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ARTICLE

Stem cell hype, hope and hardship: a computational frame analysis of news media content

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Abstract

Stem cell research and therapies have been the topic of hype in the news media in Europe, America, Asia and the Pacific. Using a computational approach, we examine stem cell hype in the news media in the unique political, media and cultural context of Vietnam. The results indicate a pattern of the news media portraying this medical advancement as a source of national pride and achievement to tap into consumers' patriotism. The computational frame analysis method was shown to be efficient, helpful, and useful when researchers are confronted with urgent social, technological or public health matters. Findings from this study suggest that there is a need for national and international efforts to investigate news media content that misrepresents the current stage of stem cell treatment efficacy and risks.

Keywords

Health communication; Popularization of science and technology; Science and media

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1 ▪ Introduction

Stem cell research and therapies have been the topic of hype in the news media in Europe, America, Asia and the Pacific [Bubela et al., 2012; Kamenova & Caulfield, 2015; Pham et al., 2021; Chen & Gottweis, 2011; McLean et al., 2015; Jurberg et al., 2009]. Stem cell therapies in general are still categorized as experimental and unproven in scientific research [Aly, 2020]; in other words, they are still considered "unsafe, inefficacious and thus unethical when clinically used" [Datta, 2018, p. 352]. The risks associated with stem cell therapies are infection, contamination, lack of immunocompatibility, uncontrolled immune response, heterogeneity, stemness instability, differentiation into undesirable cell types, bone loss and tumour formation [Isaković et al., 2023; Hirai et al., 2023; Khan et al., 2021]. A meta-analysis of 35 studies, involving 336 patients monitored up to 146 months, found that the rate of treatment-related mortality was 8.3% [Eyraud et al., 2018]. The Pew Charitable Trusts systematically documented 360 adverse event reports outside of clinical trials from 2004 to 2020 related to stem cell and regenerative medicine interventions, including serious infections, blindness, paraplegia, pulmonary embolism, cardiac arrest, and even death [PEW, 2021].

Stem cell treatment is not available to the Euro-American public through public healthcare providers like the United Kingdom's National Health Service and the United States's Medicare [Datta, 2018]. Only a handful of stem cell treatments have been officially approved, with an updated list for designated service providers [FDA, 2023]. FDA continuously alerts the public about the safety of stem cell therapies over the past two decades. In a statement published in 2020 that remained current at September 2024, the FDA [2020] warned the public that regenerative medicine products including stem cells have not been approved to treat any of the following conditions, namely: COVID-19, orthopaedic conditions, neurological disorders, such as multiple sclerosis, amyotrophic lateral sclerosis, Alzheimer's disease, Parkinson's disease, epilepsy, or stroke, cardiovascular or pulmonary (lung) diseases, such as heart disease, emphysema, or chronic obstructive pulmonary disease, autism, macular degeneration, blindness, chronic pain, or fatigue. However, vulnerable populations with chronic conditions or terminal illnesses often turn to stem cell therapies as a last resort, willing to pay out of pocket to be experimental subjects for treatments lacking established evidence of safety or efficacy. As a result, stem cell treatments have been capitalized on and marketed as commodities within what has been termed "the political economy of hope" [Webster & Wyatt, 2017, p. 8].

According to a 2023 report on country-specific regulations and international standardisation of cell-based therapeutic products (CTPs) [Hirai et al., 2023], in the United States (US), the European Union (including the United Kingdom), and Japan — the three founding members of the International Council for Harmonization of Technical Requirements for Pharmaceuticals for Human Use- regulatory frameworks often use a risk-based approach. This approach requires evaluating product-specific factors such as the extent of cell manipulation and intended use, due to the complexity of CTPs compared to conventional drugs. The absence of international guidelines for assessing the efficacy, safety, and quality of CTPs presents significant challenges.

However, some countries in the Global South have become the hub of stem cell tourism with unproven treatments [Lyons et al., 2021]. The concerns on bioethical violation, misinformation, disinformation and conflicts of interest are high in the Global South

countries, such as Mexico, Brazil, Panama, India, China, Iran, Malaysia, Thailand and Vietnam because these countries have not developed adequate regulatory frameworks and monitoring systems that medical and research institutions must abide by [Bubela et al., 2012; Lyons et al., 2021].

In a field dominated by research from countries in the Global North, only a few media, communication or marketing studies on stem cell hype have come from the Global South [Reis, 2008; Jurberg et al., 2009; Yến-Khanh et al., 2022], leaving a gap in understanding how stem cell therapies are presented by news media in the Global South. Given its distinctive political, cultural, economic, scientific and medical context, a country like Vietnam might present different kinds of hype and challenges, while its stem cell stakeholders also play an emerging role in the global arena on stem cell research, treatments, and commercialization. This study seeks to find the distinctive framing practices used by the Vietnamese news media and how the frames used in news reporting on stem cells can potentially accelerate the hype on the issue to lure consumers into unproven therapies.

This paper first reviews stem cell hype in global news media and the issues in the practice of the news media in Vietnam to refine the research problem and to formulate the research question. The theoretical framework and method section describes how framing theory and computational text mining serves the objective of the paper. The findings section presents the semantic patterns and frames found in our analysis. The paper expands on the implication of the findings in the discussion and conclusion.

2 ▪ Stem cell hype in the global news media

In the early days of global stem cell development, advocates described stem cell implants as the start of a medical revolution, the dawn of a new frontier, a new chapter in medicine history that would free the world from illness and diseases [Kitzinger & Williams, 2005, p. 125]. In contrast, opponents raised ethical, moral and political concerns for human embryonic stem cell (hESC) research on the grounds that stem cell research is steering humankind toward reproductive cloning, especially after a United States' federal ban on hESC research in August 2001 [Nisbet et al., 2003; Kitzinger & Williams, 2005]. But this counter argument attracted criticism for allegedly spreading dystopian fears and religious dogma [Kitzinger & Williams, 2005].

From 2010 onwards, most news coverage on stem cell research focused on clinical translation and new discoveries, instead of ethical and policy issues [Kamenova, 2017; Kamenova & Caulfield, 2015]. In any case, stem cell experts and service providers have authoritatively made up the media hype and unrealistic timeline for stem cell clinical translation, with an anticipation that public deployment of stem cell therapies is just around the corner [Kamenova & Caulfield, 2015]. Regardless of the provisional nature and early stage of many stem cell studies, the news media, sometimes together with profit-driven research institutions and medical service providers, alter scientific truth in a premature and overstated way, making it challenging for regular news users to distinguish between scientific knowledge and popularized representations [Kamenova, 2017]. The hype is fuelled by the news media's attraction towards novelty to make their stories newsworthy and the profit-making motivation of medical institutions [Caple & Bednarek, 2015].

Because people are highly responsive to contextual signals, how an issue is framed in

communication can have a significant influence on people's decision-making process [Iyengar, 1991; Dahmen, 2008]. Analysing news coverage provides us with a nuanced understanding of how different actors have attempted to influence audiences' knowledge of this scientific issue to profit from the hype they created [Dahmen, 2008].

Over the last two decades, researchers have identified multiple frames that have been adopted to portray stem cell research and therapies. These frames include political strategy, hope, ethics/morality, policy/legal, scientific background, costs vs health and economic benefits [Dahmen, 2008; Nisbet et al., 2003; Kim, 2011; Vicsek, 2010]. In a push for audience attention, news media have framed stem cell research in dramatic terms with human interest storytelling because narrating complex concepts and processes through stories is intuitively appealing [Nisbet et al., 2003].

3 ▪ News media in Vietnam and the research question

Operating under the regime of the Communist Party, the media system in Vietnam is predominantly state-run. Many authors have agreed news media in Vietnam is similar to news models in other Marxist countries which are widely recognized as propaganda instruments, functioning as extension of state and party voices. Under the state shadow, the news media lacks the autonomy and independence to fulfil the watchdog role that is commonly associated with Western media systems. However, the boundaries of permissible content shift in response to the political climate and the priorities of the dominant faction within the Party-State apparatus [Abuza, 2015]. Self-censorship becomes an implicit practice with each journalist fully aware of their "dig here but not there" boundaries. These limitations vary depending on the time and specific topic [M. Tran, 2021].

Although the state maintains control over mainstream media through various legal mechanisms such as professional licences for individual journalists, a licencing system for news outlets, and mandatory weekly meetings with the Central Ideology Department [Duong et al., 2019], Đổi Mới — Reform has facilitated media commercialisation since the 1990s. According to the 2016 Media Law, except for state-funded central and local news organizations, the majority of the news outlets must entirely or partially rely on circulation, advertising, sponsored content, and business collaboration [Nguyen-Thu, 2018]. While the state-funded newspapers continue to serve as a means of communication among the government with the wider public, the market-driven papers primarily focus on topics of interests to the general public. Notably, several highly-circulating newspapers, like *Tuoi tre, Thanh nien, Lao dong, VnExpress, Vietnamnet* and *Dan tri* remain aligned with the Communist Party's standpoint while adopting a more liberal orientation. Embracing the model of Western elite broadsheets, these outlets prioritize raising public awareness of and concern about important current affairs. However, factional and economic pressures, along with the rise of the Internet and social media in recent years, have increasingly strained these market-oriented news organizations' financial independence. Under the budgetary pressure, news organisations often sign "media contracts" with businesses, not only for straightforward advertising fees, but for advertorial and PR campaigns under the guise of journalistic coverage. In many cases, these media contracts force journalists to promote positive publicity or prevent them from producing negative content about the clients' issues [M. Tran, 2021; M. Tran & Nguyen, 2023]. Additional "tea/coffee money" during press conferences, interviews or company visits and overseas trips are also gifted to journalists

to earn their favour toward vested groups. Unfortunately, such an extra allowance or "media contract" is viewed as a PR "pay-to-play" tactic that is mutually accepted by both PR and news media practitioners [Doan & Bilowol, 2014], leading to an absence of critical news reporting, especially in terms of controversial social issues [Yến-Khanh, 2023].

Alongside economic burden, the loosening of government restrictions on the reporting of non-political topics, has led Vietnamese journalists, "for the first time... to serve two masters, the Party and the audience" [Dang, 2012, p. 63]. The dilemma of balancing their role as, firstly, an ideological institution under the governmental control, and secondly, as a business agent regulated by market competition, makes it increasingly more challenging for Vietnamese media to function effectively. The Press Law, which has been amended several times over the years, lacks sufficient guidance around professionalism. The generic Code of Ethics issued by the Vietnamese Journalists' Association merely focuses on political loyalty to the Communist Party as the most essential principle of journalism practice in Vietnam. Basic journalistic professional norms such as truthfulness, accuracy, objectivity, impartiality, fairness and public accountability are almost absent in their practical and ethical guidelines. Professionalism has become a fragmented ideology with each journalist interpreting and practicing it according to their own specific circumstances.

To some extent, the news media industry in Vietnam shares characteristics with the global media landscape. In the first survey of its kind titled, *The state of technology in global newsrooms*, covering 130 countries in 2017, 70% of newsrooms across the world were found to rely on advertising as their main revenue stream, while 44% generate revenue from advertorials or sponsored content, making sponsored content the second most important revenue sources for newsrooms [International Center for Journalists, 2017]. But the low autonomy and politicalized professional standards of the Vietnamese news media arguably put news media practitioners in even more vulnerable circumstances under commercial pressures than their Western counterparts [Yến-Khanh, 2023].

Alongside the unprofessional news media culture, low media literacy, a subpar healthcare system, and desperate healthcare consumers in Vietnam, there exists a fertile ground for misinformation, disinformation and unproven medical treatments. Vietnam has only 10 doctors per 10,000 inhabitants, in a population of nearly 100 million, thus, the healthcare system in Vietnam cannot offer adequate services to patients [Statista, 2023]. The situation raises concerns about medical controversies like stem cell therapies, which may burden patients and their families with heavy healthcare costs. Given the implications of stem cell hype in the news media, this study asks:

> *How do the news media in Vietnam frame stem cell research and treatments?*

4 ▪ Framing as a theoretical framework and data analysis method

Framing, in the context of the news media, involves the deliberate selection and presentation of certain aspects of information while downplaying others in the news content production process. Framing is, however, a broad concept, which has seen robust discussions over how it should be understood conceptually and methodologically. Entman's

[1993] approach, which suggests several types of generic frames including problem definition, causal interpretation, moral evaluation, and/or treatment recommendations of specific events, works well with assessing news content at the story/article level. Entman highlights the importance of framing "in the exertion of political power" with the identity of agents or interests that seek to dominate the narratives (p. 55) in order to influence people's perception of the matters at hand. Iyengar [1991] argues that to make sense of events and issues, people simplify the phenomena around them to the question of "who is responsible" in a quest for responsibility attribution.

Advancements in digital technologies and machine learning techniques have allowed for analysing large amounts of texts from online content that has been produced over the past decades [Boumans & Trilling, 2015]. Recent automated framing studies have used a variety of computer-assisted techniques to detect frames from news content. Vu et al. [2019] utilized Latent Dirichlet Allocation (LDA), an unsupervised machine learning technique, to analyze nearly 40,000 news stories to understand how the news media around the world frame climate change. Wang and Guo [2018] chose to use a supervised machine learning approach, which required training a computer program to model after human coding, to identify frames from tweets on genetically modified mosquitoes. Vu and Lynn [2020] combined semantic network analysis and basic counting of words to interpret frames in the news on the Rohingya refugee crisis. Walter and Ophir [2019] suggest using both topic modelling and network analysis to detect "macro" frames. It is important to note that these natural language processing techniques need to be adapted for them to work effectively and accurately in identifying frames in different languages or even different types of text (e.g., broadcast transcripts, news stories, and social media content among others). This has contributed to widening the technological gap between different countries, with those in the Global South lagging in engaging with and developing AI and machine learning techniques that work with languages other than European ones [Jones et al., 2024].

To gather data about stem cell communication from the Vietnamese news media, the research team commissioned a social listening company in Vietnam, YouNet Media, to crawl and scrape news media data that contain the keyword *tế bào gốc (stem cell)* from 1 January 2017 to 30 June 2022. Articles from mainstream newspapers and tabloid newspapers were scraped, excluding medical or general websites and social media because the team aimed to focus on the framing practices of news media. The research team manually cleaned the data by deleting irrelevant articles. To ensure that no articles from top news outlets with the highest readership were missed, the research team used the search engines of the eight top news outlets including *Tuổi trẻ, Thanh niên, VnExpress, Vietnamnet, Sức khỏe & Đời sống, Dân trí, Lao động* and *Zingnew*s to manually collect news on stem cell therapies, using the keyword *tế bào gốc (stem cell).* Once the data was collated, the team cleaned the data again for deduplication. The dataset in this study comprises articles from major news outlets, collected through a combination of automatic scraping and manual searches. As a result, the final dataset consisted of 907 news reports and articles, with a total of 536,592 words. This data set was big enough for computational text mining and framing analysis, as a corpus of above 500,000 words meets the requirement for analysing a specialized topic [Kennedy, 2014, p. 68].

After conducting deliberate searches and trials with popular tools for semantic network and topic modelling analysis such as Lancsbox, Gephi, vosViewer, LDA and KHCoder, we chose to use the WordSmith software for data analysis because it is the better of the only two text

mining tools that are compatible with the Vietnamese language that we were aware of. WordSmith renders word frequency, clusters, concordance and collocation in tables with quantified occurrences, which other tools were not designed to do. Text mining with WordSmith has another advantage because it allows for systematically viewing the linguistic patterns in sentence and paragraph contexts, which provides clearer identifications of the topics or frames. LDA, on the other hand, automatically puts words that often appear in topics into groups, which makes it challenging to label the topics based on wordlists without referencing how they actually appear together in the context [Agrawal et al., 2018; Lau et al., 2011]. While semantic network analysis is powerful in visualising the centrality and connection between words and topics [Leydesdorff & Nerghes, 2016; Won et al., 2021], WordSmith does not allow for visualizing the connections in network-like shapes, leaving it to the researchers to interpret these linguistic patterns. To make up for the weaknesses of WordSmith, we present linguistic patterns which are the results of data extractions with numerical values representing frequencies and distribution. We also interpret these patterns in the broader contexts to understand the content.

After data collection, we employed a four-step process for data analysis and synthesis of the findings. Figure 1 presents the research method and steps.

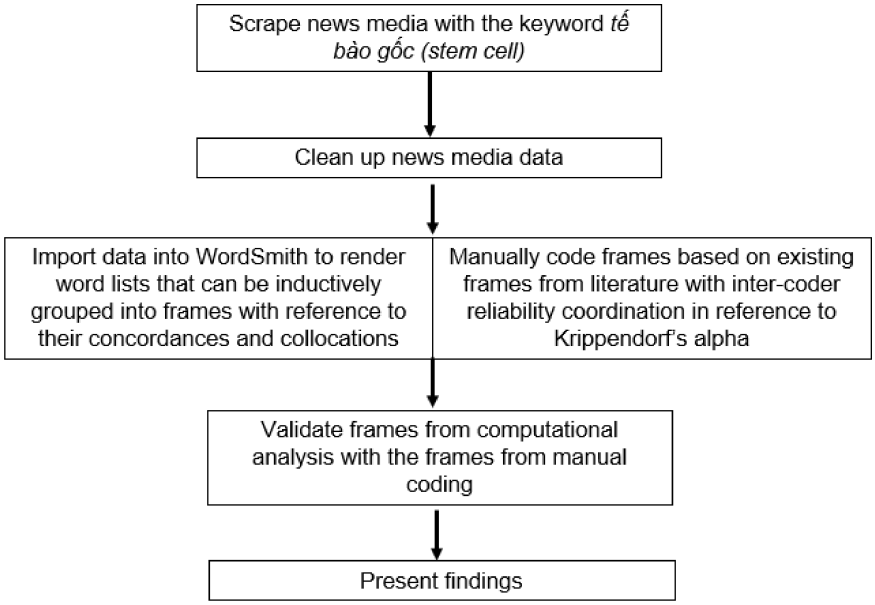

Figure 1. Research steps.

Computational frame analysis refers to the way analysts extract the central ideas from keywords, phrases and clusters empirically and systematically, without relying on personal judgement, minimizing the human subjectivity in the process [Touri & Koteyko, 2014]. We imported the dataset into the WordSmith software to render word lists, concordances, collocations and clusters, which were used to identify key themes. To determine if the themes made up specific frames, the researchers examined the concordance lists, which show how certain words or phrases appear in their contexts at sentence or paragraph or full text levels. At the same time, the researchers computed collocation lists to show how certain words consistently stand near other words to make up certain meanings.

To choose the appropriate threshold for keyness, we referenced English language keyness, where a list of 1,500 keywords is often extracted from a big corpus for corpus analysis

[Gabrielatos & Baker, 2008, p. 10]. Vietnamese is a single-syllabic language, in which two or more single words often come together as compound words to make one single meaning. Thus, we used WordSmith to extract 1,000 single keywords and 1,000 compound keywords from the corpus, at a frequency threshold of one in 10,000 (0.01%) and above, which gave focus and efficiency to the data presentation. Our analysis mainly examined the compound word list, while the single word list was referred to when it was relevant. This is a high threshold compared with other programs such as LDA topic modelling or semantic network analysis, which may examine some dozen or some hundred words only [Leydesdorff & Nerghes, 2016; Mu et al., 2022]. It allows for examination of more words and clusters in their contexts within the corpus to understand their contribution to framing.

We based our frames mainly on Iyengar's [1991] conception of frames as responsibility attribution to address "who are responsible" and on Entman's [1993] notion of frames as particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation. From the word lists that were automatically rendered by WordSmith, we grouped words and phrases by assigning them to particular frames based on Iyengar and Entman's definitions, with reference to the existing frames in the global media literature but allowed new frames to inductively emerge from the corpus. This process was done in parallel with regularly reviewing the concordance and collocation lists to understand how keywords appeared in their sentence, paragraph or full text contexts for validation.

This process resulted in seven main meaningful frames, namely *(1) institutional and individual stakeholders*, or those who play the roles of agents and subjects in the stem cell narratives, *(2) scientific process and medical procedure*s or how stem cell treatments are defined and contextualised as a solution in the health science domain, *(3) scientific progress and medical achievement* or how the solution operates, *(4) Vietnam's position in international medicine* or how stem cell treatments are interpreted in Vietnam's context, *(5) financial cost*s or what it takes to make the solution work, *(6) health risk*s or how the solution presents its challenges, and *(7) regulation* or how the solution is put under legislative monitoring and accountability.

Manual frame coding: manual coding of a subset of the data was employed for validation of the results of frame mapping from our automated analysis. This step was important as human validation has been recommended to ensure the validity of the computer analysis [Vu & Lynn, 2020]. Two independent coders concurrently conducted a manual frame coding of a random sample of 150 news articles, equivalent to over 15% of the total 907 articles in the dataset. Based on the most salient frames identified by the existing literature [Dahmen, 2008; Nisbet et al., 2003; Kim, 2011; Vicsek, 2010], the researchers examined articles in the sample collection and found relevant frames to include in the coding book. Finally, the pilot coding book came up with nine frames, as specified in Table 1. Following the approach of Strekalova [2014], frames were coded as *present* and *absent* in the text.

Krippendorf's alpha was used to measure intercoder reliability. At the third round of pilot coding, the alpha values reached at 81.4%, which are acceptable levels of agreement for intercoder reliability statistics [Neuendorf, 2002]. Most importantly, results from our manual coding of a subset of the data confirmed the presence of the frames identified through computational analysis.

Even though slightly different labels were used by the two sub-teams using different data processing and analysis methods, the frames overlap with each other most of the time, as

demonstrated in Table 1. Because computational frame analysis presented the relative dominance of frames with the volume and frequency of words and phrases, but it did not provide absolute quantification of specific frames, we only present the quantification of frames from manual coding in Table 1 and will demonstrate the prominence of frames by computational frame analysis in the findings section more specifically.

Table 1. Frames from computational analysis and manual coding.

Frames from computational analysis	**Frames from manual coding**	**Distribution of frames in 150 news articles from manual coding**
scientific process and medical procedures	scientific progress/application	56.7%
scientific progress and medical achievements		
	personal hope	20.7%
institutional and individual stakeholders	others (Including globalisation, localisation)	5.3%
Vietnam's position in international medicine		
health risks	health risks	0%
	scientific controversies/uncertainties	2.7%
financial costs	economic prospects	4.7%
regulations	policy and regulations	5.3%
	public accountability	4.0%
	ethical concerns	0.7%

Automatic and manual content analysis were separately and simultaneously conducted by deductive and inductive methods to ensure the findings' independence and objectivity. We found that major frames from automated text mining such as *scientific process and medical procedures* and *scientific and medical* were also the major frames identified in manual coding and vice versa. *Vietnam's position in international medical achievements* was derived as a separate frame in the automated frame analysis, while in the manual coding, that was coded as part of the globalisation and localisation frame. Automated analysis only detected the *regulations* frame because this approach relies more on the keywords extracted by the software, while manual coding identified three separate frames including *policy and regulation, public accountability* and *ethical concerns*. Besides, *regulations* were uncommon frames extracted from the wordlists, whereas manual coding found them to be more commonly used than health risks and other frames. The difference could, perhaps, be attributable to the fact that human coders can identify the nuances and label subtle connotations and elements in the text in a more sophisticated way, but the disparity is of degree, not of kind, or in other words the discrepancy is minor. Overall, the results of the automated text mining approach were valid in comparison with the results of manual frame coding, suggesting it an effective method for monosyllabic language content analysis.

5 ▪ Findings

Institutional and individual stakeholders: words and phrases referring to institutional or individual stakeholders in the stem cell stories made up a big portion of the corpus such *as bác sĩ (doctor), nhà khoa học (scientist), trung tâm (centre), gia đình (family), người bệnh*

(patient), đại học (university), chuyên gia (expert), nhà nghiên cứu (researcher), giám đốc (director), giáo sư (professor), nhóm nghiên cứu (research group), bộ Y tế (Ministry of Health) and *khách hàng (customers)*. Institutional stakeholders appeared as sources, agents, and subjects in high frequency with a total of 73% of the appearances of all stakeholders. Individual stakeholders accounted for 27%.

The concordance of *bệnh viện (hospital)* showed that stem cell treatments were popular in major cities across Vietnam. Not only big and established hospitals but also small and new clinics joined this stem cell race. Top of the list were VinMec, Huế, Tâm Anh, DNA, Bạch Mai, National Paediatrics, Hoàn Mỹ, Đà Nẵng and Chợ Rẫy hospitals.

Given that the institutional stakeholders have much more authority, expertise, resources, voices and access to the news media and other public spheres, they can shape the discourse on stem cell advancement and efficacy from their science or service providers' perspectives and interests, as observed elsewhere [Hall et al., 1978]. With the overwhelming presence of experts, this frame contributes to signifying the scientific process and medical procedures frame below.

Scientific process and medical procedures: nearly half of the most frequent compound words and phrases were scientific and medical terms, making this the biggest frame, together with the prevailing presence of experts, as mentioned above. Even though only a handful of medical studies on stem cells from Vietnam had been published in international peer-reviewed journals, words such as *điều trị (treat/treatment), nghiên cứu (research), phương pháp (method), khoa học (science), công nghệ (technology), y tế (medicine)* and *kỹ thuật (technique)* sat on top of the word frequency list. The intensity of these scientific and medical terms were used in content that emphasizes the credibility of the new treatments using stem cell.

It is also important to note that the most life-threatening diseases and uncurable health conditions appeared regularly in the list, as presented in Table 2, with a positive connotation that stem cell is a medical technology that can help to tackle most challenging health conditions.

Table 2. Life threatening diseases or incurable conditions in the corpus.

Word	Translation	Freq.	%
ung thư	cancer	1667	0.31%
ung thư máu	leukaemia	369	0.07%
tự kỷ	autism	335	0.06%
covid	covid	231	0.04%
bại não	cerebral palsy	214	0.04%
thoái hóa khớp	degenerative arthritis	182	0.03%
u nguyên bào	neuroblastoma	158	0.03%
tiểu đường	diabetic	135	0.03%
tim mạch	heart disease	100	0.02%
nhiễm hiv	HIV positive	94	0.02%
suy tim	heart failure	92	0.02%
xơ gan	cirrhosis	88	0.02%
suy tủy	aplastic anaemia	87	0.02%

When the news articles highlight life-threatening diseases or hard to cure health conditions, in which current development of medicine has not been able to meet the patients' needs, it may appeal to the most vulnerable families who would be willing to pay any price, even for an initial clinical trial or an unproven treatment.

Scientific progress and medical achievements: words or phrases related to achievement or success dominated the wordlist as illustrated in Table 3. When all media channels focused on accomplishments with very positive vocabularies, the hype was about how promising stem cell treatments are for those in need.

Table 3. The most life-threatening diseases and uncurable health conditions appeared regularly in the Vietnamese news media corpus on stem cell treatments with a positive connotation that stem cell is a medical technology that can help to tackle most challenging health conditions.

Word	Translation	Freq.	%
phát triển	develop/development	871	0.16%
đầu tiên	first	828	0.15%
thành công	succeed/success/successful/successfully	809	0.15%
ứng dụng	deploy/deployment	597	0.11%
kết quả	result/outcome	547	0.10%
hiệu quả	impact/effectiveness	466	0.09%
phát hiện	discover/discovery/find/finding	388	0.07%
cải thiện	improve	285	0.05%
cơ hội	opportunity	272	0.05%
chữa khỏi	cure	263	0.05%
công bố	publish/announce	262	0.05%
áp dụng	apply/implement	261	0.05%
tác dụng	effect	257	0.05%
hy vọng	hope	241	0.04%
chất lượng	quality	233	0.04%
khỏe mạnh	healthy	220	0.04%
lần đầu	first time	202	0.04%
an toàn	safe/safety	201	0.04%
tương lai	future	181	0.03%
công trình	project/publication	175	0.03%
hàng đầu	leading	173	0.03%
tìm ra	discover	168	0.03%
hồi phục	recover/recovery	163	0.03%
mở ra	open up	151	0.03%
giải pháp	solution	143	0.03%
đảm bảo	ensure	141	0.03%

When collocation and concordance of some important keywords were examined, the findings were revealing. Among the words and phrases that collocated with *thành công (succeed/success/successful/successfully)*, only two words carried a provisional meaning, namely *nghiên cứu (research)* and *thử nghiệm (trial/experiment)*. Other words such as *điều trị (treat/treatment), kỹ thuật (technique), phương pháp (method), ứng dụng (deploy/deployment/implement/implementation), áp dụng (apply/application)* and *phát triển (deveolop/development)* represented accomplished procedures, applications or

deployments of stem cell technologies with conclusive and/or affirmative connotations. *Không (no/not)* was used before *thành công (succeed/success/successful/successfully) in only 14 out of 808 instances*, which suggests that success often comes in positive nuances.

There were 512 appearances of *khỏi (cure/recover/recovery)* in the corpus, with 263 instances of *chữa khỏi (cure)* and 115 instances of *khỏi bệnh (recover/recovery)*, which stand together with other positive words in the list to create a strong hope in stem cell research and treatments. *Không (no/not)* only collocated to the left of *cure (khỏi)* in 32 out of 512 occurrences, suggesting that *cure* is often mentioned in a confirmative/assertive connotation, not in its negative form.

Table 4 shows an extract of the concordance list of khỏi *(cure/recover/recovery)* which dominantly and affirmatively stands in front of hard to cure diseases in line 39, 40, 41, 42, 46, 48, 52, 54, 55, 57, 62, 63, 64, 65.

Table 4. Extract of the concordance list of khỏi (cure/recover/recovery).

N	Concordance			Sent. #	Sent. Pos.	Para. #
39	trở thành một phương pháp điều trị đầy triển vọng đem lại cơ **hội**	**khỏi**	bệnh cho các bệnh nhi mắc các bệnh hiểm nghèo tại khu	309	209	138
40	loại. ▪▪Nhờ đó, nhiều trường hợp bệnh nan y có khả năng **chữa**	**khỏi**	hoặc kéo dài sự sống. ▪▪Ghép tủy tự thân là phương pháp	314	53	140
41	ung thư." "BỆNH ¶▷NHI ĐẦU TIÊN CỦA VIỆT NAM ĐƯỢC **CHỮA**	**KHỎI**	U NGUYÊN BÀO VÕNG MẠC NHỜ GHÉP TẾ BÀO GỐC ◅⁋		0	
42	đầu tiên của Việt Nam mắc u nguyên bào võng mạc được **chữa**	**khỏi**	nhờ phương pháp ghép tế bào gốc tự thân. ¶⁋Theo đó	330	74	144
43	hóa khớp ◅⁋Thoái hóa khớp là tình trạng lão hóa không thể **tránh**	**khỏi**	của tổ chức sụn, các tế bào, các mô ở khớp và xung quanh	520	53	257
44	tại chỗ và lấy mô mỡ bụng của người bệnh. ▪▪Sau khi được **tách**	**khỏi**	mô mỡ bụng, tế bào gốc sẽ được trộn với dung dịch chứa	534	18	261
45	▪▪Do đó, ít ảnh hưởng đến sức khỏe tổng thể và người bệnh **mau**	**khỏi**	hơn. ¶▷Biến chứng ◅⁋Hiện tại, ngoài tình trạng sưng, đỏ	561	60	269
46	bào cũ bị khiếm khuyết. ¶⁋Ghép tế bào gốc tạo máu có thể **chữa**	**khỏi**	nhiều bệnh hiểm nghèo liên quan đến hệ tạo máu như đa	633	36	308
47	tế bào tuỵ trưởng thành, trở thành "lá chắn" để bảo vệ tuyến **tụy**	**khỏi**	stress oxy hóa gây chết tế bào. ¶6. ◅Ứng dụng tế bào gốc	707	162	336
48	bào cũ bị khiếm khuyết. ¶⁋Ghép tế bào gốc tạo máu có thể **chữa**	**khỏi**	nhiều bệnh hiểm nghèo liên quan đến hệ tạo máu như đa	725	36	343
49	tế bào tuỵ trưởng thành, trở thành "lá chắn" để bảo vệ tuyến **tụy**	**khỏi**	stress oxy hóa gây chết tế bào. ¶6. ◅Ứng dụng tế bào gốc	799	162	371
50	ban đầu của chúng. ▪Cụ thể: ◅⁋Tế bào gốc sau khi bị tách **ra**	**khỏi**	cơ thể người nếu không được lưu trữ đúng khoa học sẽ dễ	858	30	408
51	họ giải phóng tế bào gốc vào máu. ▪▪Tiếp theo, máu được lấy **ra**	**khỏi**	cơ thể, một chiếc máy tách ra các tế bào gốc và các bác sĩ	981	27	467
52	đồ theo dõi nhằm giảm nguy cơ mắc bệnh, tăng khả năng **chữa**	**khỏi**	bệnh hoặc kéo dài thời gian không mắc bệnh (nếu có nguy	1.008	122	478
53	tế bào cơ tim duy trì nhịp đập của tim, tế bào da bảo vệ cơ **thể**	**khỏi**	tia tử ngoại của ánh nắng mặt trời, tế bào võng mạc giúp	1.056	159	495
54	một số trường hợp, liệu pháp thay thế tế bào gốc có thể **chữa**	**khỏi**	bệnh ung thư. ▪▪Vậy cấy ghép tế bào gốc là gì? ¶1. ¶Tế	1.200	67	551
55	một số trường hợp, liệu pháp thay thế tế bào gốc có thể **chữa**	**khỏi**	bệnh ung thư. ¶⁋Điều trị ung thư máu thường bắt đầu	1.234	67	561
56	tổ hoàn toàn. ▪▪Sau những kích thích cụ thể, tế bào gốc có thể **dời**	**khỏi**	hốc và di chuyển vào máu. ▪▪Sau đó tế bào phải bám vào	1.424	51	620
57	đồ theo dõi nhằm giảm nguy cơ mắc bệnh, tăng khả năng **chữa**	**khỏi**	bệnh hoặc kéo dài thời gian không mắc bệnh (nếu có nguy	1.457	122	628
58	của mình hơn. ▪▪Những ngày khác, bạn có thể quá kiệt sức để **ra**	**khỏi**	giường. ▪▪Có thể mất vài tháng để hồi phục hoàn toàn. ¶⁋	1.618	47	688
59	2 tuần. ▪▪Trong thời gian này, bạn sẽ cần được bảo vệ đặc **biệt**	**khỏi**	nhiễm trùng. ▪▪Mọi người vào phòng phải đeo găng tay,	1.647	53	701
60	tổn thương tế bào. ▪▪Lúc này, các tế bào gốc tạo máu sẽ **thoát**	**khỏi**	sự im lặng và bắt đầu phân chia lại một cách tích cực, tạo	1.697	41	720
61	được chiếu xạ tổng hợp từ chuột có khả năng bảo vệ đơn vị **nhận**	**khỏi**	sự chiếu xạ gây chết người bằng cách tái tạo hệ thống tạo	1.780	210	764
62	như cũ các tế bào máu, tế bào miễn dịch, từ đó giúp người **bệnh**	**khỏi**	bệnh. ¶⁋Tuy nhiên, trong ghép tế bào gốc đồng loại, có	1.948	147	830
63	trị các bệnh lý ở trẻ em, đem lại hy vọng và cơ hội được **chữa**	**khỏi**	các bệnh lý hiểm nghèo mà trước đây việc điều trị những	2.039	179	870
64	trẻ mắc bệnh suy tủy xương sau khi được ghép tủy sẽ hoàn **toàn**	**khỏi**	bệnh và có cuộc sống như những trẻ bình thường khác. ¶⁋	2.067	81	883
65	cấp. ▪▪Chúng tôi tự hào đã giúp cho hàng ngàn bệnh nhân **thoát**	**khỏi**	những cơn đau dai dẳng. ¶⁋Theo cơ chế hoạt động tự	2.126	55	912

Out of its total of 201 instances, *an toàn (safe/safety)* often appeared in such phrases as *an toàn và hiệu quả (safety and efficacy), đảm bảo an toàn (secured safety), tính an toàn (safety/safe manner), phương pháp an toàn (safe method), điều trị an toàn (safe treatment)* and *chứng minh an toàn (proven to be safe)*. *Không (no/not)* collocated to the left of *an toàn (safe/safety)* in only 11 out of 201 instances. An example to illustrate the *scientific progress and medical achievement frame* is when the Central Military Hospital No. 108 announced that, for the first time, they used a stem cell transplant technique to treat myasthenia gravis in a patient. The hospital even organized an event to celebrate when the patient exited the hospital after her surgery. This event was widely communicated on the hospital's website, social media and in a number of newspapers such as *Báo Chính phủ, Nhân Dân, Lao động, Sức khỏe & Đời sống, Vietnamnet* and *VietnamPlus*. However, most of the coverage in

these outlets contained identical content. The hospital's communication and an article on *Sức khỏe & Đời sống (Health and Life)* [2021], titled *Bệnh nhân đầu tiên của Việt Nam được điều trị nhược cơ bằng tế bào gốc* ("*The first patient with myasthenia gravis from Vietnam treated with stem cells*") created the impression that the hospital had successfully cured her condition completely. However, the patient was very reserved when discussing her case on social media, noting that she needed follow-up treatments for years to come.

After one single treatment case, the Vice Director of Central Military Hospital No. 108, Nguyễn Hoàng Ngọc, was quoted in *Sức khỏe & Đời sống (Health and Life)* [2021], claiming that the technical procedure for CD34 stem cell transplant would be applied in clinical treatments for other patients with myasthenia gravis and systemic lupus erythematosus diseases as a standard protocol. The transition from a single case treatment to clinical deployment did not align with any of the national or international recommended practices. The article concluded:

> *This is the first case in Vietnam which has successfully applied CD34 stem cell transplant to treat myasthenia gravis, opening up new treatment protocol. [This] demonstrates the expertise of Vietnamese doctors, who have been mastering specialized techniques in the new era of the world medicine to deploy stem cell therapies to successfully treat many incurable diseases.*

Claims such as *làm chủ (master), kỷ nguyên mới của y học thế giới (new era of the world medicine)* or *điều trị thành công nhiều bệnh nan y (successfully treat many incurable diseases)* were used to end this piece of publicity. From the title, the lead, throughout the article to the end, celebratory language was used on this single case of the initial treatment. Central Military Hospital No. 108 is one of the most established medical institutions in Vietnam, but doctors ignored all the principles of rigorous medical research and monitoring to blast on their premature success.

Health risks: This frame appears modestly in the corpus as shown in Table 5, in comparison with the achievement frame. The volume of words and phrases in the health risk frame accounted for less than 18% of the achievement frame.

Table 5. Wordlist making up the health risk frame.

Word	Translation	Freq.	%
nguy cơ	risk/threat	292	0.05%
thoái hóa	degression	291	0.05%
tử vong	die	179	0.03%
nhiễm trùng	infection	158	0.03%
ác tính	pernicious	156	0.03%
biến chứng	complication	122	0.02%
tác dụng phụ	side effect	100	0.02%
nguy hiểm	dangerous	85	0.02%
hiểm nghèo	life-threatening	79	0.01%

In validating the use of this frame, our assessment of the terms in their contexts suggested that, when communicators focus on hyping stem cell treatments, they generally ignore the

risks associated with them. Even though the word *nguy cơ (risk/threat)* appeared with a frequency of 292 times in the corpus, the concordance and collocation lists suggested that the word referred to general health risks; not the risks that are directly related to stem cell treatments. Similarly, the word *biến chứng (complication)* was mostly used to represent other complications related to the patients' existing health condition. The concordance list of *tác dụng phụ (side effect)* was quite mixed, but it is noteworthy that the word *tác dụng phụ (side effect)* collocated with *không (no/not)* in 26 occurrences, out of its 100 appearances. Although the words and phrases that represent health risks appeared in the corpus, in many cases, they were used for the purpose of downplaying the risks associated with stem cell treatments rather than serving as warnings of the risks of these therapies. Critical voices on stem cell treatment and communication were limited.

Financial cost: this frame included such words as *chi phí (cost/expenditure), giá (price), triệu đồng (million Vietnamese Dongs), số tiền (amount of money)* with 817 occurrences. In the concordance list of *chi phí (cost)*, there was a theme that emphasized that although the cost for stem cell treatment in Vietnam is high, it is still competitive as it is only about half of that in other countries.

Vietnam's position in international medicine: this frame highlighted how stem cell research helped Vietnam stand out in the international arena of medical studies. In the corpus, the term *Việt Nam* was the 13th most frequently used word, with 1061 occurrences and a frequency of 20 occurrences per 10,000 words. In many cases, *Việt Nam* was compared to the world's medicine, with a nationalist flare.

Table 6 illustrates an extract of how Vietnam appears in the sentence contexts whereas many achievements and costs are highlighted in comparison with other countries in the world medicine arena.

Thế giới (world) was the 27th most frequently used words in the corpus, with 630 occurrences and a frequency of 12 occurrences per 10,000 words. *Thế giới (world)* often appeared in such phrases as *đầu tiên trên thế giới (first time in the world), hàng đầu thế giới (world leading)*, or collocated with *nghiên cứu (research), điều trị (treat/treatment), chữa khỏi (cure/recovery), áp dụng (apply/application)* and *ứng dụng (deploy/implement)*. A few countries, that are known to have leading laboratories in stem cell research such as the United States, China, and Japan appeared in high frequency in the corpus, in comparison to Vietnam.

Vietnam was also juxtaposed against the world's advancements in stem cell treatments and technologies. For example, an article on *Sức khỏe & Đời sống (Health & Life)* [2020]proclaims in its title: *Trẻ tự kỷ phục hồi kỳ diệu nhờ ghép tế bào gốc* ("*Autistic child magically recovered thanks to stem cell transplant*"). After sensationally reporting the transformation in the child's behaviour to bring the family from despair to hope, the article trumpets: *Kết quả khả quan hơn các thành tựu đã có trên thế giới (the treatment outcome [in Vietnam] is more promising than those offered in other places in the world)*. It adds that stem cell therapy is a *scientific breakthrough* by VinMec Stem Cell and Gene Technology Institute.

There were 828 occurrences of *đầu tiên (first/first time ever)* in the corpus, making this word the 20th most frequently used one in the corpus, with 15 occurrences per 10,000 words. It often made up such phrases as *lần đầu tiên tại Việt Nam (the first time in*

Table 6. Extract of how the word Vietnam appears in the sentence contexts.

N	Concordance			Sent.	Sent. Pos.	Para. #
125	tìm nguồn tế bào gốc. ▫▫Chi phí ghép tại Singapore gấp 10 **lần**	**Việt**	Nam, Đài Loan gấp khoảng 5 lần. ▫▫Bệnh viện nghỉ đến	963	38	459
126	Loan. ▫▫Người Đài Loan có dòng máu phù hợp cao với **người**	**Việt.**	▫Trung tâm lưu trữ tế bào gốc hàng đầu châu Á này đã	965	49	459
127	bào gốc là 4.498 người. ¶Tổng chi phí đợt ghép tế bào gốc **tại**	**Việt**	Nam là 847 triệu đồng, bảo hiểm y tế chi trả 530 triệu. ▫▫	967	37	460
128	tế bào gốc trên thế giới để tìm nguồn hiến phù hợp cho **người**	**Việt**	Nam, tạo nền tảng thành lập hệ thống hiến tế bào gốc	970	123	460
129	tạo nền tảng thành lập hệ thống hiến tế bào gốc quốc gia **tại**	**Việt**	Nam.Gần hai tháng sau ghép, sức khỏe bệnh nhân ổn	970	194	460
130	nhau. ¶Đây là ca ghép tế bào gốc không huyết thống đầu tiên **ở**	**Việt**	Nam, cũng là lần đầu tiên tế bào gốc được một người ở	974	55	461
131	tế bào gốc được một người ở nước ngoài cho và vận chuyển **về**	**Việt**	Nam ghép cho bệnh nhân. ¶Ghép tế bào gốc tạo máu là	974	146	461
132	máu Huyết học TP HCM thực hiện ca ghép tủy xương đầu **tiên**	**Việt**	Nam. ▫▫Nam bệnh nhân sau khi hồi phục đã quay trở lại	976	85	462
133	Năm 2002, bệnh viện thực hiện ca ghép máu cuống rốn đầu **tiên**	**Việt**	Nam. ▫▫Tháng 4/2013, ca dị ghép nửa thuận hợp HLA đầu	978	61	462
134	trước tuổi đi học 3-4%. ▫▫Ông Nguyễn Thanh Liêm cho biết, **tại**	**Việt**	Nam hiện chưa có số liệu điều tra thống kê quy mô trên	991	36	469
135	do bệnh lý, qua đó phục hồi chức năng của cơ thể. ¶**Hiện**	**Việt**	Nam có năm cơ sở có khả năng thu thập, xử lý và bảo	1.001	5	474
136	▹Lê Hữu Nam" ◃▹"Bệnh viện Tế Bào Gốc Nhật Bản đã có mặt **tại**	**Việt**	Nam ◃¶Nơi đây áp dụng công nghệ tế bào gốc để hỗ trợ		0	
137	Theo Tiến Sĩ Nhật Bản- Yoji Kishi, hàng năm có nhiều khách **hàng**	**Việt**	đến Đức, Nhật Bản để tiêm tế bào gốc nhằm duy trì sức	1.117	65	521
138	đẩy lùi bệnh lý và hỗ trợ trẻ lại nhiều tuổi. ▫▫Nhằm giúp **người**	**Việt**	có thể trải nghiệm công nghệ cấy này ngay tại Việt Nam,	1.118	16	521
139	giúp người Việt có thể trải nghiệm công nghệ cấy này ngay **tại**	**Việt**	Nam, Bệnh viện Tế Bào Gốc Nhật Bản DNA vừa được	1.118	67	521
140	nói thêm. ▫▫Xem chi tiết tế bào gốc Nhật Bản tại đây.Ngay **tại**	**Việt**	Nam, mọi người có thể trải nghiệm thành tựu y học thế	1.128	50	
141	ứng dụng tế bào gốc để duy trì sức khỏe, đẩy lùi bệnh tật. ¶▹**Tại**	**Việt**	Nam hiện nay, bạn có thể trải nghiệm công nghệ Nhật	1.139	4	
142	trong ngành y khoa hiện đại, được nhiều người tin dùng. ▫▫**Tại**	**Việt**	Nam, bạn có thể trải nghiệm giải pháp này tại Bệnh viện	1.153	4	
143	tuổi thọ trung bình cao nhất thế giới. ▫▫Do đó, rất nhiều **người**	**Việt**	sang Nhật để trải nghiệm phương pháp này. ¶Mới đây,	1.159	23	531
144	Bản chuyển giao ứng dụng công nghệ tế bào gốc, giúp **người**	**Việt**	có cơ hội điều trị trong nước mà không phải mất thời	1.160	121	532
145	từ ngoài vào trong, có thể trẻ ra 10 năm tuổi. ▫""Giờ ▫đây **người**	**Việt**	có thể được trải nghiệm ứng dụng công nghệ tế bào gốc	1.169	16	
146	trải nghiệm ứng dụng công nghệ tế bào gốc Nhật Bản ngay **tại**	**Việt**	Nam khi đến Bệnh viện Quốc tế DNA mà không cần phải	1.169	93	
147	dục. ▫▫Từ đó tăng cường chức năng sinh lý. ▫""Giờ ▫đây, **người**	**Việt**	có thể trải nghiệm ứng dụng công nghệ tế bào gốc Nhật	1.184	17	
148	với Palmer giờ đây đều quý giá." "Thuật ¶▹ngữ 'tế bào gốc' **ở**	**Việt**	Nam đang bị lạm dụng ◃¶Khả năng làm chủ công nghệ		0	
149	điểm đáng lưu tâm trong nghiên cứu và ứng dụng tế bào gốc **ở**	**Việt**	Nam với VnExpress. ¶Theo PGS Phúc, Việt Nam đã có	1.214	183	545
150	dụng tế bào gốc ở Việt Nam với VnExpress. ¶Theo PGS **Phúc,**	**Việt**	Nam đã có lịch sử nghiên cứu và ứng dụng tế bào gốc	1.215	15	546
151	phát triển thực sự. ""Sau ¶hơn ¶120 năm, công nghệ tế bào gốc **ở**	**Việt**	Nam đạt rất ít thành tựu, Những công nghệ ""Made in	1.216	41	547
152	công nghệ tế bào gốc trong lĩnh vực y- dược và nông nghiệp **ở**	**Việt**	Nam"". ¶Nhiệm vụ thuộc Chương trình đổi mới công	1.218	220	547

Vietnam) or *lần đầu tiên trên thế giới (the first time in the world), ca đầu tiên (the first case), bệnh viện đầu tiên (the first hospital), bệnh nhân đầu tiên (the first patient), bác sỹ đầu tiên (the first doctor)*, etc. In general, a common discourse found in the corpus claimed that the doctors and hospitals in Vietnam are among the first to break the ground on successfully conducting the stem cell medical procedures for the treatments of diseases or illnesses in the country or in the world. Of the 54 occurrences about the milestones in stem cell treatment advancements in the world, VinMec hospital and its affiliates in Vietnam claimed a few.

Regulation frame: overall, 128 *cấp phép (approve/license)*, 101 *cơ chế (regime)*, 101 *kiểm soát (monitor)*, 93 *thông qua (approve)* and 83 *báo cáo (report)* were found in the list of word frequencies. We called this the *regulation frame*. No words related to policy or ethics made their presence in the list.

Some information about the context is helpful to understand the use of this frame. Debates about VinMec Hospital's unethical stem cell treatments and publications gained traction on social media in Vietnam in June, July, and August 2021, within the timeframe when our data were collected. Participants in the discussions included both specialists (e.g., Vietnamese researchers specialised in stem cell) and non-specialists (e.g., social media users and researchers worldwide). There were multiple posts in a renowned Facebook group on *Liêm chính Khoa học (Scientific Research Integrity)*. A webinar titled "Stem cell therapies: Expectations and complications" [H. W. Tran et al., 2021], led by Vietnamese doctors and researchers in the United States, Canada, Japan, and Singapore, was organized in response to the interests from the public in Vietnam. In these discussions, many families revealed they did not know that VinMec should have provided them with a copy of the

consent forms for their own records with explanation of all the risks and complications. When the pressure from Vietnamese researchers worldwide heightened, VinMec unprecedentedly decided to refund the medical fees they had illegitimately collected from families for the unapproved treatments, but most of the families did not keep any bill or record, so, they just accepted whatever refund VinMec offered.

The controversy drew the attention of a large number of researchers, patients' families, and lay audiences, but no content about the event was found in the corpus. When the debate was brought to the attention of some journalists from leading newspapers like *Thanh Niên* and *Tuổi Trẻ*, they chose not to cover the issue. Information about the event was only covered by *BBC Vietnamese* [BBC News, 2021], which was blocked by the Vietnamese government's firewall [Hoang, 2023].

6 ▪ Discussion and conclusion

Using a computational approach, this study examined the coverage of the controversial medical issue of experimental stem cell therapies in the Vietnamese news media. Stem cell hype is a common feature of reporting in Vietnam, as it is elsewhere in the world. However, the media framing associated with the regulation frame contributes to a minimal proportion of coverage. Frames around policy and ethics were almost absent in the news media corpus while the frequency of the health risks and financial costs frames were modest. The nationalism frame is quite unique to Vietnam. This frame represents the common narrative that promotes nationalism, patriotism, and national pride [Bonikowski & DiMaggio, 2016]. It is especially popular in the news in formerly colonized countries where aspirations of obtaining an edge in competing with the West or former colonizers are strong [Harding, 2008; Kjaergaard, 2011; Shahin, 2015]. Given the unconventionally complex relationships between corporations and news media in Vietnam, a possible explanation is that news outlets in this single-party country, under the influence of the largest businesses and medical institutions, adopted a frame that helps businesses to promote highly controversial medical services using a nationalistic narrative.

The findings demonstrate a distinctive characteristic of a country in the Global South where doctors and hospitals proclaim and associate their medical advancements with national pride and achievement. Indeed, the medical service providers are flying the nationalism flag for their own ends with their professional agenda and commercial interests. In a country where people are willing to turn to superstitious methods in health matters with such mottos as *có bệnh thì vái tứ phương (when you are ill, you pray everywhere)*, or *Đông, Tây y kết hợp thầy cúng (Oriental medicine mixes up with Western medicine, under the magic wand of the shamans)*, stem cell technology and *commodified* nationalism serves as a marriage of convenience to appeal to desperate customers with a fashionable "high-tech" solution.

In a historically colonized country, which is still plagued by poverty despite its efforts in speeding up its economic developments, Vietnamese people share a strong desire to overcome the shadows of wars that have loomed large in this nation for decades and to be recognized by the international community as an emerging economy. For years, Vietnam has dubbed itself as a "new Asian tiger" in a dominant nationalist discourse that both the government and the country's news media have populated [Le, 2023]. Therefore, it is no

surprise that Vietnamese media practitioners are motivated to seek validation to put Vietnam in the international spotlight. Many private businesses have capitalized on such discourse, positioning themselves as representatives of the Vietnamese economy and demonstrating pride in the place of the nation in the international arena. Their ultimate goals are to tap into a growing consumer market by aligning themselves with the interests and desires of Vietnamese people.

The Communist Party State, media and corporate relationship is seen as an interdependent alliance to help maintain political legitimacy and to accelerate capital accumulation, in what Beresford [2008] terms cronyism or red capitalism. In an increasingly competitive environment, utilizing consumer ethnocentrism as a marketing strategy is, perhaps, expected to boost the sales of this special health product [Nguyen et al., 2023]. Past research has found extensive evidence of the influence of consumer ethnocentrism on purchasing intentions through experiments [Balabanis et al., 2001], this study is among a few to investigate how the news media propagated ethnocentrism to support local brands. Findings from this study indicate that in a country with a state media, nationalism and the positive aspects of stem cell treatments trump ethical and objective reporting on rigors, risks and costs.

Another important finding of this research is the absence of two frames that highlight ethical issues and policy or political issues related to stem cell research and treatments. While past research on this topic has documented the presence of these frames in news content from multiple countries [Nisbet et al., 2003; Kitzinger & Williams, 2005], our analysis did not find similar results. This is, perhaps, because Vietnam's media system is primarily state-owned and lacks plurality, which does not allow for diverse opinions on these issues to be included. There is a lack of discussion of policy or the political implications of stem cell research and medical treatments, even in articles that discuss regulations at administrative levels. It also illustrates how businesses, through their financial influence, can manipulate the news to promote their products. Given the limited regulation and policy on stem cell treatments, together with Vietnam's unique news media and consumer culture, the stem cell therapies in Vietnam are hyped in distinctive ways. Reported elsewhere in the medical literature, it often takes from 10 to 14 years for experimental health services and products to move from research to market approval, and additional time is required for them to be assessed and integrated into healthcare systems and insurance policies [Glassman & Sun, 2004]. Vietnamese news media echoes the high global optimism and the promised breakthroughs of stem cell treatments, which might be fostering unrealistic expectations about the speed of clinical translation, creating a global market for inadequately proven stem cell treatments [Kamenova & Caulfield, 2015, p. 26]. Hospitals only need to apply stem cell therapies to one or a few patients to then proclaim their success and switch the treatment to the status of a clinical protocol. This is specifically dangerous when lay people are impatient and desperate, resorting to stem cell therapies as miracle cures [Turner, 2020].

The stem cell hype in Vietnam can lure consumers into expensive and unproven treatments, which can lead to declining wellbeing and financial hardship for the families. Patients and their families may not have resources for other interventions with higher efficacy for their health conditions, if they invest their time and money into stem cell treatments.

Methodologically, this study contributes to the field by demonstrating how it is possible to combine automated frame analysis with manual frame analysis of the text and contexts to

strengthen the validation of empirical evidence. Most research on media coverage of science and public health issues employs manual content analyses, which are often based on an existing frame system that merely reflects Western concerns. This study employed computerized frame analysis that inductively yielded a new frame system from the media context of a non-Western country. With automated text mining, the frames identified in this research give a panoramic view and quick assessment of big data sets. The method has been shown to be efficient and helpful, especially when researchers are confronted with urgent social, technological or public health matters [Yến-Khanh, 2020]. Media listening reports or computer science studies using natural language processing and machine learning technology can extract major themes from a corpus, but labelling and interpreting the automated data patterns needs local experience and insight from analysts. This paper goes beyond identifying themes or topics from a big data corpus, to interpreting and explaining their implications for various stakeholders. A limitation of this study is that the research team could not find software to visualise the semantic network of frames in the Vietnamese language. This is a technological gap for many countries in the Global South.

Empirically, this study contributes evidence from Vietnam to the global literature and presents the implications of stem cell hype in the national context. This helps to de-Westernize communication studies by providing evidence that is contextualized within local political, cultural, economic, social and media environments. Previous researchers have noted, as is the case in this study, that the evidence and findings from a non-Western culture can differ and challenge Western conceptions of communication because they are built on different systems of "knowledge, humanity, identity, individualism, and community" [Waisbord & Mellado, 2014, p. 366]. This study also makes practical contributions by providing more systematic accounts for a better understanding of the media in Vietnam, and how news organizations align with businesses in ways that may mislead the public, especially where there are no clear boundaries between ethical and unethical journalistic practices. Findings from an exploratory study like this enrich the sparse literature of science reporting in the Global South. Future research could examine the impact of media framing on the audience's perceptions, attitudes and behaviours toward this controversial medical treatment.

When media accountability on issues is low, and journalism, public relations and advertorials are conflated and mixed up, conditions are conducive to scientific and medical hype. Protecting patients from skyrocketing, unproven, and potentially harmful treatments requires legal, ethical and public health oversight [Lyons et al., 2021]. As such, this paper joins other researchers [Lyons et al., 2021; Petersen et al., 2017] to call for national and international efforts to build strong regulations to monitor medical institutions and media outlets, and to educate lay consumers on the current stage of stem cell treatment efficacy and risks, while acknowledging the needs and potential benefits that rigorous and evidence-based stem cell research might bring in the future.

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References

Abuza, Z. (2015). *Stifling the public sphere: Media and civil society in Vietnam*. The International Forum for Democratic Studies at the National Endowment for Democracy (NED). https://www.ned.org/wp-content/uploads/2015/10/Stifling-the-Public-Sphere-Media-Civil-Society-Vietnam-Forum-NED.pdf

Agrawal, A., Fu, W., & Menzies, T. (2018). What is wrong with topic modeling? And how to fix it using search-based software engineering. *Information and Software Technology*, *98*, 74–88. https://doi.org/10.1016/j.infsof.2018.02.005

Aly, R. M. (2020). Current state of stem cell-based therapies: an overview. *Stem Cell Investigation*, *7*, 8–8. https://doi.org/10.21037/sci-2020-001

Balabanis, G., Diamantopoulos, A., Mueller, R. D., & Melewar, T. C. (2001). The impact of nationalism, patriotism and internationalism on consumer ethnocentric tendencies. *Journal of International Business Studies*, *32*, 157–175. https://www.jstor.org/stable/3069515

BBC News. (2021, August 2). *Vinmec 'cấy ghép tế bào gốc' chữa trẻ tự kỷ ở Việt Nam gây tranh cãi quốc tế* [Vinmec "transplants stem cells" to treat autism in vietnam and causes international controversy].

Beresford, M. (2008). Doi Moiin review: The challenges of building market socialism in Vietnam. *Journal of Contemporary Asia*, *38*(2), 221–243. https://doi.org/10.1080/00472330701822314

Bonikowski, B., & DiMaggio, P. (2016). Varieties of American Popular Nationalism. *American Sociological Review*, *81*(5), 949–980. https://doi.org/10.1177/0003122416663683

Boumans, J. W., & Trilling, D. (2015). Taking Stock of the Toolkit: An overview of relevant automated content analysis approaches and techniques for digital journalism scholars. *Digital Journalism*, *4*(1), 8–23. https://doi.org/10.1080/21670811.2015.1096598

Bubela, T., Li, M. D., Hafez, M., Bieber, M., & Atkins, H. (2012). Is belief larger than fact: expectations, optimism and reality for translational stem cell research. *BMC Medicine*, *10*(1). https://doi.org/10.1186/1741-7015-10-133

Caple, H., & Bednarek, M. (2015). Rethinking news values: What a discursive approach can tell us about the construction of news discourse and news photography. *Journalism*, *17*(4), 435–455. https://doi.org/10.1177/1464884914568078

Chen, H., & Gottweis, H. (2011). Stem cell treatments in China: rethinking the patient role in the global bio-economy. *Bioethics*, *27*(4), 194–207. https://doi.org/10.1111/j.1467-8519.2011.01929.x

Dahmen, N. S. (2008). Newspapers Focus on Conflict in Stem Cell Coverage. *Newspaper Research Journal*, *29*(3), 50–64. https://doi.org/10.1177/073953290802900305

Dang, T. T. H. (2012). Vietnamese model of journalism in the age of integration and its effects to the civil society and democracy in Vietnam. *VNU Journal of Social Sciences and Humanities*, *28*, 57–64. https://js.vnu.edu.vn/SSH/article/view/1414

Datta, S. (2018). Emerging dynamics of evidence and trust in online user-to-user engagement: the case of 'unproven' stem cell therapies. *Critical Public Health*, *28*(3), 352–362. https://doi.org/10.1080/09581596.2018.1446509

Doan, M.-A., & Bilowol, J. (2014). Vietnamese public relations practitioners: Perceptions of an emerging field. *Public Relations Review*, *40*(3), 483–491. https://doi.org/10.1016/j.pubrev.2014.02.022

Duong, H. T., Vu, H. T., & Nguyen, N. (2019). Activists' Strategic Communication in an Authoritarian Setting: Integrating So cial Movement Framing into Issues Management. *International Journal of Strategic Communication*, *13*(2), 133–151. https://doi.org/10.1080/1553118x.2019.1590366

Entman, R. M. (1993). Framing: Toward Clarification of a Fractured Paradigm. *Journal of Communication*, *43*(4), 51–58. https://doi.org/10.1111/j.1460-2466.1993.tb01304.x

Eyraud, A., Scouppe, L., Barnetche, T., Forcade, E., Lazaro, E., Duffau, P., Richez, C., Seneschal, J., & Truchetet, M.-E. (2018). Efficacy and safety of autologous haematopoietic stem cell transplantation in systemic sclerosis: a systematic review of the literature. *British Journal of Dermatology*, *178*(3), 650–658. https://doi.org/10.1111/bjd.15993

FDA. (2020). *Consumer Alert on Regenerative Medicine Products Including Stem Cells and Exosomes*. https://www.fda.gov/vaccines-blood-biologics/consumers-biologics/consumer-alert-regenerative-medicine-products-including-stem-cells-and-exosomes

FDA. (2023). *Approved Cellular and Gene Therapy Products*. https://www.fda.gov/vaccines-blood-biologics/cellular-gene-therapy-products/approved-cellular-%20and-gene-therapy-products

Gabrielatos, C., & Baker, P. (2008). Fleeing, Sneaking, Flooding: A Corpus Analysis of Discursive Constructions of Refugees and Asylum Seekers in the UK Press, 1996–2005. *Journal of English Linguistics*, *36*(1), 5–38. https://doi.org/10.1177/0075424207311247

Glassman, R. H., & Sun, A. Y. (2004). Biotechnology: identifying advances from the hype. *Nature Reviews Drug Discovery*, *3*(2), 177–183. https://doi.org/10.1038/nrd1309

Hall, S., Clarke, J., Critcher, C., Jefferson, T., & Roberts, B. (1978). Policing the crisis: Mugging, law and order and the state. In *Policing the crisis: Mugging, law and order and the state*. Palgrave Macmillan.

Harding, S. (2008). *Sciences from below: Feminisms, postcolonialities, and modernities*. Duke University Press.

Hirai, T., Yasuda, S., Umezawa, A., & Sato, Y. (2023). Country-specific regulation and international standardization of cell-based therapeutic products derived from pluripotent stem cells. *Stem Cell Reports*, *18*(8), 1573–1591. https://doi.org/10.1016/j.stemcr.2023.05.003

Hoang, L. (2023). Vietnam's plan to block users puts internet access at risk. *Nikkei Asia*. https://asia.nikkei.com/Business/Technology/Vietnam-s-plan-to-block-users-puts-internet-access-at-risk

International Center for Journalists. (2017). *The State of Technology in Global Newsrooms*. https://www.icfj.org/sites/default/files/2018-04/ICFJTechSurveyFINAL.pdf

Isaković, J., Šerer, K., Barišić, B., & Mitrečić, D. (2023). Mesenchymal stem cell therapy for neurological disorders: The light or the dark side of the force? *Frontiers in Bioengineering and Biotechnology*, *11*. https://doi.org/10.3389/fbioe.2023.1139359

Iyengar, S. (1991). *Is anyone responsible?: How television frames political issues*. University of Chicago Press. https://press.uchicago.edu/ucp/books/book/chicago/I/bo3684515.html

Jones, M., Raju, D. K., Pearson, J., Reitmaier, T., Robinson, S., & Majhi, A. (2024). Beyond 'Slumming It'—AI and the Real Lives of Global South Communities. *Interactions*, *31*(6), 20–27. https://doi.org/10.1145/3696019

Jurberg, C., Verjovsky, M., Cardoso Machado, G. d. O., & Affonso-Mitidieri, O. R. (2009). Embryonic stem cell: A climax in the reign of the Brazilian media. *Public Understanding of Science*, *18*(6), 719–729. https://doi.org/10.1177/0963662509335457

Kamenova, K. (2017). Media portrayal of stem cell research: towards a normative model for science communication. *Asian Bioethics Review*, *9*(3), 199–209. https://doi.org/10.1007/s41649-017-0026-8

Kamenova, K., & Caulfield, T. (2015). Stem cell hype: Media portrayal of therapy translation. *Science Translational Medicine*, *7*(278). https://doi.org/10.1126/scitranslmed.3010496

Kennedy, G. (2014). *An introduction to corpus linguistics*. Routledge.

Khan, Z., Agarwal, N. B., Bhurani, D., & Khan, M. A. (2021). Risk Factors for Hematopoietic Stem Cell Transplantation-Associated Bone Loss. *Transplantation and Cellular Therapy*, *27*(3), 212–221. https://doi.org/10.1016/j.bbmt.2020.10.002

Kim, L. (2011). Media framing of stem cell research: a cross-national analysis of political representation of science between the U.K. and South Korea. *Journal of Science Communication*, *10*(03), A02. https://doi.org/10.22323/2.10030202

Kitzinger, J., & Williams, C. (2005). Forecasting science futures: Legitimising hope and calming fears in the embryo stem cell debate. *Social Science & Medicine*, *61*(3), 731–740. https://doi.org/10.1016/j.socscimed.2005.03.018

Kjaergaard, R. S. (2011). Stem-Cell Spin: Covering the Hwang Affair inScienceandNature. *Science as Culture*, *20*(3), 349–373. https://doi.org/10.1080/09505431.2010.549822

Lau, J. H., Grieser, K., Newman, D., & Baldwin, T. (2011). Automatic labelling of topic models. *Proceedings of the 49th annual meeting of the association for computational linguistics: human language technologies*, 1536–1545. https://aclanthology.org/P11-1154/

Le, L. (2023). Can Vietnam become the next Asian Tiger? *East Asia Forum*. https://www.eastasiaforum.org/2023/10/30/can-vietnam-become-the-next-asian-tiger/

Leydesdorff, L., & Nerghes, A. (2016). Co-word maps and topic modeling: A comparison using small and medium-sized corpora (N < 1,000). *Journal of the Association for Information Science and Technology*, *68*(4), 1024–1035. https://doi.org/10.1002/asi.23740

Lyons, S., Salgaonkar, S., & Flaherty, G. T. (2021). International stem cell tourism: a critical literature review and evidence-based recommendations. *International Health*, *14*(2), 132–141. https://doi.org/10.1093/inthealth/ihab050

McLean, A. K., Stewart, C., & Kerridge, I. (2015). Untested, unproven, and unethical: the promotion and provision of autologous stem cell therapies in Australia. *Stem Cell Research & Therapy*, *6*(1). https://doi.org/10.1186/s13287-015-0047-8

Mu, W., Lim, K. H., Liu, J., Karunasekera, S., Falzon, L., & Harwood, A. (2022). A clustering-based topic model using word networks and word embeddings. *Journal of Big Data*, *9*(1). https://doi.org/10.1186/s40537-022-00585-4

Neuendorf, K. A. (2002). *The Content Analysis Guidebook*. Sage Publications.

Nguyen, N. H., Kien Dao, T., Duong, T. T., Nguyen, T. T., Nguyen, V. K., & Dao, T. L. (2023). Role of consumer ethnocentrism on purchase intention toward foreign products: Evidence from data of Vietnamese consumers with Chinese products. *Heliyon*, *9*(2), e13069. https://doi.org/10.1016/j.heliyon.2023.e13069

Nguyen-Thu, G. (2018). Vietnamese Media Going Social: Connectivism, Collectivism, and Conservatism. *The Journal of Asian Studies*, *77*(4), 895–908. https://doi.org/10.1017/s0021911818002504

Nisbet, M. C., Brossard, D., & Kroepsch, A. (2003). Framing Science: The Stem Cell Controversy in an Age of Press/Politics. *Harvard International Journal of Press/Politics*, *8*(2), 36–70. https://doi.org/10.1177/1081180x02251047

Petersen, A., Munsie, M., Tanner, C., MacGregor, C., & Brophy, J. (2017). *Stem cell tourism and the political economy of hope*. Springer.

PEW. (2021). Harms Linked to Unapproved Stem Cell Interventions Highlight Need for Greater FDA Enforcement. *The Pew Charitable Trusts*. https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2021/06/harms-linked-to-unapproved-stem-cell-interventions-highlight-need-for-greater-fda-enforcement

Pham, V., Slawson, M., Nicks, S., Ottwell, R., Greiner, B., & Vassar, M. (2021). The Presence of Sensational Language Describing Stem Cell Therapies in News Articles: A Cross-Sectional Analysis. *Regenerative Medicine*, *16*(10), 909–913. https://doi.org/10.2217/rme-2021-0017

Reis, R. (2008). How Brazilian and North American Newspapers Frame the Stem Cell Research Debate. *Science Communication*, *29*(3), 316–334. https://doi.org/10.1177/1075547007312394

Shahin, S. (2015). Mediated modernities: (Meta)narratives of modern nationhood in Indian and Pakistani media, 1947–2007. *Global Media and Communication*, *11*(2), 147–166. https://doi.org/10.1177/1742766515588417

Statista. (2023). *Number of doctors per 10,000 inhabitants in Vietnam 2010-2022*. https://tinyurl.com/pf9pp27r

Strekalova, Y. A. (2014). Informing Dissemination Research: A Content Analysis of U.S. Newspaper Coverage of Medical Nanotechnology News. *Science Communication*, *37*(2), 151–172. https://doi.org/10.1177/1075547014555025

Sức khỏe & Đời sống [Health & Life]. (2020). Trẻ tự kỷ phục hồi kỳ diệu nhờ ghép tế bào gốc [A child with autism magically recovered thanks to stem cell transplant]. *Sức khỏe & Đời sống [Health & Life]*. https://suckhoedoisong.vn/tre-tu-ky-phuc-hoi-ky-dieu-nho-ghep-te-bao-goc-169177460.htm

Sức khỏe & Đời sống [Health & Life]. (2021). Bệnh nhân đầu tiên của Việt Nam được điều trị nhược cơ bằng tế bào gốc [The first patient with myasthenia gravis treated by stem cell transplant]. *Sức khỏe & Đời sống [Health & Life]*. https://suckhoedoisong.vn/benh-nhan-dau-tien-cua-viet-nam-duoc-dieu-tri-nhuoc-co-bang-te-bao-goc-169197929.htm

Touri, M., & Koteyko, N. (2014). Using corpus linguistic software in the extraction of news frames: towards a dynamic process of frame analysis in journalistic texts. *International Journal of Social Research Methodology*, *18*(6), 601–616. https://doi.org/10.1080/13645579.2014.929878

Tran, H. W., Nguyen, K. H., Phan, T. T., & Pham, N. Q. (2021, August 15). *Liệu pháp tế bào gốc: Kỳ vọng và rắc rối* [Stem cell therapies: Expectations and complications] [Webinar, https://www.youtube.com/watch?v=6-4H_kLl8ns&t=1560s].

Tran, M. (2021). *Science journalism for development in Vietnam: a multi-facet investigation of issues and challenges and its implications for the Global South* [Doctoral Thesis]. Bournemouth University, U.K. https://eprints.bournemouth.ac.uk/35891/

Tran, M., & Nguyen, A. (2023). Besieged from all sides: impediments to science journalism in a developing country and their global implications. *Journal of Science Communication*, *22*(04). https://doi.org/10.22323/2.22040204

Turner, L. (2020). Preying on Public Fears and Anxieties in a Pandemic: Businesses Selling Unproven and Unlicensed “Stem Cell Treatments” for COVID-19. *Cell Stem Cell*, *26*(6), 806–810. https://doi.org/10.1016/j.stem.2020.05.003

Vicsek, L. (2010). Costs and Benefits of Stem Cell Research and Treatment: Media Presentation and Audience Understanding in Hungary. *Science Communication*, *33*(3), 309–340. https://doi.org/10.1177/1075547010389820

Vu, H. T., Liu, Y., & Tran, D. V. (2019). Nationalizing a global phenomenon: A study of how the press in 45 countries and territories portrays climate change. *Global Environmental Change*, *58*, 101942. https://doi.org/10.1016/j.gloenvcha.2019.101942

Vu, H. T., & Lynn, N. (2020). When the News Takes Sides: Automated Framing Analysis of News Coverage of the Rohingya Crisis by the Elite Press from Three Countries. *Journalism Studies*, *21*(9), 1284–1304. https://doi.org/10.1080/1461670x.2020.1745665

Waisbord, S., & Mellado, C. (2014). De-westernizing Communication Studies: A Reassessment. *Communication Theory*, *24*(4), 361–372. https://doi.org/10.1111/comt.12044

Walter, D., & Ophir, Y. (2019). News Frame Analysis: An Inductive Mixed-method Computational Approach. *Communication Methods and Measures*, *13*(4), 248–266. https://doi.org/10.1080/19312458.2019.1639145

Wang, W., & Guo, L. (2018). Framing genetically modified mosquitoes in the online news and Twitter: Intermedia frame setting in the issue-attention cycle. *Public Understanding of Science*, *27*(8), 937–951. https://doi.org/10.1177/0963662518799564

Webster, A., & Wyatt, S. (2017). Series Editors' Preface. In A. Petersen, M. Munsie, C. Tanner, C. MacGregor & J. Brophy (Eds.), *Stem cell tourism and the political economy of hope*. Palgrave Macmillan, U.K. https://doi.org/10.1057/978-1-137-47043-0

Won, J., Kim, K., Sohng, K.-Y., Chang, S.-O., Chaung, S.-K., Choi, M.-J., & Kim, Y. (2021). Trends in Nursing Research on Infections: Semantic Network Analysis and Topic Modeling. *International Journal of Environmental Research and Public Health*, *18*(13), 6915. https://doi.org/10.3390/ijerph18136915

Yến-Khanh, N. (2020). *Representation of autism in Vietnamese online news media between 2006 and 2016* [Doctoral thesis]. Massey University, New Zealand. https://philarchive.org/rec/KHAROA-2

Yến-Khanh, N. (2023). Representation of autism in Vietnamese digital news media: a computational corpus and framing analysis. *Communication Research and Practice*, *9*(2), 142–158. https://doi.org/10.1080/22041451.2023.2167510

Yến-Khanh, N., Phelan, S., & Gray, E. (2022). Neoliberalism and authoritarian media cultures: a Vietnamese perspective. *Media, Culture & Society*, *44*(2), 230–246. https://doi.org/10.1177/01634437211060200

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