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https://doi.org/10.1590/SciELOPreprints.18959

Submitted on: 2026-11-18
Posted on: 2026-11-25 (version 1)
(YYYY-MM-DD)

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Appropriate utilization of an emergency care unit in Brazil: cross-sectional study with multiple measures

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All authors approved the preprint, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Authors contribution

- Leonardo Ferreira Fontenelle: conceptualization, data curation, formal analysis, funding acqusition, methodology, visualization, writing – original draft preparation.

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- Emily de Jesus Fraga: conceptualization, writing – review & editing.
- Keren Cristina Madeira de Abreu: data curation, writing – review & editing.
- Ana Paula Santana Coelho Almeida. conceptualization, data curation, funding acquisition, methodology, project administration, writing – review & editing.
- Thiago Dias Sarti: conceptualization, funding acquisition, project administration, writing – review & editing.

Conflicts of interest

LFF, APSCA and TDS closely interact with the municipality's primary health care as part of their academic duties at the Federal University of Espírito Santo. All authors worked on the manuscript as part of a research group dedicated to primary health care. LFF and TDS are former volunteer editors of a medical journal (Revista Brasileira de Medicina de Família e Comunidade) and LFF received consulting fees from a medical association (Sociedade Brasileira de Medicina de Família e Comunidade), both of which are closely related to primary care but to the municipality of Vitória.

Data availability statement

Study materials and anonymized data will be made available on reasonable request.

Use of artificial intelligence

No artificial intelligence, generative or otherwise, was used in this manuscript.

External funding

This work was partially supported by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), universal call n. 10/2023. The funding agency had no role in the preparation or decision to publish this article.

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Abstract

Prevalence of appropriate utilization of emergency services varies widely across studies, partially because different measures are used. This study aimed to estimate and correlate the prevalence of appropriate utilization with four different measures. Patients seeking care at an emergency care unit were invited for structured interviewing, supplemented by administrative data. Appropriateness was measured by self-assessed urgency, self-assessed need ("would not have sought primary care even if guaranteed timely access to a competent professional"), the Manchester Emergency Triage System, and the HESP (Hospital Emergency Suitability Protocol), and associations were estimated by hierarchical logistic regression. Among the 1024 included participants, 76.6% of the visits had self-assessed urgency, 27.4% self-assessed need, 99.3% were triaged as standard or higher urgency, and 70.7% satisfied the HESP. Self-assessed need was associated with self-assessed urgency (aOR 1.52; 95% CI, 1.07–2.17); triage as more urgent was associated with self-assessed urgency (2.33; 1.62–3.45) but not self-assessed need; and the HESP was associated with self-assessed urgency (1.50; 1.10–2.08) and triage (38.94 for very urgent versus non-urgent; 95% CI, 6.81–616.22), but not self-assessed need. In conclusion, prevalence of appropriate utilization varies widely between measures even within the same study. Even though virtually all visits were triaged as "standard" or more urgent, most were deemed "primary care problems" by the participants themselves. The strong association between the HESP and the Manchester Emergency Triage System corroborates the utilization of the latter in (non-hospital) emergency care units. The low to no association between self-assessed need and other measures has important implications for primary and emergency care policies.

Keywords

Humans, Brazil, Emergency Medical Services, Facilities and Services Utilization, Primary Health Care

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Background

The use of emergency services for non-urgent reasons is a contentious issue. It is often assumed that such use leads to overcrowding and excessive costs for these services, as well as undermining people's continuity of care in primary health care (PHC), although these assumptions have been questioned [1]. In Brazil, emergency care units ("unidades de pronto-atendimento" in Portuguese) are urgent care centers, with intermediate complexity between PHC and the emergency department of hospitals, as stated in the National Policy for Urgent Care [2]. Although emergency care units can be accessed directly, the National Policy emphasizes the role of PHC in urgent care, including referrals to other points in the network. In practice, PHC is often expected to relieve the care burden from emergency care units, not the other way around. Presumably, some health problems would justify seeking care at an emergency care unit without going through PHC, but the National Policy does not address this issue.

A recent scoping review [3] found five themes in the reasons why people would seek emergency services for non-urgent reasons: accessibility and convenience; health anxiety; uncertainty and knowledge gaps in healthcare services; external advice and encouragement; and personal influences. Qualitative research conducted in Brazil has reached similar conclusions [4–6]. Thus, the utilization of emergency services for non-urgent reasons can be understood as justified by people's circumstances and potentially beneficial to their health, even if this is not the intended use by health system management [7].

Even so, the utilization for non-urgent or "primary care problems" [3] has been called "inappropriate," "preventable," "avoidable," "low acuity" and "(clinically) unnecessary" [7,8]. The variety of names seems to reflect a variety of perspectives on what actually constitutes an emergency [3]. The National Policy for Urgent Care itself does not define them. A subsidiary document (Resolution MS/GM No. 353/2020) uses the same definition as Brazil's Federal Council of Medicine (Resolution CFM No. 1452/1995), "an unforeseen occurrence of a health condition with or without potential risk to life, whose bearer needs immediate medical assistance," without specifying the degree of immediacy. Similarly, Uscher-Pines et al. [9] define non-urgent emergency department visits as those for conditions for which a delay in "several" hours would not increase the likelihood of adverse outcomes. Niska et al. [10] emphasize that visits being classified as "nonurgent" does not imply they were unnecessary.

Operationally, Lowe and Abbuhi [1] identify multiple perspectives in the assessment of the appropriateness of a medical visit to an emergency service: what the patient knows before seeking care (self-assessment), what information is available before medical care (during triage), and what informa-

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tion is available after medical care. From each perspective, one could use either human judgment or more structured, deterministic instruments. The same visit may be considered appropriate by one measure and inappropriate by another, precluding simplistic answers about the prevalence of (in)appropriate visits.

These measures are widely used in studies of emergency service utilization, but usually one at a time [11–18]. As consequence, the estimated prevalence of appropriateness varies widely [1,9], and it is not known to what degree the different approaches identify the same visits or capture complementary dimensions of appropriateness. The question is of particular interest in (non-hospital) emergency care units, which use the Manchester Triage System [19] despite it having been developed and quantitatively validated by and for hospitals' emergency departments [20–22]. Thus, the objective of this study was to describe the prevalence of appropriate utilization of an emergency care unit using multiple measures, correlating these measures with each other and with patient characteristics.

Methods

This study had a cross-sectional design and consisted of structured interviews with patients seeking care at an emergency care unit, supplemented with data obtained from the health service. The project was approved by the research ethics committee of the Federal University of Espírito Santo (report no. 3.433.979) and participants were only included in the study after providing written consent.

Setting

Brazil's national health system, the Unified Health System (SUS, from *Sistema Único de Saúde*) is jointly funded, policy-set and managed by the federal, state and municipal governments,[23] and most of its health services are government-owned. With one of the country's highest municipal Human Development Index, Vitória has little more than 300 thousand inhabitants, but sits in the middle of a metropolitan area with 2 million inhabitants. The municipality's own health services are grouped in six health districts, include 29 primary care centers (most of them implementing the Family Health strategy [24,25]), some ambulatory specialty centers, and two (non-hospital) emergency care units. Both emergency care units provide emergency care for clinical, surgical and dental conditions for children and adults, both self-referred and referred from PHC. In the metropolitan area there is almost no overlap between the emergency care units and the public hospitals' emergency departments, because the latter only receive patients referred from the former or the ambulance operator. The emergency care unit where this study was conducted serves around 10 thousand patients per month and, like the other one, is open 24/7 and uses the Manchester Emergency Triage System.

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Participants and measurements

The study methods were previously described [26,27]. In short, from November 17 to December 18, 2019, pairs of interviewers took turns working 12-hour shifts to systematically recruit 1 in 10 people aged 18 years or older who were seeking medical care at the emergency care unit, right after they underwent triage. People were not recruited if they were seeking care for administrative reasons, or for receiving previously prescribed medication and/or dressings.

Participants answered a questionnaire including items about sociodemographic and economic aspects, as well as the healthcare trajectory, morbidity, health behavior and health system affiliation. The interviewers were medical students who had been specially trained for this study and had participated in a pretest of the questionnaire conducted the previous month in the same emergency care unit.

The study also included data collected by the service itself. The risk classification by the Manchester Triage System [28,29] was obtained from the nurse who performed the triage. After patient discharge, the interviewers collected data from the electronic medical records to assess compliance with the criteria of the Hospital Emergency Suitability Protocol [30,31], also known as Hospital Urgency Appropriateness Protocol [26].

Variables

The person's own perspective on the appropriateness of their utilization was indicated by their response to two yes-or-no questions. The self-assessed urgency of the health condition was indicated by: "Do you think your problem is very serious and needs immediate treatment?" The self-assessed need for the emergency care unit was indicated by: "If it were possible to easily obtain care from a competent health professional at the primary care center closest to your home or work (where you are registered/referenced), would you have come here?"

The perspective of the health service was indicated prospectively by the Manchester Triage System and retrospectively by the Hospital Emergency Suitability Protocol. The Manchester Triage System reflects the information available before medical care, and assigns clinical priority in terms of acceptable waiting times for medical care: immediate (red), very urgent (orange, up to 10 minutes), urgent (yellow, up to 60 minutes), standard (green, up to 120 minutes), non-urgent (blue, up to 240 minutes). This protocol has considerable support in the literature [20–22] and is widely adopted in emergency services in the country [21,32]. The "standard" category is usually called "less urgent" in Brazil.

The second measure, reflecting information available after medical care, was the Hospital Emergency Suitability Protocol [30], which in its Brazilian adaptation [31] comprises 26 items in five criteria: severity (of clinical signs; eight items), treatment (received; four items), diagnostic intensity (four

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items), other criteria (observation for 12+ hours, hospitalization, etc.; four items), and the criterion applicable only to patients not arriving by ambulance (that is, those not coming for trauma, prior medical advice to seek emergency care in case of symptoms, etc.; six items). A single item is sufficient for the criterion to be met, and a single criterion is sufficient for the visit to be retrospectively considered suitable for the emergency care service. In our study, we disregarded the "other" item in the non-ambulance criterion because it was inadvertently marked as met for every participants not fulfilling any of the other items.

The predictor variables were divided into four hierarchical levels [33,34]. The sociodemographic variables were age group (18–24, 25–44, 45–64, 65+), gender (male, female, other), education level (less than primary, primary, middle, higher), economic level according to the 2019 Brazilian Economic Classification Criteria (high to low: A, B1, B2, C1, C2, and D–E) [35,36], and place of residence (each of the six health districts of the municipality and each of the neighboring municipalities or states with at least one patient in the sample). The only health coverage variable was coverage by private health insurance or a discount card (neither; card without insurance; insurance with or without card). The healthcare utilization variables were having a referral doctor or nurse (yes, no), utilization of the emergency care unit in the last 12 months (0, 1–2, 3–4, 5+ times), and whether the participant arrived at the emergency care unit during business hours (between 07:00 and 18:00, Monday through Friday, except municipal, state, or national holidays). The health status variables were self-assessed health status (very poor, poor, fair, good, excellent) and disease count (0, 1, 2, 3+ chronic health conditions), the latter variable being generated from 23 chronic conditions (asthma, osteoporosis, arthritis, hypertension, diabetes, heart problems, pulmonary emphysema or COPD [chronic obstructive pulmonary disease], Parkinson's disease, loss of kidney function, prostate disease [imputing "no" to missing data, e.g. for women], thyroid problems, glaucoma, cataracts, Alzheimer's disease, urinary or fecal incontinence).

Study size

The intended sample size was 1,285 participants. It was calculated to provide 80% statistical power to detect prevalence ratios of 1.5 or more, with a ratio between exposed and unexposed participants of 0.2, and a prevalence of the outcome in unexposed participants of 20%. This number was higher than the 1,219 participants needed to estimate the prevalence of inappropriate use, with a 2.5% margin of error, considering the prevalence of 24.2% found in a previous study [37].

Statistical methods

The distribution of outcome variables (the two questions asked to patients, the clinical priority, and the Hospital Emergency Suitability Protocol) was described here for the total population and for

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each level of the predictor variables. The distribution of predictor variables was described in a previous article [27].

The association between the outcomes and the predictor variables was estimated as adjusted odds ratios (aOR), using multilevel logistic regression models. Each outcome was also considered a predictor of the following outcomes, in the order in which they were presented above. The regression models were hierarchical [33,34], so that the odds ratios were adjusted for other variables at the same level and lower hierarchical levels. Because both the interviewers and, presumably, the emergency care unit's workers worked in 12-hour shifts, all models incorporated a "shift" variable, with the diurnal shift of a given day including participants recruited from 07:00 to 19:00, and the nocturnal shift of a given day including participants recruited from 19:00 to 07:00 of the following day. Null models including only the "shift" variable were used to calculate the credible interval (CI) for the prevalence of the outcome variables.

Ordinal variables (age group, schooling, economic classification, self-reported health status, disease count, triage) were coded to ensure that the coefficients increase or decrease monotonically across levels [38]. Place of residence was treated as random effect variable, while gender, coverage by discount card or health insurance, and dichotomous variables were treated as fixed effect variables. Regression models were adjusted using the Hamiltonian Monte Carlo algorithm with NUTS [39,40], regularizing the coefficients (but not the intercepts) with weakly informative prior distributions.

Missing data were handled by complete case analysis, that is, by only describing and including in the regression models observations (participants) with complete data for the relevant variables. The only participant reporting being nor male, nor female had a missing value for another variable, and was thus excluded from the analyses.

The data were analyzed with R version 4.5.1 [41], using package {readstata13} 0.11.0 [42] for importing data, {data.table} 1.17.0 [43] for manipulating data, and {brms} 2.22.0 [44,45] and {cmdstanr} 0.9.0 [46] for fitting the regression models. In turn, {brms} and {cmdstanr} provided a high-level interface to Stan 2.26.0 [47,48].

Results

Throughout 30 consecutive days, 1,232 patients were asked to join the study, of which 1,177 (94.5%) accepted to participate. Of those, 1,027 (83.4%) had complete data for all the relevant variables, and were thus included in the following results. The median (range) number of included participants per shift was 14 (4–43).

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Self-assessed urgency was reported by 76.6% (95% CI, 72.7–80.1) of participants (Table 1). It varied from 68.5% among participants aged 18–24 years to 84.7% among those aged 65+ (aOR 2.39; 95% CI, 1.45–4.46) and from 69.5% among those with no chronic conditions to 86.1% among those with 3 or more of them (aOR 1.93; 95% CI, 1.18–3.24).

Table 1 — Prevalence of self-assessed urgency, and its association with predictor variables

Characteristic	n	%	aOR	(lower bound	upper bound)
Age group					
18–24	159	68.5%	1.00		
25–44	362	76.5%	1.45	1.06	2.07
45–64	194	81.9%	1.90	1.27	2.91
65+	72	84.7%	2.39	1.45	4.46
Gender					
Male	295	74.7%	1.00		
Female	492	77.8%	1.16	0.86	1.59
Education level					
Less than primary	170	82.9%	1.00		
Primary	142	75.1%	0.98	0.68	1.16
Secondary	356	74.9%	0.93	0.60	1.30
Higher	119	75.3%	0.89	0.51	1.48
Economic level					
D-E (lowest)	107	81.7%	1.00		
C2	250	79.6%	0.95	0.67	1.09
C1	215	74.4%	0.86	0.54	1.14
B2	174	73.1%	0.80	0.48	1.22
B1	31	70.5%	0.74	0.40	1.35
A (highest)	10	90.9%	0.69	0.33	1.59
Region					
Centro district	46	74.2%	1.00		
Forte São João district	96	78.0%	1.01	0.74	1.51
Maruípe district	187	75.7%	1.00	0.72	1.45
Santo Antônio district	26	72.2%	1.00	0.66	1.44
Continental district	84	72.4%	0.99	0.66	1.35
São Pedro district	23	79.3%	1.01	0.71	1.67
Vitória (unknown district)	143	75.3%	1.01	0.76	1.48
Greater Vitória (except Vitória)	166	81.8%	1.07	0.85	1.84
Espírito Santo (except Greater Vitória)	10	83.3%	1.01	0.72	1.71
Other federative units (except Espírito Santo)	6	66.7%	1.00	0.65	1.58
Private health insurance					
None	687	77.0%	1.00		
Discount card	30	69.8%	0.62	0.32	1.27
Yes	70	76.1%	1.03	0.63	1.71
Usual source of care					

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Characteristic	n	%	aOR	(lower bound	upper bound)
No	570	75.8%	1.00		
Yes	217	78.9%	1.12	0.79	1.61
Repeat utilization					
None	135	74.2%	1.00		
1–2 times	289	78.5%	1.02	0.87	1.34
3–4 times	176	73.3%	1.05	0.77	1.44
5+ times	187	78.9%	1.11	0.71	1.75
Business hours					
No	420	78.1%	1.00		
Yes	367	75.1%	0.82	0.60	1.12
Self-rated health status					
Very poor	83	88.3%	1.00		
Poor	86	78.9%	0.84	0.46	1.00
Regular	288	79.1%	0.72	0.39	1.00
Good	222	69.6%	0.59	0.31	1.00
Excellent	108	76.6%	0.55	0.27	1.01
Disease count					
0	185	69.5%	1.00		
1	227	76.7%	1.20	1.01	1.68
2	146	73.4%	1.33	1.05	1.88
3+	229	86.1%	1.93	1.18	3.24
Total	787	76.6%			

aOR: adjusted odds ratio

On the other hand, only 27.4% (95% CI, 23.6–31.3) of participants had a self-assessed need for the emergency care unit (Table 2). That is, most people reported they would have not come even if they had guaranteed access to a visit with a competent professional in the primary care center. Prevalence of self-assessed need varied from 34.0% among participants with a very poor health status to 22.7% among those with an excellent health status (aOR 0.58; 95% CI, 0.33–0.96). Likewise, the prevalence was 20.8% among participants without and 29.4% among those with self-assessed urgency (aOR 1.52; 95% CI, 1.07–2.17).

Table 2 — Prevalence of self-assessed need for the emergency care unit, and its association with predictor variables

Characteristic	n	%	aOR	(lower bound	upper bound)
Age group					
18–24	60	25.9%	1.00	1.00	1.00
25–44	123	26.0%	1.07	0.99	1.37
45–64	64	27.0%	1.20	0.96	1.65
65+	34	40.0%	1.59	0.93	2.85

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Characteristic	n	%	aOR	(lower bound	upper bound)
Gender					
Male	99	25.1%	1.00	1.00	1.00
Female	182	28.8%	1.19	0.88	1.62
Education level					
Less than primary	66	32.2%	1.00	1.00	1.00
Primary	52	27.5%	0.98	0.73	1.16
Secondary	121	25.5%	0.95	0.64	1.28
Higher	42	26.6%	0.91	0.55	1.48
Economic level					
D-E (lowest)	44	33.6%	1.00	1.00	1.00
C2	93	29.6%	0.95	0.66	1.08
C1	67	23.2%	0.86	0.54	1.13
B2	61	25.6%	0.81	0.50	1.22
B1	13	29.5%	0.76	0.43	1.37
A (highest)	3	27.3%	0.70	0.29	1.55
Region					
Centro district	13	21.0%	1.00	1.00	1.00
Forte São João district	33	26.8%	1.01	0.77	1.48
Maruípe district	63	25.5%	1.00	0.74	1.43
Santo Antônio district	10	27.8%	1.01	0.79	1.66
Continental district	33	28.4%	1.02	0.81	1.65
São Pedro district	8	27.6%	1.01	0.76	1.65
Vitória (unknown district)	52	27.4%	1.02	0.82	1.61
Greater Vitória (except Vitória)	60	29.6%	1.03	0.84	1.67
Espírito Santo (except Greater Vitória)	3	25.0%	1.01	0.76	1.69
Other federative units (except Espírito Santo)	6	66.7%	1.03	0.85	2.30
Private health insurance					
None	242	27.1%	1.00	1.00	1.00
Discount card	15	34.9%	1.41	0.70	2.73
Yes	24	26.1%	1.04	0.61	1.72
Usual source of care					
No	202	26.9%	1.00	1.00	1.00
Yes	79	28.7%	1.04	0.74	1.45
Repeat utilization					
None	53	29.1%	1.00	1.00	1.00
1–2 times	105	28.5%	0.92	0.69	1.00
3–4 times	74	30.8%	0.83	0.61	0.99
5+ times	49	20.7%	0.62	0.40	0.96
Business hours					
No	145	27.0%	1.00	1.00	1.00
Yes	136	27.8%	1.02	0.74	1.41
Self-rated health status					
Very poor	32	34.0%	1.00	1.00	1.00
Poor	34	31.2%	0.90	0.61	1.00

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Characteristic	n	%	aOR	(lower bound	upper bound)
Regular	103	28.3%	0.79	0.52	0.99
Good	80	25.1%	0.67	0.42	0.97
Excellent	32	22.7%	0.58	0.33	0.96
Disease count					
0	71	26.7%	1.00	1.00	1.00
1	71	24.0%	1.00	0.80	1.19
2	58	29.1%	1.01	0.74	1.38
3+	81	30.5%	1.01	0.65	1.54
Self-assessed urgency					
No	50	20.8%	1.00	1.00	1.00
Yes	231	29.4%	1.52	1.07	2.17
Total	281	27.4%			

aOR: adjusted odds ratio

According to the Manchester Triage System (Table 3), 0.7% (95% CI, 0.2–1.9) of participants had their visit triaged as non-urgent, 71.1% (95% CI, 66.6–74.4) as standard, 24.1% (95% CI, 20.3–27.7) as urgent, 4.1% (95% CI, 2.6–6.0) as very urgent, and 0.1% (95% CI, from less than 0.1 to 1.0) as immediate. The probability of a more urgent clinical priority was higher for older patients (aOR 1.95 for 65+ versus 18–24 years; 95% CI, 1.15–3.49), and lower during business hours (aOR 0.74; 95% CI, 0.54–0.99) and for participants with better health status (aOR 0.43 for excellent versus very poor; 95% CI, 0.24–0.82). Regarding the outcomes, the probability of a more urgent clinical priority was higher for participants with self-assessed urgency (aOR 2.33; 95% CI, 1.62–3.45), but not for those with self-assessed need for the emergency care unit (aOR 1.11; 95% CI, 0.82–1.50). It should be noted that even participants without self-assessed urgency were triaged as urgent or very urgent in 15.0% of cases, and as non-urgent in only 0.4%.

Table 3 — Distribution of the classification by the Manchester Triage System, and its association with predictor variables

[See at the end of the manuscript]

Characteristic	Non-urgent		Standard		Urgent		Very urgent		Immediate		Adjusted odds ratio		
	n	%	n	%	n	%	n	%	n	%	Esti-mate	(lower bound	upper bound)
Age group													
18–24	1	0.4%	180	77.6%	46	19.8%	5	2.2%	0	0.0%	1.00	1.00	1.00
25–44	5	1.1%	332	70.2%	118	24.9%	17	3.6%	1	0.2%	1.20	1.01	1.65
45–64	1	0.4%	169	71.3%	55	23.2%	12	5.1%	0	0.0%	1.34	1.05	1.92
65+	0	0.0%	49	57.6%	28	32.9%	8	9.4%	0	0.0%	1.95	1.15	3.48
Gender													

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Characteristic	Non-urgent		Standard		Urgent		Very urgent		Immediate		Adjusted odds ratio		
	n	%	n	%	n	%	n	%	n	%	Esti-mate	(lower bound	upper bound)
Male	3	0.8%	270	68.4%	103	26.1%	19	4.8%	0	0.0%	1.00	1.00	1.00
Female	4	0.6%	460	72.8%	144	22.8%	23	3.6%	1	0.2%	0.80	0.61	1.04
Education level													
Less than primary	2	1.0%	132	64.4%	66	32.2%	5	2.4%	0	0.0%	1.00	1.00	1.00
Primary	1	0.5%	127	67.2%	47	24.9%	13	6.9%	1	0.5%	0.95	0.73	1.07
Secondary	3	0.6%	357	75.2%	98	20.6%	17	3.6%	0	0.0%	0.81	0.57	1.12
Higher	1	0.6%	114	72.2%	36	22.8%	7	4.4%	0	0.0%	0.75	0.48	1.23
Economic level													
D-E (lowest)	1	0.8%	82	62.6%	41	31.3%	7	5.3%	0	0.0%	1.00	1.00	1.00
C2	2	0.6%	225	71.7%	72	22.9%	14	4.5%	1	0.3%	0.97	0.65	1.11
C1	2	0.7%	212	73.4%	64	22.1%	11	3.8%	0	0.0%	0.92	0.57	1.19
B2	2	0.8%	175	73.5%	52	21.8%	9	3.8%	0	0.0%	0.89	0.53	1.31
B1	0	0.0%	30	68.2%	14	31.8%	0	0.0%	0	0.0%	0.85	0.48	1.62
A (highest)	0	0.0%	6	54.5%	4	36.4%	1	9.1%	0	0.0%	0.81	0.39	2.21
Region													
Centro district	1	1.6%	41	66.1%	16	25.8%	4	6.5%	0	0.0%	1.00	1.00	1.00
Forte São João dis-trict	0	0.0%	88	71.5%	28	22.8%	6	4.9%	1	0.8%	1.00	0.73	1.26
Maruípe district	2	0.8%	177	71.7%	61	24.7%	7	2.8%	0	0.0%	0.99	0.70	1.20
Santo Antônio district	2	5.6%	23	63.9%	10	27.8%	1	2.8%	0	0.0%	0.99	0.71	1.30
Continental district	0	0.0%	81	69.8%	28	24.1%	7	6.0%	0	0.0%	1.00	0.78	1.33
São Pedro district	0	0.0%	20	69.0%	9	31.0%	0	0.0%	0	0.0%	1.00	0.72	1.31
Vitória (unknown dis-trict)	1	0.5%	141	74.2%	41	21.6%	7	3.7%	0	0.0%	0.98	0.68	1.19
Greater Vitória (ex-cept Vitória)	1	0.5%	144	70.9%	48	23.6%	10	4.9%	0	0.0%	1.00	0.75	1.29
Espírito Santo (except Greater Vitória)	0	0.0%	8	66.7%	4	33.3%	0	0.0%	0	0.0%	1.00	0.73	1.35
Other federative units (except Espírito Santo)	0	0.0%	7	77.8%	2	22.2%	0	0.0%	0	0.0%	0.99	0.69	1.29
Private health insur-ance													
None	7	0.8%	629	70.5%	219	24.6%	36	4.0%	1	0.1%	1.00	1.00	1.00
Discount card	0	0.0%	31	72.1%	9	20.9%	3	7.0%	0	0.0%	0.93	0.46	1.80
Yes	0	0.0%	70	76.1%	19	20.7%	3	3.3%	0	0.0%	0.86	0.52	1.39
Usual source of care													
No	5	0.7%	533	70.9%	187	24.9%	27	3.6%	0	0.0%	1.00	1.00	1.00
Yes	2	0.7%	197	71.6%	60	21.8%	15	5.5%	1	0.4%	0.95	0.69	1.31
Repeat utilization													
None	0	0.0%	123	67.6%	47	25.8%	12	6.6%	0	0.0%	1.00	1.00	1.00
1–2 times	4	1.1%	267	72.6%	81	22.0%	16	4.3%	0	0.0%	0.93	0.61	1.08
3–4 times	2	0.8%	176	73.3%	58	24.2%	4	1.7%	0	0.0%	0.87	0.56	1.15
5+ times	1	0.4%	164	69.2%	61	25.7%	10	4.2%	1	0.4%	0.83	0.52	1.32

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Characteristic	Non-urgent		Standard		Urgent		Very urgent		Immediate		Adjusted odds ratio		
	n	%	n	%	n	%	n	%	n	%	Esti-mate	(lower bound	upper bound)
Business hours													
No	3	0.6%	370	68.8%	138	25.7%	26	4.8%	1	0.2%	1.00	1.00	1.00
Yes	4	0.8%	360	73.6%	109	22.3%	16	3.3%	0	0.0%	0.74	0.54	0.99
Self-rated health status													
Very poor	0	0.0%	54	57.4%	32	34.0%	7	7.4%	1	1.1%	1.00	1.00	1.00
Poor	0	0.0%	88	80.7%	19	17.4%	2	1.8%	0	0.0%	0.68	0.42	0.98
Regular	2	0.5%	255	70.1%	91	25.0%	16	4.4%	0	0.0%	0.63	0.39	0.94
Good	2	0.6%	224	70.2%	81	25.4%	12	3.8%	0	0.0%	0.58	0.36	0.90
Excellent	3	2.1%	109	77.3%	24	17.0%	5	3.5%	0	0.0%	0.43	0.24	0.82
Disease count													
0	0	0.0%	199	74.8%	60	22.6%	7	2.6%	0	0.0%	1.00	1.00	1.00
1	4	1.4%	219	74.0%	60	20.3%	13	4.4%	0	0.0%	1.06	0.99	1.34
2	3	1.5%	142	71.4%	49	24.6%	5	2.5%	0	0.0%	1.19	0.98	1.61
3+	0	0.0%	170	63.9%	78	29.3%	17	6.4%	1	0.4%	1.48	0.97	2.21
Self-reported ur-gency													
No	1	0.4%	203	84.6%	34	14.2%	2	0.8%	0	0.0%	1.00	1.00	1.00
Yes	6	0.8%	527	67.0%	213	27.1%	40	5.1%	1	0.1%	2.33	1.61	3.45
Self-reported spe-cific need													
No	7	0.9%	535	71.7%	176	23.6%	27	3.6%	1	0.1%	1.00	1.00	1.00
Yes	0	0.0%	195	69.4%	71	25.3%	15	5.3%	0	0.0%	1.11	0.82	1.50
Total	7	0.7%	730	71.1%	247	24.1%	42	4.1%	1	0.1%			

According to the Hospital Emergency Suitability Protocol, 70.7% (95% CI, 66.7–74.6) of the visits being considered suitable for the emergency care unit (Table 4). The severity criterion was met in 53 (4.8%) visits; the treatment criterion was met in 608 (55.0%) visits (mostly parenteral medication, 54.5%); the diagnostic intensity criterion was met in 390 (37.7%) visits (mostly radiology, 16.8%, and laboratory tests, 25.3%); the “other” criterion was met in 30 (2.7%) visits; and the criterion applicable to patients not arriving by ambulance was met in 160 (14.7%) visits (mostly suggestive signs, 10.9%). Suitability was not clearly associated with any of the predictor variables, nor with the self-assessed need for the emergency care unit. On the other hand, the prevalence of appropriateness ranged from 63.3% among participants without to 72.9% among those with self-assessed urgency (aOR 1.50; 95% CI, 1.10–2.08), and from 42.9% for visits classified as non-urgent to 97.6% of those classified as very urgent (aOR 38.94; 95% CI, 6.81–616.22).

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Table 4 — Prevalence of appropriateness per the Hospital Emergency Suitability Protocol, and its association with predictor variables

Characteristic	n	%	aOR	(lower bound	upper bound)
Age group					
18–24	153	65.9%	1.00	1.00	1.00
25–44	338	71.5%	1.16	0.98	1.65
45–64	174	73.4%	1.32	0.96	1.97
65+	61	71.8%	1.49	0.93	2.48
Gender					
Male	268	67.8%	1.00	1.00	1.00
Female	458	72.5%	1.23	0.93	1.61
Education level					
Less than primary	149	72.7%	1.00	1.00	1.00
Primary	123	65.1%	1.05	0.95	1.33
Secondary	339	71.4%	1.23	0.90	1.77
Higher	115	72.8%	1.40	0.86	2.31
Economic level					
D-E (lowest)	96	73.3%	1.00	1.00	1.00
C2	231	73.6%	0.94	0.69	1.04
C1	199	68.9%	0.82	0.56	1.07
B2	163	68.5%	0.75	0.49	1.13
B1	28	63.6%	0.68	0.38	1.18
A (highest)	9	81.8%	0.62	0.29	1.26
Region					
Centro district	44	71.0%	1.00	1.00	1.00
Forte São João district	90	73.2%	1.00	0.77	1.35
Maruípe district	175	70.9%	1.00	0.76	1.27
Santo Antônio district	24	66.7%	0.99	0.69	1.26
Continental district	77	66.4%	0.98	0.68	1.19
São Pedro district	20	69.0%	1.00	0.72	1.35
Vitória (unknown district)	132	69.5%	1.00	0.74	1.28
Greater Vitória (except Vitória)	146	71.9%	1.00	0.78	1.31
Espírito Santo (except Greater Vitória)	10	83.3%	1.00	0.75	1.40
Other federative units (except Espírito Santo)	8	88.9%	1.00	0.75	1.44
Private health insurance					
None	632	70.9%	1.00	1.00	1.00
Discount card	32	74.4%	1.20	0.59	2.51
Yes	62	67.4%	0.88	0.55	1.41
Usual source of care					
No	530	70.5%	1.00	1.00	1.00
Yes	196	71.3%	1.02	0.74	1.41
Repeat utilization					
None	135	74.2%	1.00	1.00	1.00
1–2 times	260	70.7%	0.98	0.70	1.12
3–4 times	159	66.3%	0.93	0.62	1.21

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Characteristic	n	%	aOR	(lower bound	upper bound)
5+ times	172	72.6%	0.90	0.58	1.40
Business hours					
No	392	72.9%	1.00	1.00	1.00
Yes	334	68.3%	0.74	0.54	1.00
Self-rated health status					
Very poor	71	75.5%	1.00	1.00	1.00
Poor	84	77.1%	0.94	0.68	1.03
Regular	250	68.7%	0.83	0.54	1.07
Good	232	72.7%	0.78	0.50	1.11
Excellent	89	63.1%	0.65	0.35	1.14
Disease count					
0	187	70.3%	1.00	1.00	1.00
1	205	69.3%	1.00	0.80	1.18
2	137	68.8%	1.00	0.72	1.30
3+	197	74.1%	0.99	0.65	1.52
Self-assessed urgency					
No	152	63.3%	1.00	1.00	1.00
Yes	574	72.9%	1.50	1.10	2.08
Self-assessed need					
No	526	70.5%	1.00	1.00	1.00
Yes	200	71.2%	0.97	0.71	1.33
Triage					
Non-urgent	3	42.9%	1.00	1.00	1.00
Standard	466	63.8%	2.01	1.04	8.45
Urgent	215	87.0%	8.12	3.45	36.35
Very urgent	41	97.6%	38.94	6.81	616.22
Immediate	1	100.0%	176.55	11.22	701049.43
Total	726	70.7%			

aOR: adjusted odds ratio

Discussion

In this (non-hospital) emergency care unit, prevalence of appropriate utilization varied widely among measures, from only 27.4% people saying they would come even if they had timely access to a competent primary care provider (“self-assessed need”), to 99.3% being triaged as standard or more urgent per the Manchester Triage System. This finding confirms what Lowe and Abbuhl [1] suspected: “much of the variation [between studies] is because of differences in how visits are classified.” Because the choice of measure makes such a difference in the prevalence of appropriateness, health services researchers should ensure their measures aligns with the intended interpretations, and future meta-analyses should group or select studies according to their appropriateness measures.

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The low prevalence of self-assessed need for the emergency care unit confirms ease of the access to emergency services and difficulty of access to primary healthcare [3,4,7,49,50], and perceived primary care provider's inadequacy or incompetency [7,49], as major reasons for seeking care at emergency services. Of note, the wording of the relevant item in the questionnaire didn't allow this study to disentangle patients' concerns with accessibility from their concerns with competency. While illiteracy on healthcare systems is often blamed for people using emergency services for problems amenable to primary care [3,49,51], this is clearly not the case in this context, with most participants stating they'd rather have made their visit to primary care instead. If policymakers are to discourage people from seeking care at the emergency care units, instead of making information campaigns about seeking primary care for minor problems, they should ensure primary care is (known for being) sufficiently staffed by competent primary care providers. As Behrens and colleagues [49] found out, "patient behavior changes in response to experiences made during service delivery."

Another finding was that correlations between measures varied substantially among comparisons. Self-assessed urgency was associated with all other measures, although not enough to render them redundant. Triage was strongly associated with suitability (per the Hospital Emergency Suitability Protocol), with "urgent" visits being four times more likely than "standard" ones to be considered suitable for the emergency care unit. This is perhaps the first quantitative validation of the Manchester Triage System for emergency care units, adding to the already extensive literature on its validity for (hospital) emergency departments [20–22] and to the qualitative literature on its utilization in emergency care units [19].

Notably, self-assessed need for the emergency care unit was not associated with the classification by neither the Manchester Triage Protocol, nor the Hospital Emergency Suitability Protocol. Both measures are often used to classify visits as by "primary care problems" [11–18], but the participants in this study beg to differ. If they had timely access to a competent primary care provider at their primary care clinics, 70.3% of the visits assigned "urgent" or higher clinical priority per the Manchester Triage Protocol would not have come to the emergency care unit, as well as 72.4% of those deemed appropriate by the Hospital Emergency Suitability Protocol.

In other words, most patients presenting through the front door to a (non-hospital) emergency care unit see little difference between its role and that of primary care centers in the urgency and emergency healthcare network of Brazil's Unified Health System. While failing to see the difference between primary care and emergency services is often blamed for the inappropriate utilization of the latter [3,49,51], the present study also found this confusion among patients making *appropriate* utilization of the emergency services (as measured from the service's perspective). This finding begs the

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question: what proportion of same-day visits to primary care would be deemed appropriate for emergency care units?

This is confusion is consistent with the National Policy for Urgent Care not being explicit about any circumstances in which people should seek emergency care units without first trying primary care [2]. Both the primary care centers and the emergency care units, and perhaps even the “open-doors” emergency departments of hospitals found elsewhere, should benefit from the Unified Health System being more explicit and comprehensive about which problems are not to be brought to primary care. There are no universal standards of appropriateness of visits to emergency departments (and, by extension, emergency care units) [1], which is why these should be settled regionally, taking in consideration the context of the healthcare network. In example, even though primary care clinics can be expected to be nearer than emergency care units, the geographical accessibility of both can vary dramatically among municipalities. Furthermore, even though the convenience of having laboratory and radiology exams is an oft-cited reason for seeking care in emergency departments, in the municipality of Rio de Janeiro most primary care clinics cater to tens of thousands of enrolled patients, and have not only a room for collecting laboratory exams, but also radiography and sonography equipment [52].

Lastly, this study also found that measures of appropriateness had similarities and differences between them in their association with predictor variables. All four measures were, or seemed to be, positively associated with older age, and none were associated with other sociodemographic variables. None of the four measures were associated with having private health insurance or a discount card. Healthcare utilization variables provided some variety, with none of the measures associated with having a usual source of care, only self-assessed need being (negatively) associated with repeat utilization of the emergency care unit, and only triage being (negatively) associated with visits during business hours. Regarding the health status, all four measures were, or seemed to be, negatively associated with self-assessed health status, and only self-assessed urgency was (positively) associated with disease count.

Some study limitations should be considered when interpreting these findings. First, the study was not able to recruit patients arriving by ambulance directly to the clinical stabilization room. This can be expected to have biased downwards the prevalence of appropriate utilization, and widened the confidence intervals for the estimated associations. Second, the cross-sectional design could have biased the association between the appropriateness of utilization and predictor variables. Namely, participants were selected conditioning on them seeking care at the emergency care units, which could result in collider bias. Associations between appropriateness and other reasons for seeking care (such as poor health status, or different measures of appropriateness) should be actually higher

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than what this study estimated, and associations between appropriateness and reasons for not seeking care at this public emergency care unit (living far away, having private health insurance) should be actually lower than estimated. On the other hand, the usual disclaimer about reverse causation is not relevant, because the outcome variables (appropriateness of the current visit) are not chronic conditions, and both the literature and the pilot test gave us no reason to suspect the answers about chronic conditions were biased by the participants' reason for the visit to the emergency care unit. Finally, the cross-sectional design did not allow us to estimate the association between predictor variables and the rate of inappropriate utilization, which some researchers and policymakers might be more interested in.[4]

Conclusions

Most visits to an emergency care unit are appropriate, in terms of the information available before seeking care (self-assessed urgency), before the diagnosis (Manchester Triage System) and after the diagnosis and treatment (Hospital Emergency Suitability Protocol). Assessment by the Manchester Triage System is highly correlated to that by the Hospital Emergency Suitability Protocol, confirming the former's validity in this kind of non-hospital emergency service. Self-assessed urgency is only moderately associated with the other measures of appropriateness, confirming its unique perspective.

At the same time, most visits to the emergency care unit are deemed "primary care problems" by the patients, in the sense that they would have not come to the emergency service if they had timely access to a competent primary care provider. This measure of appropriateness is only moderately associated with self-assessed urgency, and not associated at all with the other two measures (the Manchester Triage System and the Hospital Emergency Suitability Protocol). While much has been written about patients seeking care at emergency services for problems they could have taken to primary care, the reverse is also true, with most patients preferring primary care for problems deemed appropriate for emergency services.

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