Analysis of medical regulation of the Emergency Department in a city in the State of São Paulo, Brazil

Ana Claudia Ferreira de Almeida[1] (Orcid: 0000-0003-4086-9512) (ana_falmeida@usp.br)
Leonardo Resende de Sousa[1] (Orcid: 0000-0003-1384-327X) (leoresende@usp.br)
Maria Eugenia Guerra Mutro[2] (Orcid: 0000-0002-8329-482X) (maromutro@hotmail.com)
Alessandra Mazzo[1] (Orcid: 0000-0001-5074-8939) (amazzo@usp.br)

[1] Faculdade de Odontologia de Bauru, Universidade de São Paulo. Bauru-SP, Brazil.
[2] Prefeitura Municipal de Bauru. Bauru-SP, Brazil.

Abstract: **Objective**: To analyze the profile of referrals from the emergency department in a city in the state of São Paulo, Brazil. Methodology: This is a retrospective descriptive observational study. The sample of this study included the data of individuals referred by the emergency department during the year of 2019. At the end of data collection, a descriptive statistical analysis was performed. **Results**: Valid data from 9,984 referrals were found. The average time to the release of the hospital bed was 26.6 hours (± 35.8). Among all referred patients, 1,592 (15.9%) did not complete their destinations, evolving to one of the following outcomes: medical discharge (9.3%), death (2.3%), patient dropout (2.8%) or termination of its file (1.5%). The average length of stay in the unit for patients who were discharged was 40.8 hours (±36.2), while for those who died it was 40.9 hours (±42.7). **Conclusions**: The waiting times for releasing the hospital beds requested by the emergency department are longer than those recommended in the literature. This can cause worse outcomes for referred patients and goes beyond the competencies of the emergency service as defined by the Brazilian Ministry of Health.

➤ **Keywords:** Health Care Coordination and Monitoring. Prehospital Services. Prehospital Care. Emergency Medical Services.

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Introduction

The 24-hour Emergency Care Units (ECUs) are components of the National Urgency and Emergency Policy, constituting equipment of intermediate complexity, located between Primary Care and the hospital network (BRASIL, 2003). The main objectives of the ECUs are to support primary care for acute cases that exceed their resolution capacity and reduce the influx of users to the hospital entrance doors, being a key component for the regulation of these patients (BRASIL, 2017).

It is recommended that patients remain in these services for a maximum of 24 hours for diagnostic clarification or clinical stabilization. Cases that do not have their complaints solved should be referred to hospital care through care regulation. In this regard, the care strategy is directly related to the work of the Emergency Regulation Center, which organizes the flow of care by referring the patient to the appropriate health service for the situation (BRASIL, 2017).

With the objective of improving the flow of patients in the regulation, it is important that there is a proper hospital backup and quality in the care of the ECUs, with the existence of risk classification and attendance of demands that fit the urgencies and emergencies. A study showed that the risk classification is present in almost all of the ECUs analyzed, and in most of the units, around 95%, medium and low risk care predominated (CONASS, 2015). Still in this sense, other studies in different ECUs indicate that more than half of the investigated cases were not very urgent or were considered "inadequate", according to the Hospital Emergency Adequacy Protocol (PAUH) (MACHADO *et al*., 2015; O'DWYER *et al*., 2017; SOUZA *et al*., 2020).

This scenario is present in Brazil, among other factors, due to the difficulty of accessing primary health care, marked by the delay in scheduling consultations and the longer waiting time for care. In addition, the population has a very common misconception about the situations in which urgent and emergency units should be sought. Thus, the speed and resolution of the ECUs make this service considered a reference for the health problems of the population, even in cases where it is not an emergency, which can overload the service and impact the care provided in these units. (CARRET, FASSA, DOMINGUES, 2009; SOUZA, 2020). In addition, there is great concern about the operation of emergency units without proper hospital support. Most ECU professionals consider the lack of hospital vacancies to

be the main reason why users stay in the units for more than 24 hours. In addition, the unavailability of transport to remove patients is also cited as a delaying factor in the regulation of patients (CONASS, 2015).

Often, the waiting time for the bed tends to be long and the change in the objectives of the ECU to an inpatient unit is pointed out as a consequence of the difficulty in admitting patients to hospital vacancies. As an example, it was found that in the ECUs in the city of Rio de Janeiro, of all requests for hospital beds for the ICU and Internal Medicine, only 40% and 36% were completed, respectively (KONDER; O'DWYER, 2019). In this context, it is clear that the stay of patients for more than 24 hours in pre-hospital units impacts the quality of care provided by these services, as it takes up professionals and resources for a longer period than that established by emergency policies. Generally, with the increase in demand, the units start to extrapolate their main function of promoting patient stabilization for transfer and elucidation of the diagnostic hypothesis (O'DWYER *et al*., 2017).

In addition to negatively impacting the quality of patient care, the prolonged time spent waiting for the release of specialized hospital beds can also influence the user's outcome. Some studies suggest a worse prognosis and increased mortality rates and length of stay associated with prolonged length of stay in emergency rooms (CHALFIN *et al*., 2007; CARDOSO *et al*., 2011; ALETREBY *et al*., 2021).

Thus, it is necessary to understand how this process has taken place in the municipalities, since the study of how the regulation between fixed pre-hospital units and the rest of the care network has occurred is essential to identify whether patients have reached their destinations and whether they are being subjected to adequate waiting times for the release of hospitalization vacancies.

Therefore, the objective of this study was to analyze the profile of the regulations of fixed pre-hospital units in a municipality in the interior of the state of São Paulo in the year 2019.

Methodology

This is a descriptive and retrospective observational study, carried out in a medium-sized city, with approximately 370,000 inhabitants, located in the interior of the state of São Paulo, Brazil. The municipality is a reference for 68 cities and approximately 1.6 million inhabitants of the regional health district in which it operates.

The city's care network is organized into five fixed pre-hospital units, four of which are ECUs and one municipal emergency room, which articulate with emergency mobile care service, the state's Regulation Center and reference hospitals. Referrals are made through the state regulation network.

The sample of this study comprises individuals attended at the five fixed pre-hospital units, from January 1, 2019 to December 31, 2019, who were regulated in this period for other services. The information from these references was acquired from the spreadsheets prepared by the municipal units themselves. Among the available data, those of regulations that had the following items were included: Patient's age; Date and time of vacancy request; Date and time of vacancy release; Specialty of the vacancy requested; and Destiny or other outcome (discharge, death, paciente dropout or closed file).

The destination locations were named 1) Hospital A: reference in the areas of traumatology, neurological and cardiovascular urgencies and emergencies; 2) Hospital B: reference in internal medicine, general surgery, pediatrics and oncology beds; 3) Hospital C: reference in psychiatric care and 4) Outpatient clinics: all outpatient services in the municipality. Transfers between different pre-hospital units were also identified, due to the human and material resources available in each of them.

In addition to these items described, in those referrals in which the Vacancy Zero discrimination was present, this was also analyzed. Vacancy Zero is a resource available for situations where there is no reference hospital with conditions to receive the patient and the condition is serious, that is, when there is an imminent risk for the maintenance of life and the available aids are insufficient for the case. This resource implies immediate admission, regardless of the availability of beds in the referenced units, aiming at both access to minimal resources and critical resources for diagnosis and treatment of cases with high potential for morbidity and mortality (Brazil, 2002).

Data collection began after approval of the project by the Research Ethics Committee of the educational institution (CAAE: 40001720.0.0000.5441) and technical opinion from the Scientific Committee of the Municipal Health Department of the city of the study. For recording and measuring the collected data, a Microsoft Excel spreadsheet was created with an organization related to the

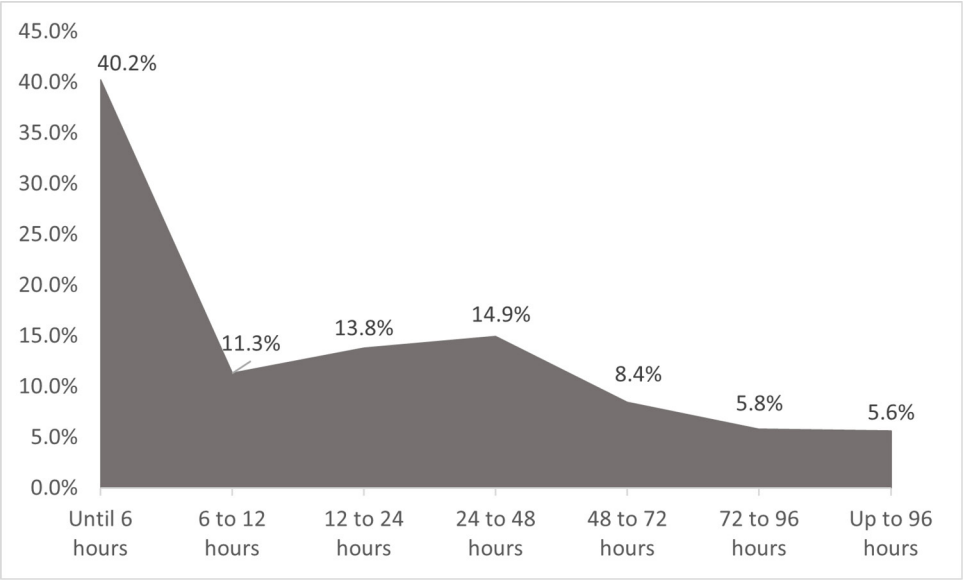
items mentioned above. At the end of the collection, a descriptive statistical analysis was performed with the numbers obtained in the survey.

Results

During 2019, among the five fixed pre-hospital units studied, data from 10,231 referrals were found. Of these, 247 were excluded for one or more of the following reasons: presence of duplicate data, absence of date and time of vacancy request, absence of date and time of vacancy release, presence of incompatible data. Thus, valid data from 9984 referrals were considered.

Regarding the waiting times for the vacancy release, which refers to the interval between the insertion of the vacancy request in the regulation system and its release, the minimum time of 0 hours was found (corresponds to the immediate vacancy release), maximum time of 337.0 hours, mean of 26.6 hours (± 35.8) and median of 10.9 hours (IQR: 2.6 - 38.3). The distribution of waiting times for the release of vacancies is detailed in Figure 1.

Figure 1. Distribution of waiting times (in percentage) until the release of hospitalization vacancies requested by fixed pre-hospital units in 2019.



Among the regulated patients, 1,522 (15.2%) were children or adolescents under 18 years of age, 4,873 (48.8%) were adults aged 18 to 59 years and 3589 (36.0%) were elderly over 60 years of age. The lowest age found was 0 and the highest was 107 years. The mean age was 46.9 years (±25.3) and the median was 49 years. The average waiting time for the release of hospital vacancies according to age group was 11.5 hours for children and adolescents, 22.1 hours for adults and 38.8 hours for the elderly.

Among the vacancies requested, the most frequent specialties were Internal Medicine, Orthopedics, General Surgery, Pediatrics and Intensive Care Unit. It is noteworthy that of the total number of requests, Intensive Care Unit beds corresponded to 6.4% and ward beds to 93.6%. The rates referring to requests divided by specialties are detailed in Table 1. Less frequent specialties such as psychiatry, cardiology, neurology, urology, otorhinolaryngology and neurosurgery were grouped in the "Others" category in Table 1.

Table 1. Distribution of waiting times (in hours) by specialties until the release of inpatient vacancies requested by fixed pre-hospital units in 2019

Speciality	N	%	Average (±DP)	Median (IQR)
Internal Medicine	2.638	26,4	41,3 (±41,0)	29,3 (8,5 - 63,3)
Orthopedics	1.939	19,4	19,4 (±29,5)	6,2 (1,8 - 23,6)
General Surgery	1.030	10,3	21,5 (±34,8)	5,2 (1,6 - 25,0)
Pediatrics	764	7,7	14,3 (±20,7)	6,7 (2,8 - 20,0)
Intensive Care Unit	635	6,4	30,0 (±35,6)	15,1 (3,9 - 47,4)
Others	2.978	29,8	-	-
Total	9.984	100,0	-	-

SD: standard deviation, IQR: interquartile range 25%–75%.

Source: own elaboration.

Among all vacancy requests made, 8392 (84.1%) patients reached their destinations among reference services in the region. The remaining 1592 (15.9%) patients did not complete their destination because they were discharged, died, dropped out or had their records closed. Data referring to destinations and other patient outcomes are detailed in Table 2. The distributions of discharges and deaths by waiting periods from the moment the vacancy was requested until the outcome are shown in Figures 2 and 3, respectively.

Table 2. Distribution of waiting times (in hours) by destinations and other outcomes until the release of inpatient vacancies requested by fixed pre-hospital units in 2019

Destination	N	%	Average (±DP)	Median (IQR)
Hospital A	4.284	42,9	19,0 (±29,6)	5,2 (1,6 - 23,7)
Hospital B	3.335	33,4	32,6 (±40,8)	15,4 (3,2 - 49,5)
Hospital C	246	2,5	23,0 (±28,7)	18,0 (3,2 - 28,0)
Ambulatory	115	1,2	9,7 (±15,7)	3,9 (1,5 - 10,1)
Other fixed pre-hospital units[1]	77	0,8	19,0 (± 30,5)	11,2 (3,3 - 22,5)
Other hospitals	335	3,3	-	-
Discharge[2]	933	9,3	40,8 (±36,2)	28,8 (14,6 - 58,8)
Dropout	282	2,8	26,6 (±27,5)	18,6 (4,5 - 41,5)
Death	229	2,3	40,9 (±42,7)	27,4 (7,8 - 61,5)
Closed record[3]	148	1,5	23,7 (±28,6)	12,4 (3,0 - 34,5)
Total	9.984	100,0	-	-

SD: standard deviation, IQR: interquartile range 25%-75%.

[1] The transfer between pre-hospital units can happen to guarantee access to different health resources for patients who have not yet had their hospital vacancies available.

[2] Corresponds to the cancellation of the vacancy request due to clinical improvement of the patient.

[3] Corresponds to the cancellation of the vacancy request for reasons other than clinical improvement, such as, for example, error in filling out the request.

Source: own elaboration.

Figure 2. Distribution of time (in percentages) elapsed between requests for vacancies and patient discharges in fixed pre-hospital units in 2019

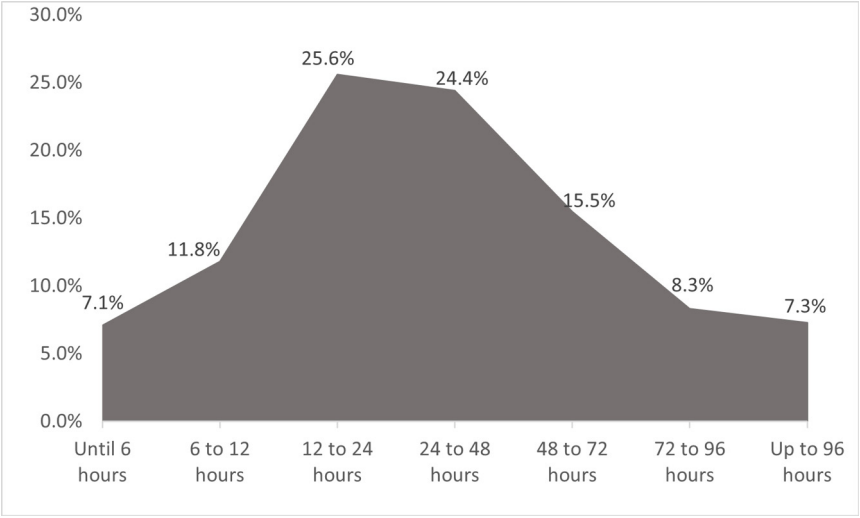
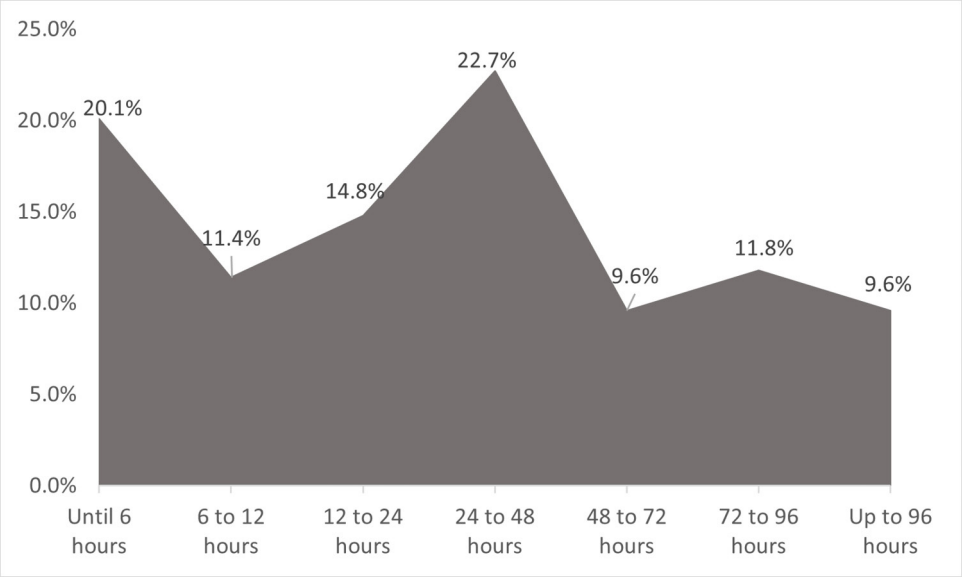


Figure 3. Distribution of time (in percentages) elapsed between requests for vacancies and patient deaths in fixed pre-hospital units in 2019



Of the 9,984 referrals that were analyzed in this study, 7,789 (78.0%) had the specification of being Vacancy Zero or not. Of these, 326 (4.2%) occurred in Vacancy Zero protocol, while 7,463 (95.8%) occurred in normal vacancies. The minimum time found between requests for Vacancy Zero was 0.2 hours and the maximum time was 293.4 hours. The average was 46.7 hours (±51.2) and the median 26.6 hours (IQR: 7.9 - 74.0).

Discussion

The stages of waiting times that patients are submitted to until they reach their final destinations can be divided into three: 1) time elapsed between the patient's entry into the service and the request for a hospitalization vacancy; 2) time elapsed between the vacancy request in the regulation system and the moment of its release and; 3) time elapsed in patient removal between the requesting unit and the destination unit. The sum of these times can influence the outcomes of patients, in addition to contributing to the overcrowding of the emergency service (CONASS, 2015).

This study was dedicated to studying only stage 2, mentioned above, defined by the time elapsed between the request for a hospitalization vacancy and its release, which is considered the most important factor in the patient's total waiting time (PINES *et al*., 2011).

In this sense, in order to mitigate the problems in the service flow of emergency departments, institutions from different countries have established some recommendations. In the United Kingdom, it was defined that for the proper functioning of the emergency service, no patient should wait more than 4 hours in the emergency units until hospital admission, emphasizing that the responsibility for achieving this goal rested with the reference hospitals (PINES *et al*., 2011). In the United States, the Society of Critical Care Medicine defined that a critically ill patient should be transferred from the emergency room to the intensive care unit within a maximum of 6 hours (SOCIETY OF CRITICAL CARE MEDICINE, 1999). In this study, when extrapolating to the metrics used not only for critical patients, but also for those scheduled for general ward beds, there is a divergence between the data found and the previously mentioned guidelines, since most patients waited more than six hours for the release of their hospitalization vacancies.

With the aim of demonstrating the influence that waiting time has on patient outcomes, researchers have shown that in Saudi Arabia delayed admission from the emergency room to the intensive care unit is an independent risk factor for hospital mortality of the patient, and the association is even stronger in waiting times longer than four hours (ALETREBY *et al*., 2021). A survey carried out from a multicenter database in the United States concluded that critically ill patients with waiting times equal to or greater than 6 hours until transfer had an increased length of hospital stay and increased mortality (CHALFIN *et al*., 2007). In Brazil, research carried out in the city of Londrina-PR found an association between delay in patient admission and higher mortality and that quick access to the intensive care unit generates benefits for critically ill patients (CARDOSO *et al*., 2011).

Thus, the importance of a quick transfer of a critical patient to an inpatient unit is highlighted. However, the data found in the present study reveal that the mean general waiting time of patients until the vacancy was released was 26.6 hours and 30.0 hours when the destination was the ICU (Table 1). The average time of 26.6 hours is also above the 24 hours recommended by the Ministry of Health for diagnostic elucidation or clinical stabilization in emergency care units. The

recommendation is that cases that do not have their complaints resolved within this period be referred to hospital care, which differs from the data found, since 34.7% of patients waited in the units for more than 24 hours for the release of the bed requested (BRASIL, 2017).

Regarding the main destinations of regulated patients, the lowest average waiting time corresponds to Hospital A, followed by Hospital C and Hospital B (Table 2). The difference in waiting time for each of these services may be related to the service profile presented, since Hospital A mostly receives cases of trauma or cardiovascular and neurological urgencies and emergencies, situations in which care needs to be provided early. Referrals between the pre-hospital units themselves possibly occurred due to the lack of human and material resources for patient care in the unit where they were initially received.

Regarding the patients who were discharged, it was found that 44.5% of these occurred before 24 hours and in the requesting unit (Figure 2). Studies question whether the reason for these discharges is the good resolution of the units or the early insertion of the request for a hospitalization vacancy by the emergency service team (KONDER; O'DWYER, 2019; GOLDWASSER *et al*., 2016). On the other hand, most discharges occurred after 24 hours, and are probably patients who received treatment in the pre-hospital unit itself, with improvement in their clinical status, thus ruling out the need to request a hospital vacancy. The treatment of these patients for more than 24 hours in the units uses professionals' time and physical and material resources that, theoretically, were not intended for this purpose, which can impact the functioning and quality of care provided in these units, also causing great wear and tear of professionals, in addition to the aforementioned overcrowding (KONDER; O'DWYER, 2019).

Regarding deaths, 46.3% occurred in the first 24 hours of the patient's stay in the unit, which may be related to the critical condition presented by the patient since admission. On the other hand, most patients who died in the units had been waiting for more than 24 hours to be released from the bed (Figure 3). These results converge with those found in the literature, making it possible to question whether these deaths could be avoided if they had been transferred early to the regulated bed (KONDER; O'DWYER, 2019).

The "Vacancy Zero" modality should only occur in situations where there is no hospital with conditions to receive the patient in a serious clinical condition, with

imminent risk for the maintenance of life, implying his immediate hospitalization (BRASIL, 2002). In this study, it is observed that the average time of adjustments in "Zero Vacancy" was higher than the general average, which raises the question of how these vacancies are being determined and occupied.

The scenario exposed in this study suggests the absence of sufficient hospital beds for the regulation of patients treated in the region and/or the lack of integration between the requesting and destination units. The lack of adequate hospital support directly influences the length of stay of users in the units, which is a decisive factor for the overcrowding of these services. In this sense, it is essential that, as in other countries, better strategies be discussed. A flow of care and regulation of patients at appropriate times can bring better outcomes to regulated patients and reduce overcrowding in emergency units (PINES *et al*., 2011).

Conclusions

Although the data used in this study were secondary and offer restrictions on the ability to establish causality, which can be considered limitations, the waiting times for the release of admission spaces requested by pre-hospital units are increased in relation to the recommendations in the literature. This fact can cause worse outcomes for regulated patients and goes beyond the competences of the emergency service defined by the Ministry of Health.[1]

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Note

1 A. C. F. de Almeida and A. Mazzo: conception; data analysis and interpretation; article writing or relevant critical review of intellectual content; final approval of the version to be published. L. R. de Sousa and M. E. G. Mutro: design and analysis and interpretation of data; final approval of the version to be published.

Resumo

Análise da regulação médica em unidades pré-hospitalares fixas de um município paulista

Objetivo: Analisar o perfil das regulações das unidades pré-hospitalares fixas de um município paulista. Metodologia: Estudo observacional descritivo retrospectivo, cuja amostra compreendeu os dados dos indivíduos regulados das unidades durante o ano de 2019. Ao final da coleta dos dados, foi realizada uma análise estatística descritiva. **Resultados**: Foram encontrados dados válidos de 9.984 referenciamentos. A média de tempo de liberação da vaga foi de 26,6 horas (± 35,8). Dentre todos os pacientes regulados, 1.592 (15,9%) não concluíram seus destinos, tendo como desfechos: alta (9,3%), óbito (2,3%), evasão (2,8%) ou encerramento de ficha (1,5%). O tempo médio de permanência na unidade dos pacientes que receberam alta foi de 40,8 horas (±36,2), enquanto para os que vieram a óbito foi de 40,9 horas (±42,7). **Conclusões**: Os tempos de espera para liberação das vagas de internação solicitadas pelas unidades pré-hospitalares estão mais elevados do que os recomendados pela literatura. Tal fato pode provocar piores desfechos aos pacientes regulados e extrapola as competências do serviço de emergência definidas pelo Ministério da Saúde.

➤ **Palavras-chave:** Regulação e Fiscalização em Saúde. Serviços Pré-Hospitalares. Assistência Pré-Hospitalar. Serviços Médicos de Emergência.