

Work and health dialogues: analysis of interactive activity in Rio de Janeiro, Brazil, firefighters' blogs

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Abstract *Advances in the techniques of automatic document analysis allow the understanding of objective and subjective aspects in texts extracted from social media. This paper proposes a study on the work-health relationship of military firefighters of the Prehospital Care in the city of Rio de Janeiro, through publications in the blogs SOS Bombeiros and SOS Bombeiros RJ. Thanks to the methodological approach, through network analysis, a strong correlation between the words used by the stakeholders was uncovered, revealing precarious working conditions and the need for increased attention to workers' health.*

Key words *Firefighters, Blogs, Emergency mobile units, Worker's health*

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Introduction

Military firefighters are perceived socially as a brave and fearless super-heroes, always ready to help and save lives. However, the reality of the activity of these workers includes the demands of any other worker, aggravated by the strict military hierarchy, exposure to risk situations and intense work rhythm¹.

They live in constant physical and psychic overload, routinely deal with tragic situations, predisposing themselves to high levels of tension, threats, and anxiety, often in unprecedented and unexpected situations, with exposure to all types of risk, also risking their lives². However, one tends to think of these professionals only as caregivers and hardly as individuals also requiring care and who may have their health compromised³.

The relationship between the health-disease process and work of this category still has little prominence in the national scientific literature^{1,4-6}. This situation is more pressing when we find a lack of studies that consider firefighters working in prehospital care (APH)⁵.

Prehospital service is a peculiarity in urgent and emergency care since it means a type of care that transcends the conventional physical environment of health facilities³. The professionals of these services work daily in adverse, unknown and unpredictable environments, with neither routine activities nor control of the time spent in each occurrence, thus hindering their time management.

Also, a particular feature is found in the municipality of Rio de Janeiro, where the Emergency Mobile Service (SAMU) has been administratively integrated into the Fire Department since 2007 and has assumed operations and implementation since 2008. This is a functional differentiated situation, because workers are military, unlike what happens in the other SAMUs of the country, whose service is manned by civilian workers⁷.

Since joining the Fire Department, SAMU has increased the rates of service to the population⁸. The capital of Rio de Janeiro accounts for about 70% of APH⁹. According to data from the Statistics Section of CBMERJ, the Fire Department attended approximately 337,060 distress calls in 2015, of which 173,532 (51.5%) were performed by the units of the capital. Of these, 7,930 (4.6%) were for fires, 30,696 (17.7%) rescues and 134,906 (77.7%) for pre-hospital care¹.

According to the 2016 CBMERJ Yearbook¹⁰, 348,568 military fire services were carried out in the state, of which 148,661 (42.64%) were car-

ried out by the APH. When compared only between the rescue modalities ($n = 266,516$), this percentage rises to 55.8%, translating into 412 daily attendances. Around 320 attendances/day are estimated in the city of Rio de Janeiro. Over the years, a large number of attendances, coupled with poor working conditions, have generated high rates of dissatisfaction, suffering, and illness of the category.

It can be said that poor conditions have become the foundation of contemporary work organization, exerting a disruptive influence on human and social relationships in and out of work. These ruptures stem from the competitiveness engendered, the imposed polyvalence, excellence, intimidation, moral harassment and other forms of violence, culminating in suffering and illness in individuals, reaching the extreme situation of suicide, often in the workplace itself¹¹⁻¹³.

One of the manifestations of military firefighters' dissatisfaction is evident in existing blogs. Currently, two blogs represent CBMERJ's military firefighters and serve as sources of dissemination, organization, and debates about the needs of the category. These spaces emerged from the demands of the military firefighters of the state of Rio de Janeiro initiated in April 2011, in the fight for decent working conditions and better salaries, at the time, the lowest in the country. Aware of possible reprisals and punishments, comments are predominantly anonymous.

These spaces allow users more freedom of expression and participation and are recognized as a new model of representative democracy and political participation, given that the internet has been the leader of political manifestations in the world¹⁴ since the end of the twentieth century.

Furthermore, blogs represent a reconfiguration of traditional media by creating new opportunities for social interaction. The blogosphere (a collective term that includes all weblogs or blogs) consists of independent "bloggers" who have created their networks and promote debates, discussions, collective actions outside the corporate media or sizeable traditional portals¹⁴.

Montardo and Passerino¹⁵ affirm that posts are at the core of the blog, in which bloggers set their reflections and visitors post comments and opinions about the subject posted. According to the authors, a communication mediated by computer postings is an essential and reliable observation mechanism.

Thus, this study proposed to analyze the relationship between work and health of the military firefighters working in Rio de Janeiro's mobile

APH, with particular attention to the meaning of work, from the interactive activity of blogs *SOS Bombeiros* and *SOS Bombeiros RJ*.

Material and methods

An exploratory and analytical-descriptive study was conducted with a quantitative-qualitative approach in two virtual communities of the sub-category of blogs: *SOS Bombeiros*, through the electronic address (<http://www.sosbombeiros.com/>), and *SOS Bombeiros RJ*, through the link (<http://www.sosbombeirosrj.com/>), without any priority order. The *SOS Bombeiros* blog was established in 2011. It has recorded 8,641,077 hits since its inception and has a representation of 6,044 thousand followers in its extension to Facebook. The blog *SOS Bombeiros RJ* was established in 2012. It has recorded 6,435,548 hits and has 14,371,000 followers on its official Facebook page (access on January 21, 2018).

Data collection

Data were collected using the Import.io software (<https://www.import.io/>) that runs on websites, performs the automatic extraction of a large volume of data and converts them into structured, analyzable data. Blogs' posts were searched by keywords, and the *by date* filter of published material from 2011 to October 2017 was applied.

Considering that these blogs address various topics of interest to the entire firefighters' category and some are more specific to particular segments of the fire brigade (lifeguards, first responders, combatants, and so forth), four keywords were established for search, in order to recover only the material that addressed matters relating to the APH service: ["APH", "ambulância", "GSE" and "SAMU"].

Selection criteria

After the initial collection, screening was carried out to select only the subjects that dealt with subjects related to the mobile APH service of the municipality of Rio de Janeiro from the keywords described in Data Collection. Those that emerged in the search terms but were not related to the search object were excluded.

Following the selection of the subjects, data were tabulated in a spreadsheet and identified through the fields position, date, paper title, link

to the paper, number of comments in the post and if exclusive of the mobile APH of Rio de Janeiro. Thus, it was possible to identify the most influential subjects among bloggers, observing the inclusion and exclusion criteria.

Establishing the corpus

With the most influential blogs at hand, the next step was to assemble a corpus with the comments inserted in the four posts with the highest number of comments. The selection of the sample was by the criterion of saturation of recurrence of words and volume of data.

A corpus is nothing more than a collection of texts that shows a set of natural languages, and establishing this set is a time-consuming task since in most cases manual processes based on the knowledge of a specialist are required¹⁶.

For this study, four corpora were assembled in plain text files, using a text editor. After building the corpus, a pre-processing was required before running the experiments in the data analysis tool. This step primarily aims to clean data, eliminate redundancies and unnecessary information¹⁷. The main techniques applied in this stage, considering textual databases, derive from computer science, through text mining, which will not be considered in this study because they are not part of the scope, except for *stop words*.

Stop words are common words that frequently appear in texts but are semantically irrelevant, that is, they have no value for analysis. These words are represented by articles, prepositions, pronouns, conjunctions, and punctuations. Also excluded were month names, dates, numbers, and words "blog", "reply", and "comments". It should be noted that the choice of stop words will result from what we intend to analyze and that some words considered stop words may be significant, depending on the context.

Data analysis

Voyant Tools (<https://voyant-tools.org/>) was used to extract characteristics of the corpus assembled in the previous step. It is a web application that facilitates exploring opportunities of analysis of text through algorithms that calculate the frequency of terms used; the distribution and relationship between words; the patterns of relationships, through quantitative analyses and graphic representations (trend, clouds, word count, among others).

Results and discussion

The implementation of the search string in blogs returned a total of 280 posts distributed between 2011 and October 2017. The filter applied through the inclusion and exclusion criteria occurred in the following sequence: a) reading the title of the material; b) excluding duplicated material in the same blog; c) excluding duplicated material between the two blogs; d) reading the full text and e) excluding subjects that did not meet the selection criteria, reducing the initial corpus of the research to 75 subjects. Table 1 summarizes the number of items obtained with search sessions.

During the process of selecting the materials, aiming to select only those that approached the mobile APH service, we found that they mostly addressed APH service-related issues, with some exceptions. However, they did not consider exclusive guidelines of Rio de Janeiro, since it is a State institution. Among the matters excluded were those that addressed matters such as APH from other municipalities of the state, matters of general interest to firefighters, matters specific to other firefighters' segments, policy, and state management.

The subjects related to the object were organized in four categories, based on the title, theme, and subject of comments: Work organization (40), Working conditions (31), Information and Dissemination (3) and Recognition (1).

Work organization – the main guidelines of debates about this realm of work were: GSE/SAMU linkage, hierarchy, subordination, harassment and penalties; *Working conditions* - urban violence, physical, environmental and psychic risks, remuneration, leave, accumulated functions, food and hygiene conditions, precarious ambulances, lack of vacancies and beds in hospitals; *Information and Dissemination* - a paper

comparing SAMU/RJ with SAMU/SP, another disseminating a reality show that would accompany the routine of SAMU Rio professionals and a call for a meeting with SAMU Rio professionals; *Recognition* - refers to a matter called “GSE of firefighters: decisive service to save lives” in which the corporation shows the rate of attendances and says that capital of Rio de Janeiro accounts for almost 70% of the state's APH and describes the relevance of the service for the outcome of accidents, trauma, and clinical events⁹.

The acknowledgment in this post is related to the statistics of the attendances, without mentioning the professionals, but it is understood as being appropriate to them since there is no work without workers. At various times, firefighters are grateful for the recognition of the population and media support. Paradoxically, they challenge the lack of recognition of the corporation, either by acknowledgment, praise or promotion.

The interactive activity in blogs was analyzed using the Voyant Tools to meet the research objectives, taking as reference the four subjects with the highest number of comments on the topic addressed in this study (Table 2).

The story with the highest number of comments “The face of inhumanity within the CB-MERJ” is the case of a nurse officer working in a SAMU ambulance who, after several occurrences, claimed to no longer have the physical and mental conditions to continue in service. Even under higher orders, the professional maintained her refusal justified by her health status. Through such stance, when returning to the barracks, she was jailed due to insubordination. The subject had great repercussion among firefighters, but among the various manifestations of support, some concerns that put in question the professional's conduct were raised.

Rodrigues and Bellini¹³ described that a worker who is ill due to work situations suffers

Tabela 1. Sumarização de seleção das matérias.

Palavras-chave	SOS Bombeiros	SOS Bombeiros RJ	Total	Consolidado dos blogs	
Ambulância	55	51	106	Somatório inicial	223
APH	3	3	6	Repetidas	25
GSE	25	43	68	Número real	198
SAMU	43	57	100	Exclusão pós-análise	123
Repetidas	23	34	57	Objeto de estudo	75
Total	103	120	223		

Fonte: Elaboração própria.

Table 2. Ranking of the top-four subjects with the highest number of comments.

Rank	Data	Subject title	Number of comments
1	Sunday, January 8, 2017	The face of inhumanity within the CBMERJ	248
2	Monday, February 3, 2014	12th GBM- The image of oppression and dictatorship!	209
3	Friday, December 23, 2016	In the GSE, "RQUERO" is worth more than general command mark	124
4	Tuesday, January 7, 2014	Ambulance firefighters and rescuers ask for help	113

Source: Own elaboration.

both from physical or mental impairment and prejudice of commanders and even colleagues, due to lack of knowledge or access to worker's social rights and health.

Firefighters participating in the study by Monteiro et al.¹⁸ reported that society and the community itself believe that firefighters cannot show fragility and must bear everything, mainly because they are military and because there is no opportunity for listening. Oftentimes, they do not complain for fear of criticism and comments from colleagues.

There was also great mobilization of the nursing category and health professionals in general, including other social media such as Facebook, whose story had 4,036 reactions through standardized figures to express users' emotions, known as emoticons; 548 comments and 1,251 shares (access on November 18, 2017). This was not different in the firefighters' blogs.

Inhuman! We have reached our physical and mental health limits. [Anonymous, January 9, 2017, 09:21 min]

This is cowardice!! An unfortunate situation. When we enter the corporation, we arrive full of spirit and will, but the working conditions drive us sick. [Anonymous, January 9, 2017, 00h43min]

The theme of the second story is the arrest of a male health military. According to the report, at the end of the shift, a corporal deployed as a nursing assistant was informed that he should work a "double-shift" because his ambulance replacement did not show up. The worker justified that he was exhausted following several attendances and did not have the physical and emotional strengths to complete another 24 hour-shift, in addition to personal issues. However, despite explanations, the military was arrested due to insubordination.

Is arresting an exhausted family man after completing his workday complying with the regulation? [Anonymous, February 6, 2014, 1:50 pm]

The third story questions the extraordinary, compulsory work schedules in the GSE, in addition to the outrage due to successive salary and 13th salary arrears, claiming not to have the financial resources to travel from the residence to the barracks and vice versa.

The dream of any Top GSE military is to leave the GSE.

*The GSE military is not entitled to leave,
is not entitled to health,
is not entitled to family,
is not entitled to leisure,
is not entitled to have rights,
is not entitled to life,*

We are worthless spare parts to those who command us.

[Anonymous, December 23, 2016, 10:12 a.m.]

The last story addresses the report of a distress call sent by a health firefighter. In this report, the worker describes the working conditions experienced by ambulance professionals, claiming to be subjected to poor working conditions, without rest and conditions to fulfill his basic needs (food and hygiene), without recognition for work, accumulated leaves to be taken and work overload after linking the SAMU to the GSE, as reported below:

I am here to ask for help from the SOS because I cannot stand the lack of consideration with the military who are already tired of giving away years of their life to APH rescue calls in CBMERJ ambulances and also accumulating SAMU's work. [Excerpt from the Firefighter's report on working conditions, January 7, 2014]

The four databases were loaded simultaneously, forming a single file. Thus, the cor-

a proportion of 1,124 inhabitants per firefighters and a shortage of approximately 10,397 firefighters. Considering the estimate of 1,200 health professionals in the GSE⁹, the deficit of this cadre would be around 843 workers, or almost double (70%) of workers.

The ratio between the number of attendances and the number of active firefighters shows that around 8% of military personnel are allocated in the APH and account for 42% of all state production. In the capital, they are 6%, and they perform almost 30% of all the attendances, and work overload of firefighters working in the mobile APH of the state and municipality of Rio de Janeiro is evident.

Decentralization, automatically uncoupling the SAMU from the GSE/CBMERJ would not only reduce the demand and work overload in the group of firefighters, but also physical and psychosocial harm, such as depression, burnout, gastrointestinal and cardiovascular disorders, RSI/WMSD, accidents, and so forth.

Unlinking would also promote an higher supply of jobs, favoring many currently unemployed workers, as well as affecting the economy of the municipality and state, with no excess burden on public coffers, since the compensation of firefighters is already the responsibility of the state manager, and there is a monthly financial incentive (50% of the budget) transferred by the Ministry of Health for the cost and maintenance of the program, and according to the guidelines of the national policy^{22,23}, there must be a counterpart of the state and municipality on a regular and agreed basis of the other 50%.

In fact, there is a sum of errors on all sides! The SAMU / CBMERJ military compete on an ABSURD work schedule, given the service demand. There are NO WORKING CONDITIONS, as many vehicles do not even have AIR CONDITIONING! Apart from the DISRESPECT concerning mealtimes and physiological needs, as well as the limit of the body itself [Anonymous, January 8, 2014, 13:43]

Several real-world structures can be represented through graphs, facilitating relevant information about their elements and their interactions. In a network, a graph is formed by nodes or vertices connected by lines, called edges or links and that establishes the relation between them²⁴.

In network analysis, centrality is the measure of the importance of a vertex in a graph, and the different metrics allow to estimate the influence of a stakeholder or element within a network.

Several studies have used networks for text analysis, in which words are the nodes and the edges the links between them²⁵.

The representation of text in a network facilitates categorization of textual data, identification of the most influential terms, detection of closely related concepts in a word community, retrieval of hidden agendas within a text, and perception of feelings, allowing the construction of meanings²⁵.

The graphic configuration of Links (Figure 2) is determined by the degree of proximity between words and expresses in a didactic and succinct manner the main topic of debate in the context studied. The words “SAMU”, “SERVICE” and “GSE” (highlighted) have the highest degree of centrality in the text *corpus* (keywords) and work as mediators in the construction of meanings. Adjacent words are the most frequent words in the context of keywords.

Corroborating previous data, we can see the centrality of the word SAMU, however, different from the cloud, we can see beyond frequency the interaction between words. The highlighted words are the most influential in the text, consequently, in the statements. The word *serviço* is directly related to the words: *absurdo*, *militar*, *bombeiro*, *SAMU*, and *vtr* (vehicle); *GSE* is immediately related to *militar*, *CBMERJ*, *fim*, *militar* and *SAMU*; and the word *SAMU*, to *GSE*, *serviço*, *CBMERJ* and *fim*.

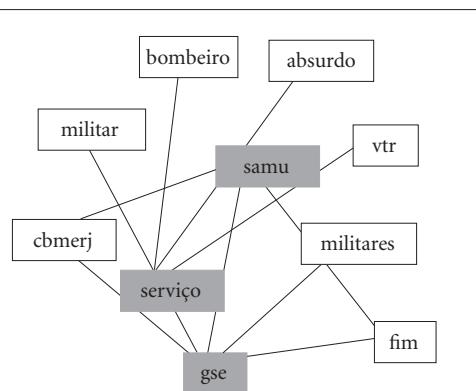


Figure 2. Graph of Links.

Source: Own elaboration in Voyant tools²¹.

The analysis of the network in dialogue with the materials and comments confirms the study by Salvador et al.⁵, whose firefighters from the city of Rio de Janeiro declared that the primary work stressor is the integration of SAMU to the Military Fire Brigade, claiming work overload and attendance of non-urgent and non-emergency demands, hampering service to the real needs of the population.

CAMPAIGN “DOWN WITH SAMU”, FOR A MINIMUM OF DIGNITY TO THE HEALTH OF THE CBMERJ WORKER! WE NEED TO HELP EACH OTHER; TOGETHER WE ARE STRONG! [MSILVA, JANUARY 8, 2014, 10:26 p.m., emphasis added]

I can't stand this work routine anymore. I've been on sick leave several times because of health problems. [...] several friends are on sick leave due to health problems. This is absurd; it has to stop. We cannot take it anymore, down with SAMU! [...] [JSE, December 23, 2016, 11:03]

An interesting function provided in the tool is the measure of Correlations, which calculation is based on the correlation function created by Pearson²⁶ and facilitated a deeper understanding of the corpus. This study does not pretend to be exhaustive regarding Pearson's correlation.

Briefly, the correlations function allows to evaluate when two variables have some relationship between them, that is, whether high (or low) values of one of the variables imply high (or low) values of the other variable. For example, one can verify whether there is an association between the birth rate and unemployment in a city, among the financial resources invested in condom use advertising.

In the correlation analysis, we attempt to determine the degree of relationship between two variables, that is, to measure the variability between them. A coefficient close to 1 indicates a positive correlation (they rise and fall together). Scores close to -1 mean a negative correlation, that is, frequencies of a term vary inversely (one rises while the other falls). Coefficient close to zero (positive or negative) indicates weak or negligible correlation²⁰.

In Figure 3, we can see a strong correlation between some words, among which the tool classified in descending order of correlation.

By verifying the words with the highest correlation index, it can be inferred that, in most of the comments, in which the word “trabalho” was used, the word “vítima” was also used, whether in the same comment or the next. It was necessary to go directly to the comments and verify at what

point they were used to check the information and validate the tool-generated result.

Words “trabalho” and “vítima” appeared concomitantly in two contexts: 1) after a comment about the work and the victims (profile of attendance and impact on victims) and 2) sometimes referring to firefighters as victims of their work. [...] *you don't solve anything, and you even shift from victim to culprit* (Anonymous, April 8, 2015, 7:03 pm).

Words “serviço” and “tirar” compete in two moments: 1) When they are referring to the activity of “replacing someone” and 2) in questionings about work (“serviço”) and impossibilities of taking leave, rest, schedule, etc., *the military is coerced to perform an extra service to take leave* (Anonymous, December 23, 2016, 09:52).

Words “dinheiro” and “militares” also appear in two circumstances: 1) when they question why the resource transferred by the Ministry of Health to SAMU is not used to remunerate them through extra work; and 2) they mention the lack of money to commute to work and other needs, as a result of various pay and/or bonus payment in arrears. *They bleed preparedness by saying that they do not have money to go to the barracks to work their shift. Imagine the situation in PROG, which doesn't pay* (Anonymous, 23 of December of 2016, 10h39min).

Words “acabar” and “direito” alternate dialectically in discourses. Users question when this management model ends (SAMU x GSE), a bond that, as they say, brings consequences to work and health (physical and mental overload, urban violence, no leaves, extraordinary schedules, delayed attendance, scrapping of ambulances, and so forth). At the same time, they question their rights (wages, rest, food, basic hygienic needs, and so forth). In short, they claim the worker's right to health and better working conditions. [...] *They don't respect the right to leave and others. When will this end?*(Mr_bm, January 9, 2017, 1:28 pm).

The correlation chart made a significant contribution to work by showing that it is possible to seek knowledge in blogs, and through the association between words, to be able to understand some aspects of reality. However, in this research, in two moments, it was not possible to establish an adequate correlation between the associations shown in the chart:

Words “menos” and “somos” - The word *menos* does not have precise semantic value and can be used as adverb, noun, pronoun, preposition, among others. *Somos* usually appeared to



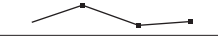
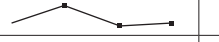
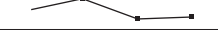

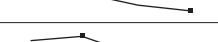

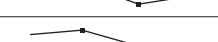



Term 1	←	→	Term 2	Correlation ↓
trabalho			vítima	0.99942154
serviço			tirar	0.99651927
dinheiro			militares	0.9960738
menos			somos	0.99059504
causa			público	0.98718387
acabar			direito	0.98644525

Figure 3. Correlations chart.

Source: Own elaboration in Voyant tools²¹.

mean collective identity or plurality. However, making an empirical inference, these suggest a disregard for various interests of the community or the reaffirmation of the community's strength in the face of deprivation or subtraction.

Words “causa” and “público” – It was also not possible to draw up a coherent correlation. The word “causa” usually appears as a consequence of something, for example, work demotivation arising from work organization, while the word “público” is a component of the term *Ministério Público*, and is repeatedly mentioned as the legal means of filing a complaint and appeal to the firefighters' rights.

According to Paranyushkin²⁵, the organization of related terms is based on affinity, causal relationships, chronological sequence, and semantic analysis. However, the computational interpretation does not apprehend subjective and cultural questions in the graphic structuring of the texts, since it is the result of a negotiation with the text itself. There is also an orthographic limitation since a compound word is not apprehended as a unique term, but as two distinct words.

Final considerations

The study showed that although firefighters are socially recognized as heroes and one of the professions most praised by the population, this recognition does not seem to reflect on the working and life conditions of the mobile APH military firefighters of Rio de Janeiro.

The analyses of the subjects and discussions revealed uncomfortable situations in the work environment, among them military rigidity, moral harassment, physical and mental over-

load, violence, among others. While many refer loving their profession, these situations have had repercussions on dissatisfaction, suffering, and sickness of these workers as a consequence of organizational and working conditions, enhanced by the linkage of SAMU to the GSE/CBMERJ.

Blogs act as a new political stakeholder in social relationships and have shown their potential for building knowledge and understanding of meanings, with elements that can be transformed into realities. The representativeness and relevance of blogs analyzed for the firefighting community under the motto “Together we are strong” (despite several censorship attempts) have contributed to the organization, information, debate, and struggle of these workers for better living, health and work conditions.

The transition of communication and information to the computerized environment, while quite advanced, often surprises us. The social relationships created in the virtual, networked environment often show us an innovative perspective that requires in-depth analysis. Like other networks, blogs are environments of intense social participation and an efficient way to communicate ideas, articulate actions, mobilize people, and so forth.

The results revealed some interesting findings on some of the needs of the APH Rio military firefighters. These results bring relevant contributions to other researchers who investigate the patterns and behaviors of people in the virtual environment and in society itself. Their findings also suggest new studies to better understand the administrative and financial covenants of the linkage of SAMU to GSE/CBMERJ, as well as provide fundamental elements to reconsider Health Governance strategies and actions in the state and municipality of Rio de Janeiro.

There is evidence of the need for institutional recognition of the category and public competition, based on the overload and shortage of professionals since the last public competition that included the entire health category dates back to 2008. It is imperative to elaborate a continuous psychological monitoring service for the APH Rio firefighters and increased attention to the health of these workers.

Of course, this study has limitations. Voyant Tools produces a series of information about the corpus and has a limited collection of metrics, bracketing possibilities of analysis. Moreover, despite the merit of being an exploratory study, the nature of the computerized model restricted further analysis of singularities of firefighters' work, which essence is the relationship with the other, suggesting new investigations in dialogue with other study methods.

Collaborations

MA Oliveira was responsible for defining the theoretical framework, planning, conducting the research and paper drafting; EMN Brito was responsible for the empirical material analysis, methodological review and paper drafting; S Oliveira participated in the overall orientation of the research and contributed to the structuring and final review of the manuscript.

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