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Factors associated to inappropriate use of emergency services

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Abstract *The increase in the demand for Emergency Services is a worldwide phenomenon, and its inappropriate use is one of the main problems. Factors related to the inappropriate use must be investigated to guide improvement in the quality of services. This article aims at analyzing factors associated with the inappropriate use of emergency services. This is a cross-sectional study with secondary data from 384 medical records from two emergency services in a city in central-southern region of the state of Paraná, Brazil, in 2013. A descriptive, bivariate using Pearson's chi-squared test was performed to verify associations between inappropriate use and independent variables. Multiple Logistic Regression was also performed. The proportion of inappropriate use of Emergency Services was 73.4% and was associated with people with some primary health care sensitive conditions, residents in areas without primary care coverage, people between 0 and 11 years old, and 12 to 17 years old, care in the first trimester of the year, respiratory diseases, lesions and poisonings and diseases of the musculoskeletal system. Primary care must be strengthened to reduce the inappropriate use of care, especially in the attention to primary health care sensitive conditions and to increase the socio-organizational accessibility.*

Key words *Emergency medical services, Primary health care, Health evaluation*

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Introduction

The increase in the search for emergency services (ES) can be considered a global phenomenon. The assistance provided by emergency services to users with non-urgent clinical conditions[1-5] characterizes the inappropriate use of urgency/emergency services.

Urgency/emergency services aim to perform procedures to immediately stabilize specific clinical conditions, but not in a continuous manner[6]. However, people often seek ES for immediate attention, regardless of whether it is an acute or aggravated chronic situation, which causes problems in the provision of this type of service[6]. Evidence shows that the inappropriate use of ES ranges from 24% to 40%, with peaks of up to 90% of all assistance provided[2,4,6].

In countries such as the United States, Canada, the United Kingdom and Australia, the demand for emergency services has increased by 3 to 6% per year[7]. Its consequence is the overcrowding of services and a longer waiting time[7,8], increased costs for the health system[2], dissatisfaction of users[8] and precarious care for urgent cases[4,8].

In Brazil, the scarcity of studies on the inappropriate use in emergency services due to the lack of information on the use of hospital emergency services and Emergency Care Units (ECUs) affects the organization and functioning of the network of emergency and urgency services, consequently affecting the results of the care provided. The analysis of the reasons that lead users to seek for ES is important to identify the problems in this network.

The ECU, which counts with 24-hour services, must primarily: welcome users and family members in urgency and emergency situations, whenever they seek assistance; articulate with other services of care assistance and with diagnostic and therapeutic support services; provide efficient and qualified assistance to users affected by either acute conditions of a clinical, surgical and trauma nature; provide diagnostic and therapeutic support and refer to other services when necessary[9]. Since it is a structure of intermediate complexity involving both the PHC and the hospital services, the observation the use of emergency services can subsidize the improvement of care flows.

The population can choose urgency and emergency services due to several reasons, which are related to a greater socio-organizational accessibility (opening hours, waiting time and availability of professionals, especially the physician) when compared with Primary Health Care (PHC), lack of confidence in PHC; perception of emergency-based services as needed; opinions of family/friends/health professionals; proximity to the ECU; agility in referral to specialists and exams, difficulty in scheduling appointments in PHC, convenience for the user or lack of knowledge about the flow of care in different levels of health care[7,10,11], problems in structuring the assistance network, in the coordination and integrality of the health care[12].

Moreover, this analysis can be done by means of health indicators, such as the Primary Care Sensitive Conditions (PCSC), which are commonly used as an indicator of hospital care and characterized by a group of causes and diagnoses that can be managed in the PHC[13] in a timely manner, without the need for assistance in emergency care units, except in acute situations, which are characterized as urgency and emergency.

Although the use of ES may seem appropriate from the patient's point of view, given the limitations that exist at other levels of health care, this type of use increases the demand for services that could be better managed at other levels and divides attention with real emergency cases[6]. Therefore, our study aims to analyze factors associated with inappropriate use of emergency services.

Material and methods

This cross-sectional study used data from medical records of patients seen at two ECU in a municipality in the center-south of Paraná, from January 1 to December 31, 2013.

The urgency and emergency services of the municipality are linked to the Urgency and Emergency Network of the region, offer 24-hour service, uninterrupted, for users of all ages, and use the reception with triage according to the severity. In 2013, 173,462 assistances were recorded.

The sample was estimated randomly using the probability technique; considering a 95% level of significance, a 5% error and a sample of at least 384 records were determined. The study population corresponded to the users assisted in the two ECUs in the city. The sample was stratified proportionally to the number of assistances between January and December 2013. To complete the sampling and randomization process, for each month, the internal selection to the strata followed simple random sampling.

Data collection from medical records occurred in May and June 2014. After the sample selection, 18 medical records were excluded because they corresponded to the same user. In this case, only the medical records for the first assistance provided for this user in the year were included. Thirteen medical records were excluded due to incomplete data. Thus, a new random sampling was performed to include 31 medical records and complete the sample of 384 records.

The assistances provided by the emergency services were categorized into two groups: appropriate or inappropriate. To classify an emergency service as appropriate, at least one of the following four criteria should be considered, based on a systematic review on the topic[6]: a) Presence of a complaint of urgency/emergency, in which the user demanded immediate attention, with risk of death or functional injuries, according to the professional service report (medical and nursing) (the Manchester Triage System helped in the definition of the case, with red, orange or yellow risk being considered as appropriate use); b) Vital signs outside normal thresholds and related to the main complaint, according to the age group; c) Professional conduct adopted related to the main complaint (observation for more than 12 hours or hospitalization); and d) Need for immediate diagnostic tests or special treatment (for example, intravenous medication, O_2). If the assistances provided did not meet at least one of the criteria described above, it was classified as inappropriate.

Medical records were analyzed independently by two researchers, with subsequent discussion of each medical record. In case of disagreements regarding the classification of appropriate use or not, experts in the field (specialists in urgency and emergency care) were consulted to reassess the medical record and define the final classification.

The following variables were collected from the medical records: gender, date, time and day of the week of assistance, age group, existence of a PHC unit of reference for the user, diagnosis of assistance in the ES (according to the Tenth Revision of the International Classification of Diseases and Health-Related Problems - ICD-10), between May and June 2014. The information was inserted in the Microsoft Office Excel® 2013 for Windows® Program.

The Brazilian List of Primary Care Sensitive Conditions[13] was consulted to classify the diagnosis described in each medical record as being or not a CSAP and characterize this variable. By analyzing the date, time and day of the week of the service, the PHC could be categorize as open or closed, considering that the PHC units operated from Monday to Friday, except holidays, from 8:00 am to 12:00 and from 1:00 pm to 5:00 pm in the municipality surveyed. Regarding the PHC coverage, the city coverage map was requested from the Municipal Health Department, and it was determined if the user belonged to the covered area or not based on the user's place of residence.

The variables were described with frequencies and percentages. The association between inappropriate use of services in the ECU according to independent variables was assessed using the Chi-square test. Multivariate analysis was performed by logistic regression models using the stepwise forward model, which estimated the Odds Ratio (OR) and respective confidence intervals (CI). Variables with $p<0,20$ were included in the model in the bivariate analysis. The variables that remained significant ($p<0,05$) or that fitted the model were maintained in the final model. The adequacy of the final models was verified using the deviance and Hosmer-Lemeshow tests, the collinearity of the variables was tested with the variance inflation factor (VIF) and the statistical analyses performed with the Stata software version 12.

The research was approved by the Research Ethics Committee of the State University of the Midwest.

Results

In 2013, 173,462 assistances were provided at the two emergency care units in the investigated municipality, with an average of 475 assistances/day. Of the 384 assistances included in the study, the proportion of inappropriate use of ES was 73,4% (Table 1).

Regarding the characterization of the assistances, they were mostly provided from Monday to Friday (74,2%), when the Health Centers (HC) were closed (62,8%), and for people living in areas covered by PHC (87%). The predominant age from 18 to 39 years old (30,5%). Among the conditions, 51% were CSPC, and according to the chapters of ICD-10, the main diseases were: diseases of the respiratory system (22,4%), symptoms, signs and abnormal findings of clinical and laboratory tests, not classified in another part (20,8%) and injuries, poisonings and some other consequences of external causes (10,2%) (Table 1).

Table 1. Characterization of assistance in Emergency Care Units. Guarapuava. state of Paraná. Brazil. 2013 (n=384).

Characteristics	n	%
Inappropriate use of ES[a]		
Yes	282	73,4
No	102	26,6
PCSC[b]		
Yes	196	51,0
No	188	49,0
Area not covered by PHC[c]		
Yes	50	13,0
No	334	87,0
Period		
1st quarter	95	24,7
2nd quarter	93	24,2
3rd quarter	97	25,3
4th quarter	99	25,8
Opening hours		
8:00 am to 4:59 pm	196	51,0
5:00 pm to 07:59 am	188	49,0
Day of service provision		
Business days	285	74,2
Weekend	99	25,8
HCd open		
Yes	143	37,2
No	241	62,8
Age		
0 to 11 years	73	19,0
12 to 17 years	34	8,9
18 to 39 years	117	30,5
40 to 59 years	96	25,0
60 years and over	64	16,7
Main diagnosis[e]		
Diseases of the respiratory system	86	22,4
Ill-defined causes	80	20,8
Injuries and poisonings	39	10,2
Diseases of the musculoskeletal system	31	8,1
Factors that influence health status	24	6,3
Diseases of the circulatory system	23	6,0
Infectious and parasitic diseases	20	5,2
Mental and behavioral disorders	15	3,9
Nervous system disorders	13	3,4
Diseases of the digestive system	13	3,4
Diseases of the genitourinary system	13	3,4
Diseases of the skin and subcutaneous tissue	6	1,6
External Causes	6	1,6
Diseases of the ear and mastoid process	4	1,0
Other chapters of ICD-10	11	2,9

Notes: [a]Emergency Service. [b]Primary Care Sensitive Conditions. [c]Primary Health Care. [d]Health Center. [e]Chapters of ICD-10.

Source: Survey data.

The bivariate analysis showed that PCSC (p<0,001), area not covered by the PHC (p=0,009), 1st quarter of the year (p=0,013), age range from 0 to 11 years (p=0,006) and age from 12 to 17 years (p=0,159), and the main diagnoses, namely diseases of the respiratory system (p<0,001), injuries and poisonings (p<0,001) and external causes (p=0,015), were associated with the use of emergency services (Table 2).

The logistic regression analysis showed that the inappropriate use of ES was associated with people assisted due to a PCSC (OR=2,55). Moreover, it was associated with those living in areas without PHC coverage (OR=2,30), people aged between 0 and 11 years old (OR=4,37), and between 12 and 17 years old (OR=3,67), diseases of the respiratory system (OR=3.82), and diseases of the musculoskeletal system (OR=3,19), and to protective effects for assistance in the first quarter of the year (OR=0,40) and injuries and poisonings (OR=0,11) (Table 3).

Discussion

The inappropriate use of ES has been studied for more than two decades. It is a worldwide concern discussed in several countries with different health contexts[6,10,14]. In our study, we observed a high proportion of inappropriate use of emergency care services, which corroborates the literature[5,15,16].

The proportions found in the studies may be related especially to the methods used to determine situations of inappropriate use[6], which are characterized by non-urgency or emergency situations assisted in emergency services[1,2,5], that is, they do not constitute acute conditions of a clinical, surgical or traumatic nature[9].

Despite being defined in the literature, there are still controversies about the criteria for classifying cases of inappropriate use of emergency services[10]. In our study, the severity criteria were adopted to classify the inappropriate or appropriate use of the ES, based on strict criteria disseminated in the literature[6]. This rigor is important when considering the construction of local health systems guided by PHC, since it allows the understanding of the role of each level of care, such as in a study conducted in France, which analyzed the assistance provided in emergency services and found that non-urgent situations assisted in ES could be managed by general practitioners in PHC[10].

Table 2. Bivariate association between inappropriate use of the Emergency Care and independent variables. Guarapuava, state of Paraná, Brazil, 2013 (n=384).

Variables	Appropriate		Inappropriate		OR	p-value[a]
	n	%	n	%		
PCSC[b]						
Yes	24	23,5	172	61	5,08	<0,001
No	78	76,5	110	39	ref[c]	-
Area not covered by PHC[d]						
Yes	21	20,6	29	10,3	ref.	-
No	81	79,4	253	89,7	2,26	0,009
Gender						
Male	51	50	123	43,6	ref.	-
Female	51	50	159	56,4	1,29	0,268
Period of the year						
1st quarter	41	40,2	54	19,1	0,45	0,013
2nd quarter	18	17,6	79	28	1,52	0,230
3rd quarter	19	18,6	80	28,4	1,46	0,273
4th quarter	24	23,5	69	24,5	ref.	-
Opening hours						
8:00 am to 4:59 pm	53	52	143	50,7	0,95	0,828
05:00 pm to 07:59 am	49	48	139	49,3	ref.	-
Day of service provision						
Business days	28	27,5	71	25,2	0,88	0,653
Weekend	74	72,5	211	74,8	ref.	-
PHCd open						
Yes	40	39,2	103	36,5	0,89	0,630
No	62	60,8	179	63,5	ref.	-
Age group						
0 to 11 years	10	9,8	63	22,3	3,30	0,006
12 to 17 years	7	6,9	27	9,6	2,02	0,159
18 to 39 years	35	34,3	82	29,1	1,22	0,537
40 to 59 years	28	27,5	68	24,1	1,27	0,487
60+ years	22	21,6	42	14,9	ref.	-
Main diagnosies[e]						
Infectious and parasitic diseases	1	5	19	95	7,26	0,054
Endocrine, nutritional and metabolic diseases	2	66,7	1	33,3	0,14	0,161
Mental and behavioral disorders	5	33,3	10	66,7	0,71	0,546
Nervous system disorders	4	30,8	9	69,2	0,8	0,727
Circulatory system diseases	6	26,1	17	73,9	1,02	0,958
Diseases of the respiratory system	4	4,7	82	95,3	10,04	<0,001
Diseases of the digestive system	3	23,1	10	76,9	1,21	0,773
Diseases of the skin and subcutaneous tissue	2	33,3	4	66,7	0,71	0,706
Diseases of the musculoskeletal system	5	16,1	26	83,9	1,97	0,177
Diseases of the genitourinary system	6	46,2	7	53,8	0,4	0,114
Ill-defined causes	22	27,5	58	72,5	0,94	0,831
Injuries and poisonings	31	79,5	8	20,5	0,06	<0,001
External Causes	5	83,3	1	16,7	0,06	0,015
Factors that influence health status	5	20,8	19	79,2	1,4	0,513

Notes: [a] Chi-square test, [b] Primary Care Sensitive Conditions, [c] Category of reference, [d] Primary Health Care, [e] Chapters of ICD-10.

Source: Survey data.

Table 3. Independent factors associated with the inappropriate use of emergency services. Guarapuava, state of Paraná, Brazil, 2013 (n=384).

Variables	OR	CI[a]
PCSC[b]	2,55	1,33; 4,87
Area not covered by PHC[c]	2,30	1,11; 4,78
0 to 11 years	4,37	1,46; 13,02
12 to 17 years	3,67	1,07; 12,51
Diseases of the respiratory system	3,79	1,21; 11,85
Injuries and poisonings	0,11	0,04; 0,28
Diseases of the musculoskeletal system	3,20	1,10; 9,31
1st quarter	0,40	0,19; 0,85

Notes: [a] Confidence interval, [b] Primary Care Sensitive Conditions, [c] Primary Health Care.

Source: Survey data.

Our study showed that people assisted due to some PCSC had a greater chance of inappropriate use of the emergency services. A study in a municipality of Paraná pointed out that the presence of chronic morbidity and lack of physicians in Health Centers are factors associated with the inappropriate use of ES by older adults with PCSC[17]. On the other hand, the increase in the density of general practitioners and the structuring of the care network affect the reduction of hospitalizations due to PCSC[18].

The aggravation of a PCSC is characterized as a case of appropriate use of the ES, since this service is structured to meet situation of urgency and emergency. However, such occurrence indicates failures in the management and control of such diseases in the PHC context, showing the weakness of this level of attention in the control of the PCSC.

PHC must be constantly evaluated to encourage improvements to perform its role. If the PCSC were assisted in PHC, the risk of aggravation and subsequent exacerbation, which leads to the demand for assistance in emergency care units and/or hospitalization, would be reduced[19]. Moreover, when a user seeks an ES frequently and due to non-urgency situations, the user does not have a continuous care such as that offered by the PHC.

PCSCs are responsible for most hospitalizations due to clinical conditions, and the financial investment in the Unified Health System, expansion of the FHS and the More Doctors program has important influence on reducing these hospitalizations[20,21], strategies that value and strengthen the PHC.

Our results suggest that, by providing and effective care to PCSCs at PHC, the benefits will be not only the reduction of hospitalizations, but also the reduction of the assistances provided at other levels of care[20], with reduced costs and improved quality of health care[2,22].

Inadequate service requests are among the causes of inefficiency in the health system, since a significant portion of health expenses is reserved for procedures considered unnecessary. The user's initial intention when seeking a health service may differ from the action that would be more appropriate in terms of the organization of the system, which generates an inopportune cost[23]. Health services must then be reorganized with PHC valuation, since the users seek care at the health service that best meets their desires when the PHC does not offer a structured, effective and timely service.

Our results also showed that users in regions without PHC coverage have a greater chance of inappropriate use of emergency services. This can be explained by the lack of regular access to primary care, which results in the search for ES for any condition or problem[4], regardless of the severity, a common situation in low-income countries[14]. Most of users assisted in ES could receive a care service without the need for accurate technological resources, which would reduce the overcrowding of emergency services[3].

Despite the scarcity of literature on the influence of PHC actions in the search for emergency sectors, there is interest in interventions that facilitate the proper use of emergency services. Studies have reported that empowerment or user-centered care can reduce this inadequacy[12]. In the United States, the distribution of educational materials with instructions on how to deal with simple problems by themselves and how to decide when to seek for ES have helped to improve the flow of care in ECUs[24]. The development of information and communication technologies can be tools that provide information to users and have been able to assist in decision making, such as mobile health tools (*m-health*) and online medical advice platforms[23]. Despite these efforts, difficulties in the adequate demand for ES still increase in many countries[7].

In Brazil, ECUs have been built since 2009, which should be strategically installed to configure the emergency care network, differentiating from emergency services, which produce "emergency consultations"[25]. However, the implementation process was accelerated, without accomplishing the purpose of organizing the

network, which resulted in the reproduction of the traditional emergency service model and had little positive effect on coping with the problems of providing care to emergency situations[25].

The overcrowding of ES due to causes that can be assisted in PHC implies a PHC underutilization, and the consequent overload of emergency services, both regarding the work of urgency and emergency teams and regarding the costs for the health system[10,22].

In addition to the specific aspects of the inappropriate use of ES, the specific issues of PHC structuring and instrumentalization must be evidenced. One of the challenges faced by the Brazilian health system is to make PHC a gateway for users, which allows it to assist most of health problems. The scarcity of resources due to underfunding and the lack of effectiveness overload other levels of attention and directly influences the quality of the service provided[15,17,26].

PHC has been recognized as a central component of effective health systems since the beginning of the 20th century. However, despite the remarkable progress, there is still a big gap between the necessities of the individuals and communities and the quality of care provided[27].

Brazil has considerable flaws in the way primary care is organized, financed and provided, and these issues are associated with problems in the performance of the health system, including the medical assistance in a timely and effective manner[28]. PHC still has high levels of organizational barriers, lack of continuity of care, especially due to difficulties in the stability of professionals at this level of care. Another important problem is the lack of coordination of care, which reflects the challenge of successfully incorporating secondary prevention and advanced diagnostic services in PHC[28].

Our study found an association between two age groups, 0 to 11 years and 12 to 17 years, with inappropriate use of ES, which corroborates the findings from other studies[3,4,15,16]. In Australia, the use of emergency sectors for situations not characterized as urgency decreases proportionally with user's aging[3]. Older adults are more closely monitored for chronic conditions by PHC, which reduces the chances of an inappropriate use of the ES[15].

The search for care for children and adolescents in the ES for non-urgency conditions involves the evaluation of the caregiver/guardian about the benefits and disadvantages of attending an ES compared to the service in the PHC. Moreover, this assessment is influenced by both the perception of the severity of the disease and the availability of the service at the time the user considers it necessary[8].

There are difficulties in accessing PHC by adolescents due to problems in geographic and organizational accessibility[29] and friendly services for them must be urgently prioritized, such as opening hours that allow young people to leave during class hours and professionals with skills to work with that specific audience. In general, these services should be provided in a way that is available to adolescents, but also acceptable and accessible[30].

The knowledge of caregivers/guardians about both the child health issues[8] and the flow of emergency care in the health system must be improved, in addition to improving organizational aspects of the health system, as a way to optimize the therapeutic itinerary to be followed, especially by expanding health care of socio-organizational accessibility, such as the implementation of extended service hours in PHC.

Inappropriate use was also associated with diseases of the respiratory system, common in the region of the studied municipality, especially due to the cold climate. We also observed an association with diseases of the musculoskeletal system, which are prevalent in other studies on the subject[1,16] and common among workers (mostly men) in the municipality's timber industry.

Both diseases of the respiratory and of the musculoskeletal systems constitute preventable conditions within the PHC scope[16], by strategies aimed at coping with diseases and conditions, with early treatment and articulation among sectors for occupational health intervention.

Injuries and poisoning, on the other hand, showed to be a protective factor for inappropriate use, which can be explained by the fact that they are acute conditions, which are adequately referenced for care in an ECU[6].

Assistance provided in the first quarter of the year was negatively associated with inappropriate use. The first quarter may be a protective factor against inappropriate use due to a behavioral issue, in which people, especially children, are on vacation, and therefore away from contact with other people in closed environments, which minimizes the occurrence of diseases, especially those of the respiratory system. Moreover, the municipality has a mild summer climate, with less frequent conditions typical of the intense summer weather.

Our study had some limitations, such as data collection only from medical records, which lim-

its the association with the available data; lack of standardization among different studies on inappropriate use of ES, and the cross-sectional design of the study, which prevented the establishment of cause-and-effect relationships. Despite these limitations, we could build a greater understanding of the inappropriate use of ES and its associated factors.

Conclusions

The inappropriate use of ES can generate an imbalance of the health system, both by making it disorganized and by replicating the hegemonic curative model. Thus, understanding the factors that influence this inappropriate use is necessary since this knowledge could clarify conditions and situations that can be improved and modified in the health care network to assist users with higher quality and effectiveness, and lower costs for the system.

In our study, the results indicated a high proportion of inappropriate use of emergency services, associated with PCSC and the lack of PHC coverage, demonstrating that the weakness of PHC affects the overload of other levels of care. Moreover, the inappropriate use was associated with the age groups from 0 to 11 years and from 12 to 17 years, affected by diseases of the respiratory and of the musculoskeletal system. Care provided in the first quarter of the year and due to injuries and poisoning were protective factors against the inappropriate use of emergency services.

Ou results emphasizes the need to strengthen PHC to reduce the inappropriate use of emergency services. The redirection of non-urgency care to PHC is a desirable management goal, so that the ES concentrates efforts on users in severe situations.

Collaborators

T Baratieri and MH Lentsck contributed to project design, data analysis and interpretation, article writing, critical review and approval of the final version to be published. MHL contributed to project design, data analysis and interpretation, article writing, critical review and approval of the final version to be published. LP Corona contributed to data analysis and interpretation, article writing and approval of the final version to be published. KP Almeida contributed to project design, data analysis, article writing and approval of the final version to be published. ACGC Kluthcovsky contributed to data analysis and interpretation, critical review, and approval of the final version to be published. S Natal contributed to data analysis and interpretation, critical review, and approval of the final version to be published.

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