

# Five Patterns of Vaccine Misinformation on Telegram

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**Abstract.** The high production of information during the COVID-19 pandemic, characterized by the WHO as an “infodemic”, has fueled uncertainties and anti-science discourse, particularly on social media. This phenomenon has significantly contributed to vaccine hesitancy, evident in Brazil’s low childhood vaccination rates against COVID-19, where only 10% were fully vaccinated. To address this challenge, this study analyzed over 1.8 million messages shared in 248 Telegram anti-vaccine channels between July 1, 2022 and January 31, 2023. Using a methodological approach based on the use of data science and data analysis techniques, we identified five common types of vaccine misinformation: 1) pseudo-protective (propagating pseudo-protective measures against ‘experimental vaccines’); 2) immunological (building clinical stories that would demonstrate the reduction of immunity due to immunization); 3) false utility (disseminating legal and argumentative instructions for parents not to vaccinate their children); 4) medicalizing (highlighting medical reports to legitimize false or inaccurate facts); and 5) conspiracist (spreading conspiracy theories based on the idea that global corporations want to subjugate people with eugenic policies). These findings offer valuable insights for health professionals and managers to strategically develop targeted communication campaigns to counter these narratives and address vaccine hesitancy.

**Keywords:** Misinformation · Telegram · Vaccine · COVID-19

## 1 Introduction

The high production of information in the context of the COVID-19 pandemic, with the accelerated dissemination of news about the virus, recommendations on how to avoid contagion, reports of contamination, and comments on the disease, led the World Health Organization (WHO) to characterize the situation as an infodemic. Infodemic is a pandemic of information, including those which are false or misleading, in physical or digital environments, caused during an

epidemiological outbreak [18]. An infodemic can intensify or extend pandemic events, as they generate uncertainties about forms of protection, conduct, and behavior. The use of digital media and social networks further the circulation of information that can be harmful for disease control, accentuating the problem of misinformation [17].

The objective of this work is to identify patterns of vaccine misinformation on Telegram mapping the denialist narratives present in 248 channels and groups, which mobilize a superbase made up of 3.903.049 subscribers. By misinformation we mean false content that is deliberately intended to harm or cause damage. It can be fabricated or decontextualized content - designed to deceive, spread fear or distrust among the population -, or even the use of expert speeches, which are taken out of context, to generate confusion and undermine the credibility of official authorities [7]. Misinformation can circulate according to a political agenda or it can simply be inaccurate information amplified with manipulative intent [17]. In the specific case of the COVID-19 pandemic, the amount of inaccurate or false information concerns the origin of the virus, the treatments, and the mechanisms of propagation [13].

The vaccine against COVID-19 was one of the main resources used by public health institutions to mitigate the effects of the pandemic. In this context, the emergence of groups resistant to vaccination is noteworthy. [11] demonstrated that, in Brazil, despite the social recognition of the historical importance of vaccines (which, between the years 2001 and 2015, achieved coverage of more than 70% of the population [1]), the rapid dissemination of false and inaccurate information indicated a favorable scenario for the growth of anti-science discourse, especially in social networks, provoking a historical increase of vaccine hesitancy, particularly against COVID-19. Data from [6] reveals that only 16% of children were fully vaccinated against coronavirus in Brazil.

It is possible to state that, if “in the case of the COVID-19 pandemic, infodemics and misinformation are closely related phenomena” [5], the same process dangerously spreads in the field of immunization, generating noise and changes in habits that lead to vaccine hesitancy in Brazil.

In this context, this study aims to map anti-vaccination narratives that reinforce a process of health misinformation. These narratives often present claims as established facts, despite lacking scientific evidence [4]. In our view, the narrative is conceived as “the power we have to imagine complex sets of ideas into being, and to then share these among the community, which creates both the societies we live in and the cultures that provide the meanings for our lives.” [16].

## 2 Methods

The mapping and analysis of messages that produce misinformation in Telegram groups and channels is based on the combination of data science techniques with social network analysis. Therefore, our methodology is divided into four phases: (1) delimitation of Telegram channels and groups, (2) extraction of

techno-linguistic data, (3) data mining, and (4) data visualization and interpretation.

## 2.1 Delimitation and Collection Data

The approach used to obtain the network of Telegram channels and groups involved in the vaccine misinformation process was based on the “snowball” method, often used in research on this kind of platform [15]. In this method, from the messages collected from a certain channel, those that were forwarded from other channels are identified in order to add such channels to the collection as they become relevant sources. This allows to generate a network based on “connections” between channels and groups and procedurally identify more “hidden” actors, for whom access is less intuitive and requires the researcher to be immersed in the network [8].

To apply this method, it is necessary to obtain an initial base of representative channels and groups to start composing the network that is to be obtained at the end of the process. In the case of this work, initially, it was selected channels and groups characterized as ultraconservative and listed in the Supreme Federal Court (the highest court of law in Brazil) survey for disseminating disinformation against the Brazilian democratic order, in addition to those found by the application’s search interface when searching by the terms “vaccine” and “covid”. Other channels and groups associated with the anti-vaccine movement were also searched on Twitter and Facebook pages.

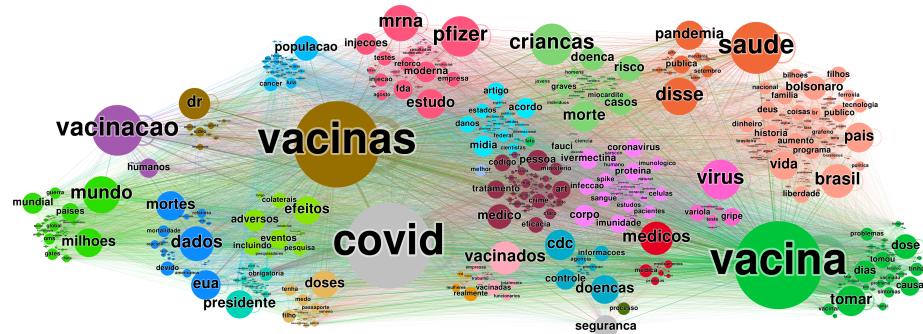
The initial base was formed by 108 chats. After applying the snowball method, the base was expanded to 248 Telegram chats. Among these, 129 are channels and 119 are groups. Together they are composed of 3,903,049 users registered as followers.

In the channels, communication is massive and works on a top-down model, since only the administrator can send messages to all subscribers. The groups work in a different way, as an interpersonal communication, since the participants are at the same time message producers and commentators. Telegram treats both as chats because they can house textualities formed by posts, comments, forwarding, and emojis, serving as a digital public arena.

## 2.2 Extracting Techno-Linguistic Data

Once the sample of channels and groups was defined, the next methodological procedure was to export the messages collected from them to a text file, to form the initial dataset. In internet social media analysis, datasets have communicational and linguistic functions, as they allow the researcher to detect and calculate the degree of relationships between actors and between textual entities.

The extraction of posts in these chats was performed by the Telegram Observatory software, or Obtel [3], which communicates directly with the Application Programming Interface (API) of Telegram. Hence, it was possible to download massive data from hundreds of channels and groups. Obtel has captured 2,564,886 publications and detected 408,939 forwarded messages posted in the



**Fig. 1.** General Narrative Network based on messages of the Brazilian anti-vaccine movement on Telegram. Each hue in the graph represents a cohesive group of words that represent a part of the overall narrative. The lines signify the ties between the words. The thicker the line, the more times the terms (nodes) appear together.

248 Telegram chats between July 1, 2022, and January 31, 2023. This time frame was chosen due to the high number of political acts that took place in the period, such as general elections and their subsequent consequences (e.g. the invasion of the seats of the Legislative, Judiciary, and Executive branches by ultraconservative demonstrators). The correlation between these political events and the issue of vaccine misinformation is because, during the COVID-19 pandemic, the stance of the Brazilian far-right representatives (including former president Jair Bolsonaro) was to encourage disbelief in the safety and the efficiency of the vaccines against coronavirus. Therefore, it is fair to say that there was in Brazil a politicization of pandemics that led ultra-conservative groups to stand against the vaccination.

Posts consisting of only links or emojis were excluded from the database. After this refinement, the data was reduced to 1,842,211 textual messages, which then formed the macro dataset of our work. Following the macro dataset generation, it was necessary to filter the messages that contained words associated with the context of vaccination. For this purpose, we have adopted as inclusion criteria only messages with the term “vaccin” (in Portuguese, “vacin”). We used this radical to extract messages that contained derivations of the word, such as “vaccine”, “vaccination”, “vaccinated”, “vaccining”, etc. After this processing, 48,313 messages were selected, forming the micro dataset.

Macro and micro datasets form the techno-linguistic corpus of this article. The macro dataset reveals the ideological issues and interests that stand out in the exchanges of messages performed by the members of the 248 chats of ultra-conservative groups. The micro dataset, for its part, makes it possible to link the ideological dimensions of the groups to the arguments, facts, sources of information, and types of misinformation conveyed in the messages that constitute the anti-vaccine discourse.

### 2.3 Data Mining: Generating Graph Archives

In possession of the datasets, in text extension format, each of these datasets was processed in the softwares Ford [14] and Obtel to export files in .gdf format (supported by the complex network visualization software, Gephi). This phase is called data mining, which is used to answer questions and unravel complex network patterns.

Our first focus was to find a semantic network analysis process based on graphs [10], in which words are the nodes and the association between them are the edges. We initially started with the 150 most frequent words among the 48,313 messages. Then, using the same corpus, Ford calculated the 30 words most associated with each of those 150 in the Telegram messages set. Thus, this mining resulted in a matrix with 2,200 unique words, which formed 40,000 pairs.

### 2.4 Visualizing and Interpreting Data

The next step was to make the relationships between the words visible. To achieve this goal, we created a network in Gephi software [2]. In it, we applied the “modularity” metric to detect the most cohesive groupings of words. In total, 23 groups, called “clusters”, were identified and marked with colors (Figure 1). We then applied the “degree” statistic to the nodes. This metric calculates the number of relationships maintained by a node (in this case, a word) in the network, or the number of times a word was paired with another present in the graph. The more pairs a word generates, the greater its importance in the semantic network. With this information, it was possible to assign the size of the point in the network according to the value of its degree.

The final phase in Gephi was to apply the “Circle Pack Layout” algorithm, randomly distributing the clusters of words, allowing a better perception of which words are grouped more intensely with which ones. We call this visualization the General Narrative Network, as it allows us to detect the topics that each group of words denotes. Therefore, we were able to map all the subjects covered by the 48,313 messages on Telegram, as we can see in Figure 1.

Each word group in this graph is conceptualized as a perspective [10], because it contains a specific topic on the object of study (vaccine). The idea of a lexical cluster as a perspective has allowed us to visualize a diversity of meanings that disinformation is shaped. In this method, digital tools taken from data science are activated to detect groups of perspectives (clusters) that derive from the association of words that are linked to denote different points of view on a narrated or argued subject [9]. Thus, “every network is understood as an overlapping of layers-worlds-network that deepen relationships with each other” [12].

## 3 Results and Discussion

When viewing Figure 1, it is clear that the movement of vaccine misinformation on Telegram has given greater weight to the word “covid”, mentioned in 10,219

of the 48,313 filtered messages. This is a much higher number than the citation of other diseases for which there are immunizations - e.g. there are only 605 mentions of “flu” (“gripe”) and 546 of “Monkeypox” among the messages.

It is also worth highlighting the other 9 terms most cited in messages about vaccination: “children” (“crianças”), present in 1,983 messages; “take” (“tomar”), in 1,950; “Pfizer”, in 1,711; “virus”, in 1,667; “world” (“mundo”), in 1,559; “doctors” (“doutores”), in 1,353; “mRNA”, in 1,256; “Dr”, in 1,253; and “death” (“morte”), in 1,157. Each of these words is located in a different perspective in Figure 1, and they are associated with particular discursivities in the web of posts and comments that mark vaccine misinformation on Telegram.

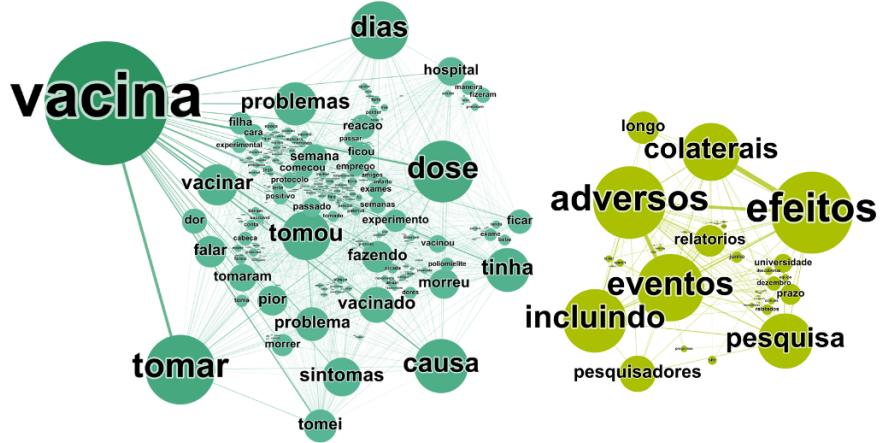
### 3.1 Pseudo-protective

By analyzing the universe of each of the 23 perspectives present in the General Narrative Network (Figure 1), we detected five predominant patterns in the messages with vaccine misinformation on Telegram. The first narrative pattern has a protective bias, inducing people to protect themselves against “adverse reactions”, “side effects”, and “adverse events” caused by the act of “taking” an “experimental vaccine”, an expression used by the Telegram groups studied to pejoratively qualify the vaccine.

Figure 2 shows the groupings with the rhetoric that offers a kind of guiding line for the anti-vaccine movement on Telegram (AMT). It is the main driving force of the movement. The terms “vaccine” (“vacina”), “take” (“tomar”), “they took” (“eles tomaram”), “experimental”, “experiment” (“experimento”), “problem(s)” (“problema”), “cause” (“causa”), “symptoms” (“sintomas”), “events” (“eventos”), “adverse” (“adverso”), “effects” (“efeitos”), “side effects” (“efeitos colaterais”) and “reaction” (“reação”) form two cohesive and associated groups of topics. This linguistic community is derived from messages that correlate severe symptoms of illness with immunization. In this sense, the main point of view of the anti-vaccination movement is to associate the vaccine with a permanent state of illness.

One of the most viewed messages in the ultraconservative chats, with 13,894 views and 700 forwards, explores the impossibility of reversing any symptom manifested by a patient with COVID-19, implying that they will persist and be constant. In the anti-vaccination ruse, every immunization causes irreversible reactions (“[...] Vaccinated people will no longer be able to continue treating the symptoms of the vaccine. Vaccinated people will have to bear the consequences because they will no longer be able to be cured [...] because the genetic defect is eternal”).

The basis of AMT manipulation is therefore to plant seeds of doubts grounded on pseudo-scientific certainties that generate panic, correlating the immunization with severe side effects. These side effects are reported in the first person, however, the patient is often a third person (“my daughter”, “my mother”, “my father”) who is experiencing serious reactions caused by the vaccine, such as: “acute allergic reaction”, “acute myocardial infarction”, “cerebral ischemic attacks”, “hypertension”, “cardiac hypertrophy”, “genetic defect”, “acute headache”.



**Fig. 2.** Two clusters originated from the General Network Narrative. The cohesion of the terms means refusal of vaccination, preaching that the vaccine is experimental and that it generates side effects and adverse events.

Testimony is taken, in this context, as clinical evidence. It is the particular that intends to generalize, like a virus, to spread fear and mistrust about the vaccine, thus operating as the main veridiction of misinformation language. In conspiracy logic, the qualitative data would be the generating principle of truth, while the statistician would be what manipulates society. Thus, in the anti-vaccine rhetoric, the humanized narrative of the clinical case overrules the cold and impersonal discourse of statistics. Between the particular and the general, the misinformation language adopts the first one as a convincing strategy (“I will never stop talking. Think of a healthy man, who at the age of 51, an athlete, had three cardiac arrests after 20 days of the third dose. A tragedy (sic) in my family [...] On the day he told me he had taken the third dose of the experimental vaccine, my body froze because I knew something was going to happen [...]”).

The anti-vaccine rhetoric captures the virality of the digital world to serve as symptomatological evidence, turning an episodic reaction (mild vaccine effects) into unsuspected proof that they will be adverse and permanent, generating uncertainty about the safety and effectiveness of vaccines. The irreversibility of pain, the irreversibility of a health problem, and the irreversibility of death are commonly celebrated by “anti-vax” as a strategy to simultaneously generate doubt (which brings out its experts) and monetization on social networks (which will guarantee their financing).

The cause of health problems and deaths, reported in the anti-vaccine Telegram groups, is associated with the “experimental vaccine” (“vacina experimental”, in Portuguese), as said, an expression used as a metaphor to refer pejoratively to any vaccine against covid, as well as “experimental shot” or “experimental drug”. The denialist narrative propagates that the vaccine, instead of

immunizing against diseases, makes people “sick again”, with “serious sequelae”. “Or worse, they kill!” The vaccine is portrayed as a “poison”, sold as “safe and mandatory by the press”, pushed and “injected into guinea pigs” by pharmaceutical companies, generating more risks for people than coronavirus itself. Thus, AMT proposes as the first therapy that people should increase their immunity in a natural manner, “not trusting an experimental vaccine”.

In an abstract way, the term “experimental vaccine” has become an ultra-conservative identity token to make believe that vaccines against COVID-19 are immunizations whose formulas would still be in the clinical trial phase. But, in a concrete way, it originally served as a discursive bulkhead to justify the delay in vaccination against covid during the government of President Jair Bolsonaro<sup>4</sup>. The rhetoric of scientificity, when used, serves as a shield for political negligence, reinforcing the AMT’s political belief more than the credulity in the shared misinformation (“An experimental vaccine that does not immunize, does not prevent contagion or dissemination. They used our children as guinea pigs and, just like the Nazis, they made propaganda for the people to accept it!”; “[...] People are falling to the ground like flies because of heart-related problems that are, in virtually all cases, caused by an adverse reaction to mRNA injection”).

AMT’s rhetoric, however, is not limited to denial. Far from being a discursive element that would only work to deny vaccination, the expression “experimental vaccine” operates in a positive rotation, by propagating messages whose content is prevention against adverse reactions and/or risks of death, and problems allegedly derived from the vaccine. In the building of vaccine misinformation, the protection of the other is the subliminal text that the messages carry syllogistically. Instead of being written with a denialist tone, misinformation about vaccines is shaped to generate the impression of care intention, which makes its dismantling more complex. In addition to spreading fear and panic, the anti-vaccine narrative seeks to suggest care for the other, inverting the scientific sense of vaccines, as it convinces its members that adverse reactions to the vaccine are the norm, when they are an exception.

The formula “experimental vaccine” unfolds, in short, in three narrative structures. First, it is used to refute the seriousness of a disease and its vaccine. Second, it contributes to inventing or overestimating risks and damages. Third, it is strengthened by exemplifying testimonial stories that would have occurred within the family.

### 3.2 Immunological

The second pattern of vaccine misinformation creates a narrative centered on the idea that there is a loss of immunological defenses when someone is vaccinated. The irreversibility of “side effects” and “adverse events” is connected to the second

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<sup>4</sup> The theme was extensively reported by Brazilian press, e.g.: Bolsonaro contraria dados do governo e diz que vacina está em “fase experimental”. Estadão. <https://www.estadao.com.br/politica/bolsonaro-contraria-dados-do-governo-e-diz-que-vacina-esta-em-fase-experimental>. Accessed: 09-05-2023.

narrative pattern of vaccine misinformation, expressed in the idea that messenger RNA (mRNA) vaccine technology, developed by Pfizer/BioNTech and Moderna, triggers in people a loss of immunity, leaving them susceptible to autoimmune diseases. These vaccines were the first to use RNA technology in history to be permitted for use in humans. This unprecedented development was labeled “experimental” by denialist groups, corroborated by official speeches by far-right politicians. An example is Brazilian former president Jair Bolsonaro, who amplified distrust about the Pfizer vaccine, in particular, saying, in a tone of irony, that people could turn into anything when taking a dose of this type of vaccine: “Turning into an alligator”<sup>5</sup>.

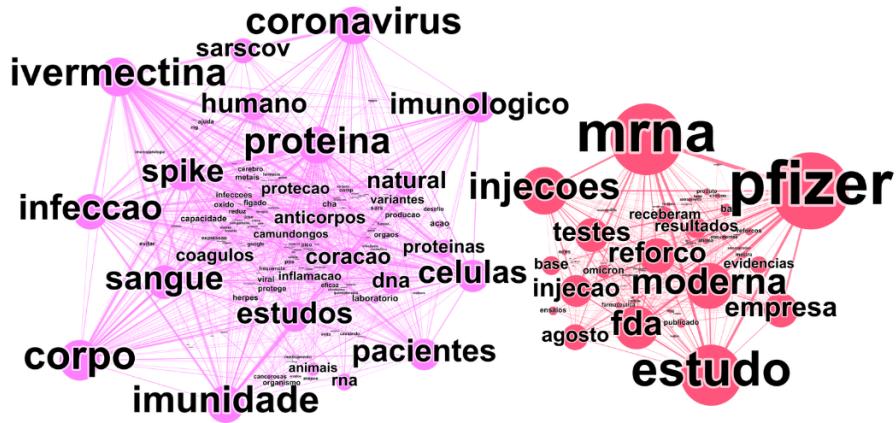
The declared political position against mRNA vaccines became a password for ultra-conservative supporters to question the safety and effectiveness of the vaccines. In Figure 3 it is possible to detect two semantic groupings that demonstrate how the topics “mRNA” and “spike protein” (“proteína spike”) drive the fabrication of false controversies about immunization. It once again reveals how the anti-vaccine movement on Telegram, in Brazil, focuses its efforts predominantly on undermining the vaccine against COVID-19, since both “mRNA” and “spike protein” are terms related to the most advanced technology in vaccine production. Contrary to what propagates AMT, the spike protein is responsible for the entry of the virus into the human cell, coupling to the ACE217 receptor. The mRNA vaccine produces antibodies against the spike, preventing the coronavirus from entering the body, neutralizing it<sup>6</sup>. The villainization of the scientific method adopted in the production of mRNA vaccines became an AMT strategy to spread the feeling that the pharmaceutical industry was conducting genetic manipulation of human bodies. The movement does this by embodying the rhetoric of the weak against the oppressors. They collectively embark on a crusade against what they consider to be an intellectual elite (scientists), a media elite (mainstream press), and an economic elite (big pharma). Thus, the vaccine denialist message emulates the social processes of political resistance, inverting them, by encouraging its members to refute the benefits of vaccination, as a way of not bending to power structures. On one side, there would be citizens who resist all coercion; on the other, the manipulated unwary people who get vaccinated. Denialism presents itself as a movement of “real people” skeptical of what comes from the establishment. And, because of this, they seek their own therapies.

Figure 3 reveals some very frequent expressions that appear in the messages in the second pattern, such as: (1) “natural-protection” (“proteção-natural”) and “natural-immunity” (“imunidade-natural”), which works as the opposite of vaccine immunization; (2) “human-body-inflammation” (“corpo-humano-inflamação”),

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<sup>5</sup> On this subject: Bolsonaro é provavelmente o primeiro líder político da história a desencorajar vacinação, diz especialista francês. 2021. BBC News Brasil. <https://www.bbc.com/portuguese/brasil-55939354>. Accessed: 09-05-2023.

<sup>6</sup> About that, it is worth reading: Como imunizantes contra covid-19 podem alavancar vacinas que combatem câncer. 2022. BBC News Brasil. <https://www.bbc.com/portuguese/geral-59814298>. Accessed: 09-05-2023.



**Fig. 3.** Two clusters of the General Narrative Network mined from 1.9 million messages from the anti-vaccine movement on Brazilian Telegram. It is possible to note that the cohesion of the terms shows the incidence of the misinformative narrative that links the mRNA/spike protein vaccine, from Pfizer and Moderna, as causing the loss of human immunological defense.

“inflammation-human-body-dna” (“humano-inflamação-corpo-dna”) and “infection-immunological” (“infecção-imunológica”), semantic marks linked to messages that support stories that would prove the weakening of the immune system triggered by spike protein; and (3) “ivermectin-patients” (“ivermectina-pacientes”), reported continuous as drug for preventing COVID-19 massively. Stories and expressions shared in groups serve to create community bonds, revealing a way of thinking and behaving in terms of health. In this case, within the AMT logic, the vaccination would imply being dominated by the system and hostage to a governability that would place bodies in a state of continuous risk by making them susceptible to “inflammations”, “infections”, “reactions”, “effects”. In sum, a permanent state of lack of defenses. Some messages highlight this: “COVID vaccines are affecting T cell memory”; “the spike protein reactivates the herpes zoster virus, weakens the immune system and causes several side effects such as clots”.

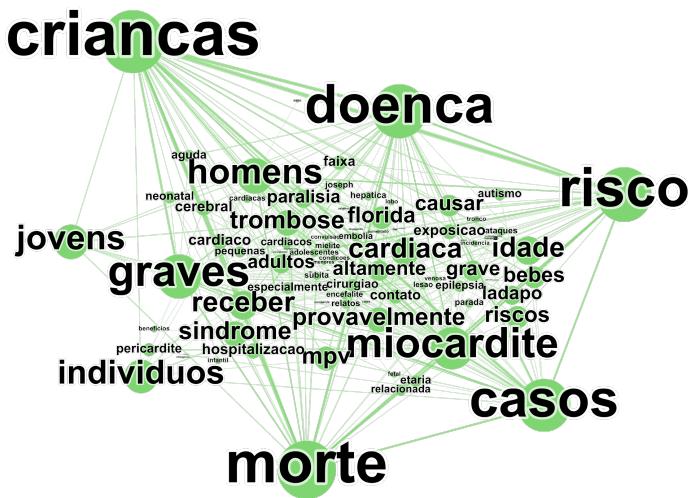
### 3.3 False Utility

The narrative of public utility is what characterizes the third pattern of misinformation about vaccines. After COVID-19, the word most associated with “vaccine(s)” (“vacina”) is “children” (“crianças”). Together they appeared in 1,983 messages. In them, there are several emotional appeals for members of AMT groups to refrain from vaccinating their “children”, “babies” (“bebês”), and “young people” (“jovens”), correlating immunization with the development of serious diseases.

The messages associate the vaccine with: child intoxication (“Covid vaccines do not protect children at all, they are toxic poisons”, says one of the comments); autism (“Vaccines have greatly increased the number of children with autism nowadays is everywhere”); heart attack and myocarditis (“vaccine, I mean experimental genetic therapy (sic) without registration, even 7-year-old children having heart attacks in schools”; “woman rebels against journalist and says that children are dying of myocarditis due to vaccines”); sudden illness (“8-year-old child dies after sudden illness. The killer ‘covid vaccine’ claims another victim”); and even polio (“Health [institution] suspect of ‘inadequate vaccination’ in case of paralysis in Pará. 3-year-old child presented symptoms compatible with polio in a city in the interior of the state. The Ministry of Health is investigating”).

This small extract from the messages reproduces what Figure 4 shows: children are the preferred target of narratives that connect deaths to vaccination. That is why in this graph the words “death” (“morte”), “risk(s)” (“risco”), “syndrome” (“síndrome”), “serious cases” (“casos sérios”), “myocarditis” (“miocardite”), “thrombosis” (“trombose”), “paralysis” (“paralisia”), “liver disease” (“doença de fígado”), “heart disease” (“doença de coração”), “brain disease” (“doença no cérebro”), “embolism” (“embolismo”), “sudden death” (“morte súbita”), “hospitalization” (“hospitalização”) belong to the same class as “babies” (“bebês”) and “children”.

The misinformation strategy therefore affects the population that most intensely needs to seek out vaccination rooms and, at the same time, those that are most susceptible to doubt, since fathers, mothers, or guardians are more attentive to any reported danger against the children.



**Fig. 4.** Cluster of words belonging to the General Narrative Network. The cohesion of the terms shows the incidence of the misinformative narrative that links vaccines with severe diseases in babies and children.

Messages focused on children do not just use the rhetoric of a health alert, but above all a political alert. The architecture of misinforming messages chooses the target to protect (children), to avoid (serious diseases) and the position to defend. AMT posts suggest how parents should proceed to oppose the mandatory vaccination card required by schools or the National Immunization Program (PNI) or even how to argue, using false studies or instructions from false doctors, when confronting pressure from other parents for collective vaccination. The logic of misinformation on Telegram is not only supported by messages that share false collective concerns and false care for others, but it is a narrative on how to behave, and how to act. In other words, it produces protocols, which serve as an orientation guide for child care. Messages like this illustrate the tactic: “A POISON vaccine will never be mandatory...fight react, take your child out of school but don’t vaccinate your child [...] read the ADVERSE effects OF THIS EXPERIMENT”.

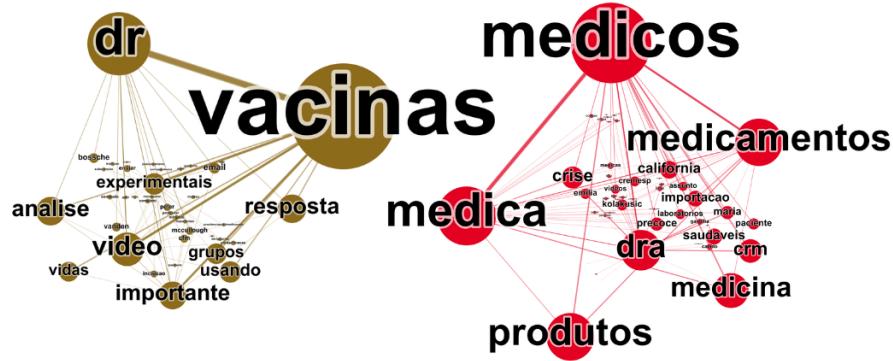
Thus, these messages are instructive materials on how to acquire “healthy behaviors”, which, in the end, serve as a gateway to resistance to any and all vaccines. Vaccine misinformation presents itself as public utility information, self-instructive knowledge, and easy to understand and replicate.

### 3.4 Medicalizing

One of the strengths of misinformation is providing instructions on how to act, a kind of tutorial. However, the use of an argument from authority helps to change the habit of getting vaccinated. This is why there is the fourth pattern of misinformation in vaccine contexts: the medical expert narrative. It is important to point out that several messages are carried out by professionals who participate in a network called “Doctors for Life” (“Médicos pela Vida”, in Portuguese). The strategy is reporting medical guidelines in videos posted on Telegram channels. This is why the word “video” appears intensely connected to the term “Dr” in Figure 5 .

In about 20% of messages that we analyzed, there is the presence of the lexicons “dr” (divided into “dr” and “dra”, in Portuguese), “doctor” (“doutor”), “study” (“estudo”), “research” (“pesquisa”), “products” (“produtos”), “CFM” (an acronym for Conselho Federal de Medicina or Federal Council of Medicine, in English), “medicines” (“medicamentos”), “products” (“produtos”) as markers of authorities that legitimize misinformation. This indicates that medical discourse shapes the truth that supports arguments against the mandatory PNI vaccines, against vaccination records in schools, and even in conversation streams.

In a context where there are doubts about the manufacture, safety and effects of the vaccine, the anti-vaccine movement uses the reported speech of a “medical expert” (“especialista médico”) as a persuasion strategy. The doctors’ speech serves as an authentication of the facts, in which the case report is considered a scientific fact. The reality comes from medical misinformation, in which the doctor explains, tells, speaks, studies, affirms, prescribes, indicates to an audience ready to share the recommendations of these professionals or even looking for reports to avoid getting vaccinated (“Dr. Robert Malone explains that the FDA



**Fig. 5.** Cluster of words belonging to the General Narrative Network. There is a cohesion of terms associated with medical reports.

knew for a long time that vaccines caused harm such as Myocarditis, Blood Clots, reactivation of viruses in the form of Herpes Zoster, Epstein-Barr, among others and did their best to obfuscate.”; “Dr Maria Emilia explains the serious risks of applying vaccines to young people. spectacular live”).

### 3.5 Conspiracism

Finally, there is the fifth pattern of vaccine misinformation, which is the conspiracist bias. This perspective can be seen in Figure 1, in the light green cluster, where the words “world” (“mundo”), “global” (“global”), “countries” (“países”), “war” (“guerra”) appear. This grouping also has key terms for understanding the conspiracy theories generated by vaccine misinformation, they are: “Bill Gates”, “WHO” (“OMS”, according to the acronym in Portuguese), “China”, and “reduction” (“redução”). These are clue words, whereas they function as clues for detecting conspiracy theories.

Firstly, such theories serve to provide easy answers to complex problems, generating socio-cognitive relief for those who disseminate them, since they create certainty for the group, freeing its components of concerns arising from events without immediate explanations. Secondly, they serve to give AMT a global identity, since several of the theories already circulate in other languages (especially English) and are tropicalized and adapted for Brazil, revealing that the dissemination of misinformation follows dynamics orchestrated by internationalized groups, making it more complex for national health policies. (“Bill Gates is now pumping millions of dollars into a new brainwashing program that manipulates people into getting future experimental COVID-19 vaccines”).

In the conspiracy narrative, the word “Gates” refers to Bill Gates. The term works as a force of attraction for the other terms previously mentioned. Gates would be investing millions of dollars in a plan to genetically modify humanity to create a new way of reducing global population, together with countries like

China and pharmaceutical corporations, through mutations that could do both: to manipulate people into smoothly accepting new experimental vaccines, as well as to allow the “depopulation of the world” (the “reduction” in the number of inhabitants on the planet), due to deaths caused by adverse reactions to vaccines.

The conspiracy about the American millionaire is based on the image of Gates as a generator of patents and financier of research and scientific initiatives in different parts of the world. And this would become proof of his global influence on ways of thinking and living. In the conspiracist narrative, Gates would function as a pervasive power, capable of creating a liquid chip to be inserted into the vaccine or buying Coca-Cola to ship “RNA in the recipe, just like they put in the vaccine”. This same theory is also attributed to other billionaire foundations (Rockefeller, George Soros, etc.). These conspiracy theories reproduce a logic based on the warlike and dichotomous discourse of the “war” of natural versus artificial, the war of rich against poor, and the war of death against life. In practice, AMT thus adopts storytelling as a resource to popularize a narrative of the war against vaccines (which would be one of the technological elements to combat in contemporary life).

In practice, as [16] analyzed, these stories, transformed into conspiracism, convert abstract theories about changes in the world into concrete scenarios, translating deep philosophical reflections into clear experiences and images for cognition. This is because shared stories (“the global elite”, “the vaccine chip”, “the experimental vaccine”) link the private sphere of our individual consciousness to the public domain of politics, as if vaccine refusal were also resistance to policies, commercials of large global corporations, the subjugation to the guidelines of more technologically advanced countries, the programmatic definitions of partisan groups that dominate the political establishment. The causal link of vaccine conspiracy theories has a historical basis of veridiction, making it seductive and persuasive. After all, international inequalities and asymmetries of power are felt by the vast majority of the population in a context of globalization.

#### 4 Final Remarks

This work sheds light on the key strategies employed by ultra-conservative Telegram channels to persuade their audiences. We observed that, in addition to the narratives about the COVID-19 vaccine, these groups are intensely influenced by Brazilian political polarization. In this sense, the first conclusion is that the efforts of these groups are focused on debunking the population on the COVID-19 vaccine. On the other hand, the number of mentions regarding other vaccines was significantly lower. This presents a strategic opportunity for health professionals and managers to focus communication campaigns on vaccines that are not yet entangled in societal polarization.

Furthermore, the investigation identified five patterns of vaccine misinformation on Telegram: protection of others; genetic risk of vaccines; concern for children; doctors against vaccines; and conspiracy against the global order. For each of these categories, there are specific narrative strategies and clue words

that were evident in the messages analyzed. Our attention was drawn to the need to formulate health communication actions that make greater use of reporting clinical cases in arguments defending vaccination. This is because the anti-vaccine discourse uses the example of personal stories to verify its thesis. Using the same tactic with users of the healthcare system seems to be more effective in persuading people to get vaccinated than disseminating numerical and purely scientific arguments.

Lastly, the analysis underscores the power of narratives that leverage medical discourse and doctors as trusted authorities to persuade audiences on Telegram. This highlights the critical need for ongoing communication from medical experts. By engaging in a daily dialogue with the population, these experts can effectively dispute the war of narratives around adherence to vaccination schedules and promote evidence-based information.

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