UNIVERSIDAD DISTRITAL
FRANCISCO JOSE DE CALDAS

Bogota's Emergency Care System

Juan Bedoya[1], Juan Cardozo[2]
[1] Universidad Distrital Francisco Jose de Caldas, Colombia
jsbedoyas@udistrital.edu.co[1], jdcardozot@udistrital.edu.co

Introduction

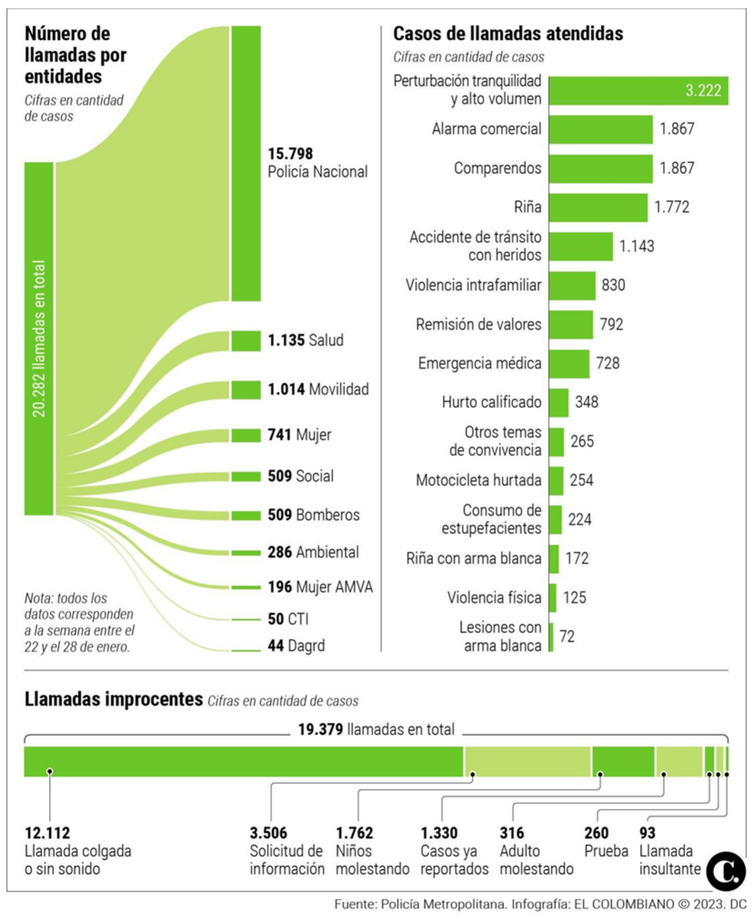
The emergency care system is a complex network designed to manage urgent medical situations through the coordination of personnel, technology, and facilities to deliver immediate care. However, it could have different emerging behaviors that generate chaos and some effects that interfere with the functioning of the system, for this reason, analyse how the system work and counteract this situation is a good way to understand the system.

Goal

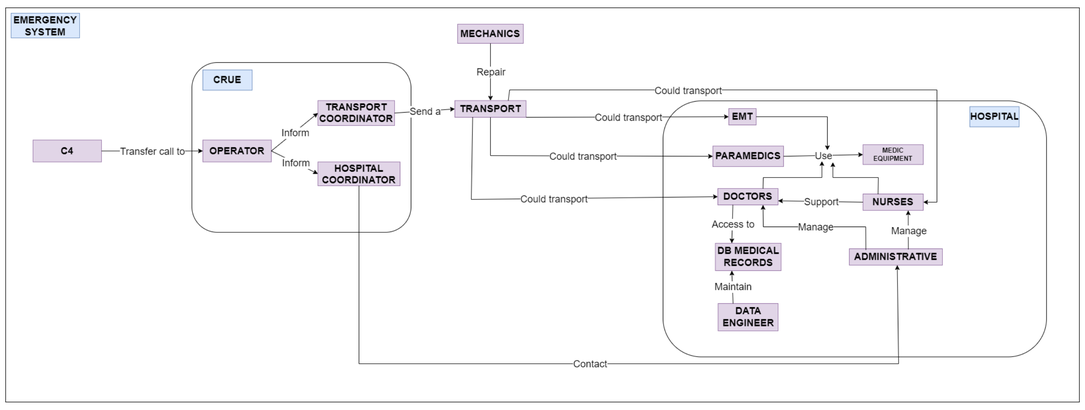
The main objective of this analysis is to answer the question of How the Bogota emergency system is affected by different factors. To do this, it is hoped to fully analyze the functioning of the emergency system, covering the different elements that are part of it and those that, although nor directly related, maintain a constant interaction with it.

In addition, it is hoped that concepts from general systems theory such as synergy, entropy and homeostasis can be applied to this analysis in order to have an even deeper understanding of the functioning of the system.

This analysis will ultimately provide a clearer understanding of how the system operates under various conditions, and suggest ways to mitigate the chaotic effects that arise from both predictable and unpredictable events. Through the lens of General Systems Theory, we can better understand how to enhance the system's resilience, improve coordination, and ensure a reliable response to emergencies in Bogotá.



Proposed solution



The emergency care system was divided in four parts, C4 (Centro de Comando, Control, Comunicaciones y Cómputo), CRUE (Centro Regulador de Urgencias y Emergencias), transport and the hospital. This division allows indentify easily the different elements and relations in the system, so with the inputs, elements, and relations, it is possible to establish characteristics, emerging behaviors, and a analysis related to the chaos theory. Also, it is also possible to analyze the influence that the environment has on these emerging behaviors. in addition, the system takes emergency calls as inputs. The relationships between the elements also allow for the visualization of the process through which inputs move across the system and the taking into account this process it is possible to see the effects in each element, studying if is a snowball effect, a butterfly effect or a domino effect.

Results

Initially, the following statistics were obtained, where it can be observed that there are multiple factors external to the system that can affect its operation. Things such as prank calls, hung up calls, or calls without sound are factors that can ultimately result in a serious impact on the entire process followed by the emergency system.

Furthermore, the study highlights how each element of the system contributes to the overall flow of care, from the initial call to medical intervention, which shows the importance of communication and coordination between the different areas to ensure a rapid and effective response. In addition, random elements are recognized that generate disorder in the system, such as unpredictable transport times and unexpected medical complications. This randomness increases complexity and the need for adaptation.

Finally, it could be said that despite all the inconveniences that may arise, the system maintains its internal balance thanks to protocols such as triage, allowing resources to be used optimally.

Conclusions

Across the system analysis, it was found that it is very useful to apply the Top-Down methodology, allowing for the identification of the system's elements, their relationships, inputs, outputs, emergent behaviors, and environment.

Thanks to this methodology and the elements identified through it, in addition to the different concepts taken from the general theory of systems, a more in-depth systemic analysis of the emergency system in Bogota was possible, allowing the behavior of the system to be understood from its foundations to its most specific elements.

References

[1] "Emergency Care — What to Expect". St. Mary's Regional Medical Center. A. Available: https://www.stmarysregional.com/services/emergency-services/emergency-care-what-to-expect

[2] "WHO Emergency care system framework". World Health Organization (WHO). Available: https://www.who.int/publications/i/item/who-emergency-care-system-framework

[3] Harveen Bal Bergquist, Taylor W. Burkholder, Osama A. Muhammad Ali, Yasein Omer, Lee A. Wallis, Considerations for service delivery for emergency care in low resource settings, African Journal of Emergency Medicine, Volume 10, Supplement 1, 2020, Pages S7-S11, ISSN 2211-419X, https://doi.org/10.1016/j.afjem.2020.07.002. (https://www.sciencedirect.com/science/article/pii/S2211419X20300707)

[4] Ministerio de salud. "Sistema de emergencias médicas SEM". Sistema de emergencias médicas SEM. Available: https://www.minsalud.gov.co/salud/PServicios/Paginas/Sistema-de-emergencias-medicas-SEM.aspx