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Emergency care in Brazil: factors leading to clinically inappropriate use of emergency care among young adult users in the Brazilian context

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Abstract

Background This study aims to investigate the prevalence and associated risk factors of inappropriate use of emergency services among young adults in Vitória, Brazil.

Methods A cross-sectional study was conducted over 30 consecutive days in November and December 2019, involving systematic random sampling of young adults (aged 18–39) visiting the municipal emergency care unit. Data were collected through structured interviews, utilizing the Hospital Urgency Appropriateness Protocol (HUAP) to identify inappropriate use. Demographic characteristics, healthcare utilization patterns, and medical diagnoses were assessed. Poisson regression models were employed to explore associations between variables.

Results Among the 631 young adults surveyed, 30.6% exhibited inappropriate use of the emergency care unit. Factors associated with higher rates of inappropriate use included not seeking previous care in other healthcare services; having specific medical diagnoses like diseases of the respiratory system (PR: 2.03), diseases of the skin (PR: 4.13), and diseases of the ear and mastoid (PR: 3.74).

Conclusion The study underscores the significance of addressing inappropriate use of emergency services among young adults. Though the prevalence of inappropriate use was not significantly different from other age groups, the demographic characteristics and healthcare utilization patterns of young adults contribute to their unique challenges. To mitigate inappropriate use, efforts should focus on improving access to primary healthcare services, enhancing continuity of care, and raising awareness about appropriate healthcare-seeking behaviors among young adults. Ultimately, these interventions can foster a more effective and sustainable healthcare system that better serves the needs of the community.

Keywords Emergency medical services, Health services misuse, Young adult, Brazil

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Background

Inappropriate use of emergency services for non-urgent conditions is the main cause of overcrowding in emergency services worldwide. Non-urgent (NU) patients are those whose condition does not require immediate care and is not life-threatening, implying that they could have received appropriate care in an alternative setting [1]. The utilization of urgent or emergency care by NU patients is also called inappropriate use, misuse, or "clinically unnecessary use" of emergency services [2]. The inappropriate use of emergency services is a complex issue with multiple underlying causes. One possible factor is the deficiencies in the delivery and organization of other levels of healthcare services [3]. Inadequate management and follow-up of patients at these levels may contribute to the deterioration of their health conditions, leading to the need for emergency care. Additionally, limited access to primary care services may drive patients to seek emergency services for issues that could be better addressed at other levels of care within a comprehensive and longitudinal healthcare system [4–6].

Many international studies have identified a considerable proportion of NU cases. For instance, a study in Iran reported that 64.4% of emergency room cases were classified as non-urgent [7], while a cross-sectional study in France found that 35% of cases were considered non-urgent. In the United States (US), NU cases accounted for an average of 37% of triage numbers [8], while in the Netherlands, 41.2–51.9% of self-referred Emergency Departments (ED) patients fell into the NU category [9]. In Taiwan, the proportion of NU cases was approximately 30% [10]. In Brazil, the percentage of NU cases among ED visits ranges from 20 to 70% [4, 11–13].

In Brazil, emergency care within the public healthcare system is structured into a comprehensive health care network. This network includes primary health care units, the Mobile Emergency Medical Service (SAMU), 24-hour pre-hospital emergency care services, hospital care, and home care [14]. The establishment of pre-hospital 24-hours emergency services aimed to reduce the burden on hospital emergency departments [15]. These units will be referred to as Emergency Care Units throughout the article. Emergency Care Units are extensively utilized by young adults in the Brazilian context [4].

Among young people (18–39 years-old), the likelihood of inappropriate utilization may be even higher due to their tendency to face difficulties in accessing healthcare services from primary care practitioners and experiencing less satisfactory encounters compared to older individuals [16]. As a result, they are more inclined to resort to using emergency services for non-urgent conditions.

Research scarcity on young adults' emergency service use, notably in the Global South, accentuates the need for tailored studies. Despite their overall better health status, young individuals presenting at emergency services for NU reasons are exacerbating system strain, prompting unnecessary interventions, and heightening iatrogenic risks [17]. This study aims to examine the prevalence of inappropriate emergency care utilization among young adults in a Brazilian municipality, while also identifying the associated risk factors. It seeks to fill a critical gap in understanding their healthcare-seeking behaviors in this specific region.

Methods

The undertaken investigation took the form of a cross-sectional study conducted within the urban confines of Vitória, capital of Espírito Santo, Brazil, with the primary objective of examining the utilization of the emergency care unit. The data collection phase spanned an uninterrupted duration of 30 days encompassing the months of November and December in the year 2019, covering a 24-hour timeframe each day.

Vitória is located in the Southeast region of Brazil, has 322,869inhabitants [18], a Human Development Index of 0.845 (the highest in the state and 4th highest in the country, according to 2010 the Brazilian Institute of Geography and Statistics - IBGE) and an infant mortality rate of 10.9 deaths per thousand live births (Brazil has a rate of 12.6 deaths per thousand live births) [18]. The local public health system has a wide range of basic and specialized services, including two emergency care units and is fully computerized. The municipal emergency care network operates 24/7, serving around 10,000 users per month. It follows the Manchester Protocol [19] for patient risk stratification and provides clinical care for adults and children, including low-complexity emergency care, minor surgical procedures, and emergency dental services.

The sample size was determined considering a predicted prevalence of 24.2%, which was found in a study by Carret et al. [4] that used the same protocol to measure inappropriate emergency service utilization. The sample size calculation incorporated a margin of error of ±2.5% points, a 95% confidence level, 80% sample power, a 0.2 ratio between exposed and unexposed groups, a 20% outcome rate in the unexposed group, and a minimum prevalence ratio of 1.5. Adjusting for a 10% potential loss and refusal rate, the projected sample size for the prevalence study was determined to be 1,219 individuals, while the study investigating associations required a sample size of 1,285 participants. In the process of selecting participants, a systematic random sampling method was used. Within the clinical risk stratification room, which is where patients undergo their first assessment by nurses to determine the type of care they'll receive, the initial participant was chosen randomly. After this initial selection, every 11th individual was subsequently chosen in a

consistent pattern. This pattern was established based on their sequence of arrival, ensuring a systematic and consistent approach to the selection process.

The interviews took place within the emergency care unit and were conducted by proficient interviewers, all of whom were aged over 18 years and possessed substantial experience in the healthcare sector. The research coordinators meticulously supervised the interview procedures. To ensure thorough coverage during the 24-hour service operations across the 30-day fieldwork duration, the interviewers were grouped into pairs and assigned to 12-hour shifts.

Data collection was carried out using a structured questionnaire that addressed sociodemographic aspects, detailing the reason behind the individuals' current visit to the Emergency Care Unit, their medical record, previous utilization of health services, self-perception of health and existing comorbidities.

The outcome variable was inappropriate use of Emergency Care Unit (Yes/No). To measure the inappropriate use of the emergency care service, this study utilized the Hospital Urgency Appropriateness Protocol (HUAP) tool [20]. The HUAP is an objective instrument validated in Spain [21] and Brazil [22], designed to identify inappropriate use of emergency care. It consists of five criteria that determine the emergency of the complaint, including severity, treatment requirements, diagnostic intensity, prolonged observation and/or transfer, and self-referral. In this study, inappropriate use was defined as not meeting any of the twenty-eight questions derived from the five criteria, assessed through a questionnaire. Most of the questions had Yes or No answers, allowing for straightforward evaluation. For example, questions assessing severity might include "Is the patient's condition life-threatening?" or "Does the patient require immediate medical intervention?". Treatment requirements on the other hand might be evaluated by questions like "Does the patient need specific treatments available only in an emergency setting?"

The research team, with full access to the patient's medical record and assistance from the on-call physician, completed the criteria after the user had been attended to. This method ensured a comprehensive and accurate assessment of whether the emergency care was used appropriately based on the defined criteria.

The independent variables included years (18–28 years/30–39 years), sex (Female/Male), skin color (White/Black/Mixed-Race, Indigenous or Asian), marital status (Married/ Single, Widowed or Separated), level of education (None and primary/ Fundamental school/ Middle school/ Graduate and Postgraduate studies), economic status by Brazilian Economic Classification Criteria (Brazilian Criteria) – ABEP [1](AB/C/DE) [23], employment status (Employed/Unemployed), and variable designated as multimorbidity – living with two or more chronic illnesses (yes/no) was created.

Variables relating to healthcare utilization and Emergency Care Unit visits included private health insurance (No/Yes); presence of a reference physician or nurse (No/Yes); has a reference primary health clinic (the patient had a designated healthcare facility where they receive regular care, having visited it at least once in the preceding 12 months); Emergency Care Unit use in past year (None/1–2 times/3–4 times/5 or more times), time of visit (18pm-6am/7am-17pm); day of visit (Monday to Friday/ Saturday and Sunday); previous care in the other healthcare service for current complaint (No/Yes); Received care in Primary Care for the same complaint (No/Yes), medical diagnosis (by chapter International Classification of Disease: ICD-10); clinical risk stratification - Manchester Protocol (red/orange/yellow/green/Blue) [19].

For this study, only individuals aged between 18 and 39 years were included. Data analysis was performed using StataSE version 17.0 statistical software (USA: StataCorp LLC). Descriptive analysis was conducted before inferential analysis. The bivariate analysis between the outcome and independent variables employed the chi-square test for heterogeneity (for dichotomous and nominal categorical variables) and linear trend (for ordinal categorical variables). The prevalence of inappropriate use of the Emergency service and their 95% confidence intervals were calculated.

Variables identified with a significance level set at <0.20 in the bivariate analysis were included in the Poisson regression model using robust variance estimates as appropriate for binary outcomes with high prevalence and the adjusted prevalence and p-value was calculated.

Results

Based on the data collected, it was found that among the 678 (57.60%) of young adults who made use of the Emergency Care Unit, the majority were female (60.21%), mixed-race (55.85%), single (56.89%), middle or working class (58.69%), with higher education (56.25%), employed (73.86%), and without private insurance (87.00%). Most of them were recurrent users of the Emergency Care Unit and had utilized the service at least once in the past year (75.19%). A small percentage of young adults had a reference family physician or nurse (22.16%), although most of them (68.83%) were aware they had a PHC near

[1] ABEP's socio-economic stratification in Brazil utilizes a points system considering household amenities like bathrooms, domestic workers, automobiles, and education levels. This leads to strata (A, B1, B2, C1, C2, D-E) indicating various socio-economic levels, each associated with an average household income estimation (ABEP, 2022).

their house. Most of the assistances among young adults occurred on weekdays (76.41%) and during the same opening hours as PHC (62.31%) (Table 1).

Of the 27% of young adults who sought previous care for the same complaint at any available healthcare service, 65% were able to receive care. The most sought-after services by those who received care were PHC (53.33%), Emergency Care Unit (22.9%), and the Public Hospital ER (12.6%). According to the chapters of the ICD 10, the main diseases for seeking care at the Emergency Care Unit were symptoms, signs, and abnormal findings of clinical and laboratory tests not classified elsewhere, also defined as ill-defined causes (35.99%), diseases of the respiratory system (14.45%), and diseases of the musculoskeletal system (9.14%). Among the young adult population, approximately one-third had two or more long-term health conditions (32.34%) (Table 1).

The Manchester clinical risk stratification Protocol revealed that the majority fell into the Green and Blue category (75%; 95%CI 71.58–78.12), the lowest risk categories, while a smaller percentage were classified as Yellow (22.04%; 95%CI 19.06–25.33), and the least common groups were Red and Orange (2.95%; 95%CI 1.91–4.54) (Table 2).

The prevalence of clinically inappropriate use was 30.58% (95%CI 27.10–34.30), and was higher among men (31.60 −95%CI 26.11–37.64) of white skin colour (34.12 −95%CI 27.30-37.08), single (31.46 −95%CI 26.83–36.48), with higher education (31.86 −95%CI 25.48–39.01), middle or higher income (33.50 −95%CI 27.19–40.46), without private insurance (30,71 −95%CI 26,97−34,71), employed (30.70 −95%CI 26.68–35.04), who had used the Emergency Care Unit 3 to 4 times in the past year (33.55 −95%CI 26.40-41.55), without a reference family physician or nurse (31.22 −95%CI 27.26–35.47), without a reference PHC (31.74 −95%CI 22.07–34.89), visiting the Emergency Care Unit during the same opening hours as the PHC (34.44 −95%CI 29.87–39.32), visiting on weekends (34.70 −95%CI 27.50–42.60), having two or more long-term health conditions (31.86 −95%CI 25.80-38.59), and not having received care from another healthcare service for the same condition (32.50 −95%CI 28.61–36.65). The highest prevalence of inappropriate use was observed regarding diseases of the skin (81.48 −95%CI 68.72–89.80), diseases of the ear and mastoid (75 −95%CI 53.81–88.53) and diseases of the respiratory system (40.81 −95%CI 31.49–50.85) (Table 3).

In the crude and adjusted analysis, no demographic characteristics were associated with inappropriate use. Regarding the time of visit, between 7 am and 5 pm, the prevalence of inappropriate use was 41% higher than between 6 pm and 6 am (95% CI 1.09–1.84), but this difference did not maintain statistical significance in the adjusted analysis. The adjusted analysis revealed that

Table 1 Sample description of the use of Emergency Care Unit. Vitória, Brazil, 2019 (*n* = 678)

Demographic characteristics	*N*	%
Years (*n* = 678)		
18–29 years	446	65.78
30–39 years	232	34.22
Sex (*n* = 676)		
Female	407	60.21
Male	269	39.79
Skin colour (*n* = 675)		
White	137	20.30
Black	161	23.85
Mixed-Race, Indigenous or Asian	377	55.85
Marital Status (*n* = 675)		
Married	291	43.11
Single, Widowed and Separated	384	56.89
Education (*n* = 672)		
None and Primary	11	1.64
Fundamental school	86	12.80
Middle school	378	56.25
Graduation and Postgraduate studies	197	29.32
Economic Status (ABEP) (*n* = 673)		
A-B	215	31.95
C	395	58.69
D-E	63	9.36
Employed (*n* = 677)		
No	177	26.14
Yes	500	73.86
Multimorbidity (*n* = 671)		
No	454	67.66
Yes	217	32.34
HEALTHCARE UTILIZATION AND ED VISIT		
Private health insurance (*n* = 677)		
No	589	87.00
Yes	88	13.00
Family physician and nurse reference (*n* = 677)		
No	527	77.84
Yes	150	22.16
Reference PHC clinic (*n* = 677)		
No	211	31.17
Yes	466	68.83
Emergency Care Unit use in past year (*n* = 655)		
None	99	14.89
1–2 times	238	35.79
3–4 times	162	24.36
5 or more times	166	24.96
Time of visit (*n* = 674)		
18 − 6 hs.	254	37.68
7–17 hs.	420	62.31
Day of visit (*n* = 674)		
Mo-Fr	515	76.41
Sat-Sun	159	23.59
Prev. care at any available healthcare service (*n* = 678)		
No	492	73.00
Yes	182	27.00

Table 1 (continued)

Demographic characteristics	*N*	%
Received care in Primary Care for the same complaint (*n* = 180)		
No	84	46.67
Yes	96	53.33
Main Diagnosis (ICD) (*n* = 678)		
Ill-defined causes	244	35.99
Diseases of the respiratory system	98	14.45
Diseases of the musculoskeletal stem	62	9.14
Diseases of the skin	54	7.96
Infectious and parasitic diseases	45	6.64
Diseases of the genitourinary system	36	5.31
Injuries and poisonings	19	2.80
Diseases of the ear and mastoid	24	3.54
Diseases of the digestive system	16	2.36

ABEP: Brazilian Economic Classification Criteria; PHC: Primary health care ICD ; ICD: International Classification of Diseases

young adults who sought other services beforehand for the same complaint were 36% less likely to make inappropriate use of the Emergency Care Unit (PR: 0,64–95%CI 0.46–0.88). Furthermore, young adults with the following ICD categories were more likely to make inappropriate use: those with diseases of the respiratory system were twice as likely (95%CI – 1.50–2.74), those with diseases of the skin were 4,13 times more likely (95%CI 3.29–5.17), and those with diseases of the ear and mastoid were 3,74 times more likely (95%CI – 2.80-5.00) (Table 4).

Discussion

In this study conducted among young adults using a public emergency care unit in a Brazilian municipality known for high quality of life indicators, a notable prevalence of inappropriate service utilization was observed. Initial analyses revealed that this inappropriate use was more common among young adults presenting with respiratory, skin, ear, and mastoid conditions, who had not sought treatment from other healthcare providers previously, and who accessed emergency services between 7 a.m. and 5 p.m. Even after adjusting for potential confounding factors, the heightened inappropriate use of emergency services persisted among those with respiratory, skin, ear, and mastoid issues who had not previously sought care elsewhere for these conditions.

The inappropriate use of emergency services has emerged as a global concern and has therefore been increasingly explored in the past two decades [4, 9, 24]. The findings of this study shed light on the concerning issue of inappropriate use of emergency services among young adults. The significant proportion (30.58%) of young adults resorting to inappropriate use of emergency care underscores the urgency of addressing this issue.

The findings are consistent with a prior study in Pelotas, localized in South of Brazil, that utilized a similar HUAP protocol [25] where inappropriate use of emergency care among young adults was reported at 26.4%, thereby validating our results. However, it is essential to acknowledge the substantial variation in proportions observed in other Brazilian studies, such as the one conducted in the State of Paraná in which the proportion of inappropriate was estimated at 73.4% [12]. Different estimates of the prevalence of inappropriate use of emergency services may also result from the use of different definition criteria.

In this study, for a visit to be deemed appropriate, it needed to meet at least one of five criteria, including emergency complaints, abnormal vital signs, specific professional conduct, or need for emergency diagnostic tests or treatments. Instances failing to meet these criteria were classified as inappropriate use [4]. The lack of a consensus on the criteria to define inappropriate use of emergency services further complicates the understanding of this issue. These indicated the need for standardized methodologies to calculate the inappropriate use of Emergency Care.

Despite being introduced with the primary purpose of alleviating the burden on emergency departments, Emergency Care facilities have become increasingly attractive to young adults. This is largely due to their extended operating hours and ability to accommodate unscheduled visits [2, 26]. This heightened accessibility may contribute to the higher prevalence of young adults utilizing Emergency Care in Brazil. Interestingly, in this study most emergency care visits by young adults occurred on weekdays, during the same opening hours as PHC. This observation suggests a possible overlap in service availability and indicates that young adults may perceive Emergency Care as a more convenient option for seeking care during regular working hours when PHCs are also open. The high prevalence of inappropriate use among young adults might suggest systemic neglect of young adults' needs within the primary healthcare system [27, 28]. Several studies have demonstrated this trend among adolescents, who are often perceived as a healthy demographic [29, 30], a pattern which has also been observed in Brazil [31]. This difficulty to access primary care services as a driver for inappropriate use has been discerned by several studies [9, 17, 28, 31–33]. Nevertheless, it is crucial to pay closer attention to understanding their health status, the barriers they face, and their specific requirements. This negligence may stem from a healthcare system that initially centered around acute care, lacking a robust emphasis on primary care.

As the system faced the 'epidemiological transition', with the rise of non-communicable and chronic diseases, efforts were primarily directed towards strengthening primary care for the older people, women, children, and those with chronic illnesses. Consequently, young adults

Table 2 Prevalence of inappropriate use of Emergency Care Unit and risk classification. ($n=678$)

Variable	*N*	Prev. (95% CI)
Inappropriate use of Emergency Care Unit (*n*=631)		
No	438	69,41 (65,69–72,89)
Yes	193	30,58 (27,10–34,30)
Risk classification (*n*=676)		
Green and Blue	507	75,00 (71,58–78,12)
Yellow	149	22,04 (19,06–25,33)
Red and Orange	20	2,95 (1,91 −4,54)

CI: Confidence interval 95%

often perceive themselves as somewhat overlooked within the healthcare system at various points [2, 4, 12, 25, 26]. Many young adults do not perceive PHC as their first or preferred point of contact within the healthcare system, emphasizing the necessity to enhance the accessibility and quality of care provided by PHCs [25, 34]. Lima et al. also point out the bureaucratization of actions and procedures in primary care, stating that often the understanding of the patients' needs is neglected [9, 17, 27, 28, 31, 33, 35].

To address this issue effectively, interventions should be directed towards improving organizational aspects of the healthcare system and increasing awareness among young adults about the services available to them. In that sense, implementing extended service hours in PHCs could be a pivotal step in optimizing healthcare pathways, reducing the inappropriate use of emergency services, and ensuring that young adults have timely access to primary care services [17].

Another potential solution is the implementation of targeted outreach programs that promote the benefits of PHCs and the significance of establishing a long-term relationship with a family physician, for example as part of the Brazilian Family Health Strategy Program (FHS). These programs should be tailored to address the specific needs and concerns of young adults, considering their diverse backgrounds, socioeconomic circumstances, and the fact that 32.34% of young adults had two or more chronic diseases. High multimorbidity among the younger population was observed by another study and in the Brazilian National Health Survey, confirming the need for specific policies and programs [36].

The study's findings highlight two preventable conditions, respiratory and musculoskeletal diseases, as significant contributors to the inappropriate use of Emergency Care. These conditions are prevalent, largely due to factors like industrial activities and physical labor and were also pointed out by other international studies [12, 29]. Inappropriate Emergency Care use for such conditions indicates gaps in the management of these diseases in other healthcare services. The high prevalence of respiratory diseases in the region can be attributed to industrial pollution, with a significant concentration of polluting industries in Greater Metropolitan Vitoria (Espírito Santo State Environmental Secretariat). These preventable conditions warrant special attention when developing targeted interventions to improve their management and reduce their impact on inappropriate Emergency Care use. Notably, three ICD chapters, diseases of the respiratory system, diseases of ear and mastoid, and diseases of the skin, showed a significantly higher prevalence of inappropriate use, emphasizing the importance of focusing efforts on addressing these conditions to mitigate inappropriate use effectively.

This specific pattern of diseases related to the increased inappropriate utilization of emergency services, coupled with a high rate of multimorbidity, underscores the need for healthcare system managers to be vigilant about the quality of care provided throughout the care network, particularly in PHC and emergency services. Factors such as low resolvability, unnecessary complementary tests, lack of essential therapeutic resources for the adequate management of these conditions, and the insufficient preparation of professionals for this care can result in a pattern of service use that favors emergency services [37].

Furthermore, in Brazil, a significant number of healthcare professionals working in PHC believes that acute illness conditions (e.g. many respiratory diseases) shoudl not be adresses in this level of care. Some of these professional's advocate for a PHC model centered in specific health programs (such as care for individuals with hypertension and diabetes mellitus, prenatal care, and children up to 2 years of age etc.) [38].

This study was not designed to analyze in depth the influence of the quality of clinical care provided by PHC teams and emergency service professionals, nor the impact of different PHC models on the profile of inappropriate emergency service use. However, it is possible that both issues contribute to an increased tendency towards such utilization patterns.

Despite the valuable insights provided by this cross-sectional study, it also has inherent limitations. The lack of causality and temporal ambiguity restrict the ability to draw definitive conclusions about the causal relationships and trends over time. Additionally, biases may have influenced the results, as patients were interviewed in the Emergency Care Unit waiting room and may have been motivated to seek care. Although the sample calculation was conducted for the overall research rather than specifically for young adults, the study still achieved statistical power for the observed associations.

Despite these limitations, the study makes a substantial contribution to understanding the inappropriate use of emergency services among young adults in Vitoria, Espirito Santo, Brazil. Healthcare policymakers and

Table 3 Prevalence and crude analyses factors associated with the inappropriate use of Emergency Care Unit ($n=631$)

	Inappropriate use	Crude PR	
Independent variables	**Prev. (95% CI)**	**PR (95% CI)**	***P* value**
Years			0,1753
18–29 years	32,43 (28,06–37,13)	1	
30–39 years	27,14 (21,67 – 33,41)	0,84 (0,65 – 1,08)	
Sex			0,6695
Female	30,0 (25,58 – 34,81)	1	
Male	31,60 (26,11–37,64)	1,05 (0,83 – 1,34)	
Skin colour			0,2115
White	34,12 (26,34–42,86)	1	
Black	25,00 (18,72 – 32,52)	0,73 (0,51 – 1,06)	
Mixed-race, Indigenous or Asian	32,00 (27,30–37,08)	0,94 (0,70 – 1,25)	
Marital Status			0,5820
Married	29,41 (24,28–35,12)	1	
Single, Widowed and Separated	31,46 (26,83 – 36,48)	1,07 (0,84 – 1,36)	
Education			0,9294
None and Primary	25,00 (5,66 – 64,91)	1	
Fundamental school	25,20 (19,28–39,24)	1,13 (0,32 – 3,95)	
Middle school	30,81 (26,22–35,81)	1,23 (0,37 – 4,14)	
Graduation and Postgraduate studies	31,86 (25,48 – 39,01)	1,27 (0,38 – 4,32)	
Economic Status			0,5146
A-B	33,50 (27,19–40,46)	1	
C	30,10 (25,64 – 34,97)	0,90 (0,70 – 1,15)	
D-E	26,22 (16,65 – 38,75)	0,78 (0,49 – 1,25)	
Employed			
No	30,43 (23,79 – 38,00)	1	0,9492
Yes	30,70 (26,68 – 35,04)	1.01 (0,77 – 1,32)	
Multimorbidity			0,6791
No	30,23 (26,02–34,81)	1	
Yes	31,86 (25,80 – 38,59)	1,05 (0,82 – 1,35)	
Private health insurance			0,9135
No	30,71 (26,97 – 34,71)	1	
Yes	30,01 (21,17–40,88)	0,98 (0,69 – 1,39)	
Family physician and nurse reference			0,5529
No	31,22 (27,26–35,47)	1	
Yes	28,57 (21,67 – 36,64)	0,92 (0,68 – 1,23)	
Reference PHC clinic			0,3615
No	22,04 (22,07–34,89)	1	
Yes	31,74 (27,55 – 36,25)	1,13 (0,87 – 1,48)	
Emergency Care Unit use in past year			0,4763
None	25,26 (17,49 – 35,01)	1	
1–2 times	32,42 (26,52 – 38,92)	1,28 (0,86 – 1,90)	
3–4 times	33,55 (26,40–41,55)	1,33 (0,88-2.01)	
5 or more times	28,38 (21,81 – 36,02)	1,12 (0,73 – 1,72)	
Time of visit			0,0098
18 – 6 hs.	24,36 (19,31 – 30,25)	1	
7–17 hs.	34,44 (29,87 – 39,32)	1,41 (1,09 – 1,84)	
Day of visit			0,1917
Monday to Friday	29,14 (25,22–33,39)	1	
Saturday to Sunday	34.7 (27.5–42.6)	1,19 (0,92 – 1,54)	
Prev. care in other healthcare service			0,0306
No	32,50 (28,61 – 36,65)	1	
Yes	21,29 (14,54 – 30,08)	0,66 (0,45 – 0,96)	
Main Diagnosis (ICD)			

Table 3 (continued)

	Inappropriate use	Crude PR	
Independent variables	**Prev. (95% CI)**	**PR (95% CI)**	***P* value**
Ill-defined causes	17,57 (13,23 – 22,95)	0,46 (0,34 – 0,62)	0,0000
Diseases of the respiratory system	40,81 (31,49–50,85)	1,42 (1,08 – 1,87)	0,0117
Diseases of the musculoskeletal system	24,19 (15,06–36,47)	0,77 (0,49 – 1,22)	0,2709
Diseases of the skin	81,48 (68,72–89,80)	3,16 (2,61 – 3,81)	0,0000
Infectious and parasitic diseases	22,27 (12,58 – 37,53)	0,73 (0,42 – 1,27)	0,2672
Diseases of the genitourinary system	19,44 (9,44 – 35,83)	0,62 (0,32 – 1,22)	0,1686
Injuries and poisonings	36,84 (18,26–60,36)	1,21 (0,66 – 2,21)	0,5304
Diseases of the ear and mastoid	75,00 (53,81–88,53)	2,60 (2,00–3,38)	0,0000
Diseases of the digestive system	25,00 (9,36–51,80)	0,81 (0,34 – 1,92)	0,6371

PHC: Primary health care ICD ; ICD: International Classification of Diseases; PR: Prevalence ratio 95%; CI: Confidence interval 95%

Table 4 Adjusted analysis independent factors associated with the inappropriate use of Emergency Care

Characteristics	Adjusted analysis	
	PR (95% CI)	***P* value**
Years		0,206
18–29 years	1	
30–39 years	0,86 (0,69 – 1,08)	
Time of visit		0,133
18 –6 h	1	
7–17 h	1,21 (0,94 – 1,55)	
Day of visit		0,226
Monday to Friday	1	
Saturday to Sunday	1,17 (0,91 – 1,50)	
Prev. care in other healthcare service		0,007
No	1	
Yes	0,64 (0,46 – 0,88)	
Main Diagnosis (ICD)		
Ill-defined causes	0,75 (0,51 – 1,09)	0,128
Diseases of the respiratory system	2,03 (1,50 – 2,74)	0,000
Diseases of the skin	4,13 (3,29 – 5,17)	0,000
Diseases of the genitourinary system	0,78 (0,36 – 1,71)	0,539
Diseases of the ear and mastoid	3,74 (2,80 – 4,99)	0,000

ICD: International Classification of Diseases; PR: Prevalence ratio 95%; CI: Confidence interval 95%

providers can leverage these findings to create targeted interventions that effectively address this issue. Standardizing methodologies for calculating inappropriate use, improving accessibility to primary healthcare, understanding the specific needs and requirements of this demographic, and enhancing the quality of care and dissemination of preventive measures for conditions commonly associated with inappropriate emergency care can collectively contribute to a more sustainable and efficient healthcare system. This, in turn, will benefit both young adults and the broader community.

Conclusion

Inappropriate use of the Emergency Care Unit among young adults is a significant concern, with nearly one-third of them utilizing emergency services for non-emergency situations. Importantly, socioeconomic factors such as sex, age, and economic status were not found to be significant, indicating that it is a common phenomenon independent of these characteristics. Notably, not seeking care for the same complaint, specific medical diagnoses such as ear and mastoid diseases, skin disorders and respiratory diseases, were associated with increased inappropriate use. These findings underscore the need for targeted interventions to address this issue and promote more efficient healthcare resource allocation.

To address this issue, interventions should focus on improving access to and quality of primary healthcare services. Strengthening primary care relationships, educating young adults about appropriate healthcare utilization, and enhancing disease management in primary health clinics are essential steps towards reducing the inappropriate use of emergency services.

By addressing these factors and promoting appropriate healthcare-seeking behaviours, healthcare systems can optimize resource allocation, improve the efficiency of emergency services, and ensure that those in genuine need of immediate care receive timely and appropriate attention. Ultimately, reducing inappropriate Emergency Care Unit use among young adults will contribute to a more sustainable and effective healthcare system for the entire community.

Abbreviations

HUAP	Hospital Urgency Appropriateness Protocol
NU	Non-urgent
US	United States
ED	Emergency Department
IBGE	Brazilian Institute of Geography and Statistics
ABEP	Brazilian Economic Classification Criteria (Brazilian Criteria)
PHC	Primary healthcare
ICD	International Classification of Diseases
FHS	Brazilian Family Health Strategy Program

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Author contributions
LM, TDS and APSCA performed data analysis, interpretation and drafted the manuscript. KCMA contributed to the drafting and reviewed the manuscript. All authors read and approved the final manuscript.

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Data availability
The datasets used and analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Authors' information
LM is a master student in the Athena Institute at Vrije Universiteit Amsterdam; TDS and APSCA are professors in the Department of Social Medicine, Federal University of Espírito Santo; and KCMA is an undergraduate student at the Department of Integrated Health Education, Federal University of Espírito Santo.

Ethics approval and consent to participate
The project was approved by the Medical School Ethics Committee of the Federal University of Espírito Santo (Certificate of Presentation of Ethical Appreciation-CAAE: 13990719.4.0000.5060), and informed consent was obtained from all subjects. All methods were carried out in accordance with the Declaration of Helsinki and Regulations nº 466/2012 by National Committee of Ethics in Research (CONEP).

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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