPH.2010.198887

13. Mendonça CS, Harzheim E, Duncan BB, Nunes LN, Leyh W. Trends in hospitalizations for primary care sensitive conditions following the implementation of Family Health Teams in Belo Horizonte, Brazil. Health Policy Plan 2012; 27(4): 348-55. DOI: 10.1093/heapol/czr043

14. Dias da Costa JS, Borba LG, Pinho MN, Chatkin M. Qualidade da atenção básica mediante internações evitáveis no Sul do Brasil. Cad Saúde Pública 2008; 24(7): 1699-707. DOI: http://dx.doi.org/10.1590/S0102-311X2008000700024

15. Weissman JS, Gatsonis C, Epstein AM. Rates of avoidable hospitalizations by insurance status in Massachusetts and Maryland. JAMA 1992; 268(17): 2388-94.

16. Nedel FB, Facchini LA, Martín-Mateo M, Vieira LAS, Thumé E. Programa Saúde da Família e condições sensíveis à atenção primária, Bagé (RS). Rev Saúde Pública 2008; 42(6): 1041-52. DOI: http://dx.doi.org/10.1590/S0034-89102008000600010

17. Schneider D, Lilienfeld DE. Foundations of epidemiology. New York: Oxford University Press; 1994.

18. Rosenberg D. Trend analysis and interpretation. Key concepts and methods for maternal and child health professionals. Maryland: Division of Science, Education and Analysis Maternal and Child Health Information Resource Center; 1997.

19. Boing AF, Vicenzi RB, Magajewski F, Boing AC, Moretti-Pires RO, Peres KG, et al. Redução das internações por condições sensíveis à atenção primária no Brasil entre 1998-2009. Rev Saúde Publica 2012; 46(2): 359-66. DOI: http://dx.doi.org/10.1590/S0034-89102012005000011

20. Campos AZ, Theme-Filha MM. Internações por condições sensíveis à atenção primária em Campo Grande, Mato Grosso do Sul, Brasil, 2000 a 2009. Cad Saúde Pública 2012; 28(5): 845-55. DOI: http://dx.doi.org/10.1590/S0102-311X2012000500004

21. Junqueira RMP, Duarte EC. Internações hospitalares por causas sensíveis à atenção primária no Distrito Federal, 2008. Rev Saúde Pública 2012; 46(5): 761-8. DOI: http://dx.doi.org/10.1590/S0034-89102012000500001

22. Elias E, Magajewski F. A atenção primária à saúde no sul de Santa Catarina: uma análise das internações por condições sensíveis à atenção ambulatorial, no período de 1999 a 2004. Rev Bras Epidemiol 2008; 11(4): 633-47. DOI: http://dx.doi.org/10.1590/S1415-790X2008000400011

23. Silva Júnior JB. 40 anos do Programa Nacional de Imunizações: uma conquista da Saúde Pública brasileira. Epidemiol Serv Saúde 2013; 22(1): 7-8. DOI: http://dx.doi.org/10.5123/S1679-49742013000100001

24. Habicht JP, Victora CG, Vaughan JP. Evaluation designs for adequacy, plausibility and probability of public health programme performance and impact. Int J Epidemiol 1999; 28(1): 10-8.

25. Lima LD, Queiroz LFN, Machado CV, Viana ALA. Descentralização e regionalização: dinâmica e condicionantes da implantação do Pacto pela Saúde no Brasil. Ciênc Saúde Coletiva 2012; 17(7): 1903-14. DOI: http://dx.doi.org/10.1590/S1413-81232012000700030

26. Solla JJSP, Reis AAC, Soter APM, Fernandes AS, Palma JJL. Mudanças recentes no financiamento federal do Sistema Único de Saúde: atenção básica à saúde. Rev Bras Saúde Mater Infant 2007; 7(4): 495-502. DOI: http://dx.doi.org/10.1590/S1519-38292007000400018

27. Castro ALB, Machado CV. A política de atenção primária à saúde no Brasil: notas sobre a regulação e o financiamento federal. Cad Saúde Pública 2010; 26(4): 693-705. DOI: http://dx.doi.org/10.1590/S0102-311X2010000400012

28. Ferreira JBB, Borges MJG, Santos LL, Forster AC. Internações por condições sensíveis à atenção primária à saúde em uma região de saúde paulista, 2008 a 2010. Epidemiol Serv Saúde 2014; 23(1): 45-56. DOI: http://dx.doi.org/10.5123/S1679-49742014000100005

29. Moreira MA. Impactos da crise financeira do Rio Grande do Sul sobre o investimento em saúde pública nos anos 2000. Porto Alegre: Secretaria do Planejamento, Gestão e Participação Cidadã; Fundação de Economia e Estatística; 2014.

30. Fernandes VBL, Caldeira AP, Faria AA, Rodrigues Neto JF. Internações sensíveis na atenção primária como indicador de avaliação da Estratégia Saúde da Família. Rev Saúde Pública 2009; 43(6): 928-36. DOI: http://dx.doi.org/10.1590/S0034-89102009005000080

31. Lima-Costa MF, Barreto SM. Tipos de estudos epidemiológicos: conceitos básicos e aplicações na área do envelhecimento. Epidemiol Serv Saúde 2003; 12(4): 189-201. DOI: http://dx.doi.org/10.5123/S1679-49742003000400003

32. Lima CRA, Schramm JMA, Coeli CM, Silva MEM. Revisão das dimensões de qualidade dos dados e métodos aplicados na avaliação dos sistemas de informação em saúde. Cad Saúde Pública 2009; 25(10): 2095-109.

33. Wooldridge JM. Introductory econometrics: a modern approach. 4ª ed. Canada: South Western Cengage Learning; 2009.