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*INTEGRATED STUDY MASTER'S THESIS*

# *Medical Misinformation on Social Media: Assessing the Ethical Responsibilities of Healthcare Professionals, Social Media Platforms, and Users in Combating the Spread of False Medical Information*

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Vilnius, 2025

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# LIST OF ABBREVIATIONS

| Abbreviations | Full Term |
|---|---|
| AI | Artificial Intelligence |
| CDC | Centers for Disease Control and Prevention |
| COVID-19 | Coronavirus Disease 2019 |
| ECDC | European Centre for Disease Prevention and Control |
| FDA | Food and Drug Administration |
| FLCCC | Front Line COVID-19 Critical Care Alliance |
| HIV/AIDS | Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome |
| MMR | Measles, Mumps, and Rubella (vaccine) |
| NGO | Non-Governmental Organization |
| RKI | Robert Koch Institute |
| UK | United Kingdom |
| USA | United States of America |
| WHO | World Health Organization |
| URAC | Utilization Review Accreditation Commission |
| IQWiG | Institute for Quality and Efficiency in Healthcare |

# ENGLISH SUMMARY

This thesis deals with the role, spreading mechanisms and consequences of medical misinformation in social media. Special attention is paid to the different stakeholders involved in this type of communication and the ethical responsibilities that arise from it. It is a narrative (non-systematic) literature review, whereby the sources were filtered out from databases such as PubMed and Google Scholar as well as from the grey literature and official public health websites. Further relevant literature was identified using a snowball method. For a better understanding, key terms such as misinformation, disinformation and the term 'infodemic' are described on the first few pages. This is followed by a detailed discussion of the channels through which social media influence health communication and thus the health behaviour of the population, both in a positive sense, for example through improved access to information and effective crisis communication, and in a negative sense, by the rapid spread of false content and its algorithmic amplification through echo chambers. In the worst-case scenario, this can result in serious negative effects such as damage to health and decreasing trust in healthcare facilities. These effects are illustrated using historical and current examples. The work also goes into detail on the controversy surrounding the smallpox vaccine, the Spanish flu, the HIV/AIDS epidemic, the debate surrounding the MMR vaccine and, as the most recent example, the COVID-19 pandemic. All of these health crises, which quickly became international crises, illustrate how uncertainty, fear and a lack of reliable information can lead to serious health consequences. And that the problem does not end at national borders, but spreads worldwide in a matter of seconds. Ethical aspects of this interaction form the core topic of the work. Basic principles such as accuracy, transparency and proportionality are used to analyse and evaluate the communication responsibilities of the various actors. Ethical theories such as deontology, utilitarianism (consequentialism) and virtue ethics help to subject actions and strategies to critical scrutiny. The results show that ethical responsibility cannot lie solely with a single group. Education and efforts are needed at all levels to counteract the possible negative effects, to put them in relation to the facts and thus contain them. Governments should improve their communication strategies and health education. Platform operators must not only focus on the number of likes and maximising profits, but must also ensure transparent moderation processes, even if this is inconvenient, labour-intensive and therefore costly. Doctors, on the other hand, should become more actively involved in public debates, familiarise themselves with the content disseminated online and thus be able to provide patients with better and more comprehensive advice on their concerns. And users need to be more aware of the content they disseminate and also consider possible unintended consequences. A co-operative approach is needed at all levels to ensure the

responsible health information that the public expects and should be provided and to curb the spread of medical misinformation.

# 1. INTRODUCTION

Health communication is an important pillar of the public health system. “Health communication is a multidisciplinary field of study and practice that applies communication evidence, strategy, theory, and creativity to promote behaviours, policies, and practices that advance the health and well-being of people and populations.”(1) In the past, direct personal dialogue between the patient and their doctor or pharmacist was the standard. Over time, the mass media also increasingly took on this role. Health information was shared via radio, television, the press, information brochures and billboards. The providers included a wide variety of private individuals, state and semi-state institutions and companies. But this hierarchy changed with the introduction of social media and the internet: nowadays, the internet has almost overtaken these earlier communication channels in terms of importance.(2)

Countless sites offer everything from scientific publications to influencer content and patient self-counselling in forums, chats, or support groups.(3) This poses challenges for healthcare communication: In the context of globalisation, not only are diseases spreading internationally, but the providers of medically relevant sites are also distributed worldwide. For the medical layperson seeking advice, it is very difficult or even impossible to recognise the competence, objectivity and reliability of the authors of health-related internet information. In addition to the enormous benefits, potential misinformation and disinformation are therefore major dangers and ethical difficulties in this communication channel.

The aim of this narrative review is to show the role of social media in the spread of medical misinformation and the responsibility of the various stakeholders. The purpose of this paper is also to highlight consistent trends and illustrate how these have undermined public confidence through past incidents and their repeated appearance on social platforms. In addition, it explores the moral dilemmas faced by platform providers, users, governmental bodies, and other relevant organizations. The aim is to contribute to a differentiated understanding of the ethical challenges of combating medical misinformation in a digitally networked world.

# 2. METHODOLOGICAL APPROACH

This thesis was written in the form of a narrative (non-systematic) review. The aim was to give a broad overview of the topic of medical misinformation on social media and its ethical implications. In contrast to a systematic review, no strict protocol was followed. Instead, the approach was more flexible and allowed the literature to be explored step by step and expanded gradually.

At the beginning, relevant key publications were identified through targeted searches in academic databases such as PubMed and Google Scholar. In addition, information from official government websites, public health organisations, and grey literature portals was used. Based on the most relevant results, further literature was found by using a snowballing method, where the reference lists of selected articles were reviewed to find new sources. This way, different types of literature were included to give a more complete picture of the topic. Scientific studies were combined with grey literature such as government reports, campaigns, and ethical guidelines to reflect not only theory but also current practices and public discussions.

To focus the search, the following keywords were used: medical misinformation, health disinformation, fake health news, social media algorithm, echo chambers, infodemic, COVID-19 misinformation, government responsibility misinformation, medical ethics, beneficence and misinformation, social media misinformation.

The inclusion criteria were:

- English or German language
- Peer-reviewed article official reports, recognised grey literature
- Sources from 1990 to 2024, with a special focus on the last five years
- And content related to medical misinformation and ethical questions

The exclusion criteria were:

- Non-health related topics
- Commercial advertisements
- Unverified blogs or anonymous social media content

To include a national context, some German-language sources were added. Germany was chosen as example of a European country with a specific digital health regulation. The combination of international sources helped to show different perspectives on the topic.

# 3. DEFINITION AND UNDERSTANDING OF MEDICAL INFORMATION

The US Department of Health and Human Services warns that false or misleading health information can lead people to make decisions that pose serious risks to their well-being. Misinformation about diseases, treatments, vaccines, diets and cosmetic procedures can pose a great danger for the public. A clear example of this occurred during the COVID-19 pandemic, when the spread of inaccurate information led some people to refuse vaccination, to ignore public health measures such as masking and social distancing, and to turn to unproven treatments with potential health risks.(4)

## MISINFORMATION

Misinformation is false or misleading information. It was published without any intention to deceive. It typically arises from misunderstandings, misinterpretations, or sharing of unverified claims. There is therefore no intention behind it. This includes so-called click baiting (gaining an emotional reaction and attention through lurid headlines), parodies and satire (exaggerated or humorous depictions) or newspaper hoaxes (inadvertent false reports due to typing errors etc.)(5)

For example, during the COVID-19 pandemic, one of the most common misconceptions was that eating large amounts of pepper or spicy food could prevent coronavirus infection. It was widely shared on social media platforms as helpful advice, but there was no scientific study to support this prophylaxis. It was later debunked by the WHO in their Mythbusters collection.(6)

## DISINFORMATION

This type of information is compared to misinformation created with harmful and malicious intent to create discord, mistrust and disharmony in government agencies. Disinformation also aims to undermine the credibility of scientific experts and law enforcement agencies.(7) This can be achieved through manipulated deepfakes that appear genuine (these can be photos, videos or voice recordings created with the help of artificial intelligence and are almost indistinguishable from reality. This also includes text passages taken out of context (such as abbreviated quotes or false statistics) and fabricated facts (lies, rumours and tendentious claims).(5) A good example was the conspiracy theory that COVID-19 was a "bio-weapon funded by the Bill & Melinda Gates Foundation to promote vaccine sales".(8) This false narrative gained considerable traction on various platforms and reinforced many people's distrust of global immunisation efforts and pharmaceutical platforms.(8)

## INFODEMIC

The term “infodemic” was defined by the head of the World Health Organisation (WHO), Ethiopian Tedros Adhanom Ghebreyesus, who said in connection with the coronavirus pandemic in February

2020 that fake news spreads faster and easier than the virus and is at least as dangerous. It is termed as “too much information including false or misleading information in digital and physical environments during a disease outbreak.”(9) Making it harder for people to access reliable information and trustworthy support.(10) So, in addition to the health problem (pandemic), there was also a news problem (infodemic) that needed to be tackled. The potential harm of this information overload could be seen in the number of home tips on how to prevent COVID-19 infections. Or that it is possible to treat ongoing infections with antibiotics if it is a virus, or that drinking disinfectants is a method of ridding the body of the virus.(6,11)

# 4. SOCIAL MEDIA

## 4.1 THE ROLE OF SOCIAL MEDIA

Social media has revolutionized healthcare. Patients, healthcare professionals, organizations, industry and governments suddenly have the ability to communicate and interact with millions of people simultaneously. Social media has been instrumental in increasing public trust in healthcare systems. User statistics once again underline the explosion in the importance and influence of social media. The number of registered social media accounts has risen from 1.48 billion in 2012 to 5.04 billion in 2024.(12) However, it should be noted that many users are active on various social media platforms, so these numbers do not represent unique users. Nonetheless, the importance of social media in everyday life is immense, with “the typical working-age internet user spending more than 2.5 hours per day on social platforms.”(13)

The potential reach of social media also has its downsides. The fact that everyone has access to the platforms and can upload whatever they want without being checked makes social media a powerful tool. User-generated content is algorithmically rated and pushed through user interaction with the post and displayed to more and more users in a chain reaction, regardless of whether the information is true or not. According to a Forbes survey, one in ten Americans use social media for health information, although it is difficult to verify the accuracy of the content.(14) Artificial intelligence (AI) using false information or actively creating irrelevant sources by increasing the creation and dissemination of misleading information is another factor exacerbating the issue.

Various studies illustrate this:

- A 2018 study from the Massachusetts Institute of Technology (MIT) found that false claims on Twitter (now X) travel faster and reach more people than factual ones. The study noted that inaccurate posts were about 70% more likely to be reshared by users.(15)

- These digital spaces also create an environment in which public opinion can be strongly influenced. According to the 2021 Cyber Security Report on IT security in Germany, 75% of political and business leaders viewed fake news as a serious threat to the population.(10)
- Leading sources of health misinformation on social media reportedly receive almost four times more traffic than official platforms such as the World Health Organization.(10)
- Another example is the messenger service Telegram, it has become a hub for conspiracy communities, where large numbers of users coordinate and share content. “At the latest with the introduction of vaccinations against the coronavirus, a large number of channels and groups emerged through which fake test certificates, vaccination cards or QR codes were offered for sale, reported the Bundesgesundheitsblatt in spring 2022.”(10)

## 4.2 EFFECTS OF HEALTH COMMUNICATION

The overwhelming amount of information, which can no longer be clearly structured or filtered, makes it difficult for patients to find accurate, evidence-based knowledge and trustworthy health advice.(16) This is fatal, as the impact of such health information on the population is serious: “an overabundance of health-related information in digital media can affect the selection and use of information in patients and caregivers, where misinformation and disinformation can result in suboptimal decision-making, health behaviours, and practices leading to adverse health outcomes.“(17) Whoever informs and communicates about health information, medical staff, authorities, journalists or pharmaceutical companies wields a powerful instrument.

## 4.3 POSITIVE EFFECTS

The introduction of social media has led to numerous positive effects in many areas of daily life. These include increased accessibility of heath information, support for patients, direct communication channels, and real-time public health messaging.

### INCREASING OF HEALTH LITERACY

“Health literacy describes skills and competencies that enable people to gain access to understand and apply health information to positively influence their own health and the health of those in their social environments.”(18) Platforms such as Facebook, Instagram and Twitter allow public health organisations to disseminate targeted health messages aimed at specific population groups. For example, campaigns promoting immunisation or raising awareness of mental health have reached millions of users across different cultural and language groups, significantly improving health literacy and empowering individuals to make informed decisions.(19)

## FACILITATING PUBLIC PARTICIPATION AND INFORMATION

Social media encourages public engagement in health-related conversations and enables individuals to connect with peers, health professionals and organisations in a low-threshold way. Users can share their personal health experiences, seek advice and participate in discussions in support networks that promote health awareness.(20) It is also the patients “tools to make independent choices, such as by helping patients understand various aspects of their care.”(20) It is much easier for the patient to understand what his diagnosis is, what possible consequences and restrictions he will face, he can inform himself, which was much more difficult without social media.

## SUPPORTING PATIENTS THROUGH ONLINE COMMUNITIES

This interactive nature allows social media to engage users and give them a sense of belonging and community. Patients with chronic, very serious or rare diseases feel at home and supported by their peers. These platforms, such as Facebook, Reddit, YouTube and others, can also bring immobile patients out of isolation and provide a sense of belonging and direction.(3,21) In this way, social media make a valuable contribution to helping patients come to terms with their condition and overcome the challenges it presents.(21)

## ENHANCING THE PATIENT-HEALTHCARE PROFESSIONAL RELATIONSHIP

Health information is of immense importance as it forms the foundation on which the population can make informed decisions regarding health issues. These decisions influence all facets of health awareness and behaviour from treatment decisions and following health recommendations to empathetic behaviour towards risk groups and sick people.(22) It also offers patients a new and direct way of communication with their healthcare professional.(23) Nowadays many hospitals and clinics maintain active social media profiles to share educational content, give the patient insight about the daily work life and answer patients’ questions or provide updates on services. This modern level of interaction fosters trust and transparency in the patient-provider relationship. Social media is a step forward and an achievement for many healthcare professionals. It opens them new channels to exchange ideas and network with colleagues in online communities and stay up to date.(23)

## REAL-TIME UPDATES AND CRISIS COMMUNICATION

In crisis situations, social networks play a key role in informing public health and the population quickly and directly. They serve as a useful tool for government agencies and health institutions to effectively pass on information on prevention, current developments, recommendations for action and alerts. The ability to inform the public quickly and widely also helps to counter the spread of misinformation in times of crisis. Platforms can direct users to authoritative sources, ensuring they are provided with accurate information before false narratives gain traction.(24)

For example, during the COVID-19 pandemic, social media and various apps enabled authorities to motivate the population to take action and vaccinate themselves and ensure the widespread dissemination of accurate health information. In total, twenty-two authorities developed national tracking, and alert apps. They have traced the chain of infection through contact tracing and alerts when you have met someone who has been infected.(25) At the same time, official social media platforms such as the World Health Organisation (WHO) and the Center for Disease Control and Prevention (CDC) have also been extensively using social media to share real-time information on case numbers, safety protocols and vaccination campaigns.

## PROMOTING PUBLIC HEALTH CAMPAIGNS

Public health organisations are using social media to run health campaigns and raise public awareness of important issues. Platforms such as Instagram and TikTok have proven particularly effective in reaching younger audiences and could have an immense effect in promoting issues such as mental health, smoking cessation, and healthy lifestyles in the future.(26) Campaigns such as #HeartMonth, which raises thousands every year for research and offers people free education on CPR techniques(27), or #ThisIsOurShot during COVID-19, promoted vaccination through relatable and engaging content with testimonials from healthcare workers and public figures.(28) These campaigns not only provided accurate information, but also counter misinformation by addressing common myths and fears.(29)

## PROMOTION OF HEALTH BEHAVIOUR CHANGE

Social media platforms have proven to be effective in promoting positive behavioural change through targeted health promotion. For example, the fitness challenge #RunForHeroes was an initiative that encouraged people to run 5k, donate 5 pounds, and nominate 5 others resulting in over 7 million pounds for NHS Charities and participation of over 1.5 million people.(30) This is just one example that shows the potential strength and impact of social media on “providing access to “hidden” or at-risk audiences”(31), such as young people, who are not so likely to read newspaper articles.(31)

While social media has brought many positive developments, it can also have serious negative effects. The high speed, wide reach, and emotional tone help health messages to go viral, equally easy do misinformation spread. It is essential to consider both perspectives and recognize the potential dangers that accompany the advantages.

## 4.4 NEGATIVE EFFECTS

Social media has transformed the modern healthcare communication with its ability to disseminate information at rapid speed and across national borders. But besides its positive effects, it brings negative impacts on individuals, healthcare systems and public health efforts. Key risks include the spread of medical misinformation, negative impacts on mental health, the promotion of unhealthy behaviours and ethical dilemmas around privacy and security.(21)

### SPREAD OF MEDICAL MISINFORMATION

One of the most worrying risks of social media is its ability to spread false health information. Platforms such as Facebook, Twitter, and TikTok serve as hotspots for false health information. Misinformation spreads very quickly due to the design of social media.

### ALGORITHMIC AMPLIFICATION OF HARMFUL CONTENT

Social media platforms use complex algorithms to personalise the content for each user based on their interaction on the platform, likes, shares, comments, and viewing time. The algorithms are designed to maximise the users’ engagement with the platform. These algorithms prioritise attractive content, which often includes lurid or emotionally charged posts, and prioritise attractive and sensational content over accuracy. Studies have shown that false information spreads significantly faster and has a wider impact range than verified content.(32) This leads to the rapid spread of false stories, sometimes reaching millions of people before fact-checkers can intervene.(33) As a notable example, a 2018 study by the Massachusetts Institute of Technology (MIT) found that false claims on Twitter were 70% more likely to be retweeted than true ones, and reached users more rapidly and widely.(15) Also, internal reports from Facebook have revealed that the algorithm recommendation often guided users toward misinformation and conspiracy content, especially in medical or political topics. The algorithm of Facebook for example, is able to “evolve with a user’s shifting preferences, perpetually showing each person what will keep them most engaged."(34) The algorithmic bias creates so-called "filter bubbles " and "echo chambers", which repeatedly expose users only to content that aligns with their beliefs.(35)

### PUBLIC HEALTH CONSEQUENCES OF MISINFORMATION

Health communication can also significantly worsen the health of the population. "In these cases, the damage can be physical (e.g. through inappropriate treatment), emotional (e.g. through false hopes or fears) or financial (e.g. through the purchase of inappropriate products). Undesirable effects can also occur at a social level, such as stigmatisation of individual population groups or a worsening of the social inequality of health."(22)

### SOCIAL FRAGMENTATION AND LOSS OF TRUST

This can result in social fragmentation, "the division of society into distinct groups that do not interact or integrate with one another as they once might have".(36) This leads to a decline in trust towards various institutions, driven in part by internal factors such as personal beliefs and a tendency toward disorder.(33)

### CHALLENGES TO EVIDENCE-BASED MEDICINE

In addition, misinformation also leads to public scepticism toward healthcare providers, public health organisations, and scientific research. The loss of trust has tangible consequences, including reduced adherence to public health guidelines and a reduced willingness to seek and follow the advice of healthcare professionals. Instead, alternative or unproven treatments are chosen over evidence-based medicine.(4,33) During the COVID-19 pandemic, unverified claims about vaccines and treatments such as hydroxychloroquine and ivermectin spread rapidly, leading to vaccine scepticism, confusion, and mistrust among the public, as well as distrust in public health authorities.(37–39)

## 5. CASE STUDIES FROM THE PAST AND PRESENT

Medical misinformation is not a modern phenomenon, the problem has existed for centuries. In today's world, however, it spreads more easily, and anyone can join in. Historical documents have shown that the spread of false health information repeatedly obstructed public health efforts, often with devastating consequences: false beliefs about transmission, prevention and treatment have led to stigmatisation, delayed interventions and increased mortality. A look at these cases highlights the recurring challenge of combating misinformation and reveals the pattern of medical misinformation and its impact on society.(40)

## SMALLPOX VACCINE RESISTANCE

Smallpox vaccine resistance in the 18th and 19th centuries is one of the earliest examples of vaccine scepticism and how medical misinformation affected the acceptance of vaccines.(40) Misinformation during the early efforts to combat smallpox led to widespread skepticism and fear, which slowed down the acceptance of crucial public health measures.(40) Back in 1796, Edward Jenner made a major discovery when he used material from a cowpox sore to inoculate an eight-year-old boy, an approach that would become the major help to control smallpox, one of the most devastating diseases in history. The experiment proved successful when the boy remained immune to smallpox after a subsequent exposure. Despite its proven effectiveness, the introduction of the smallpox vaccine was met with a high levels scepticism and misinformation that shaped public opinion. One of the beginnings and most damaging claims was the belief that vaccination could cause a physical transformation. Other rumours which gained great publicity, were the supposed connection of the vaccine to diseases like syphilis or tuberculosis. Some of this negative propaganda was based on ignorance and fear, while other claims were deliberately misleading. (40,41) One of the first and most shocking pieces of misinformation was the idea that the vaccine could turn people into cows because it was made from them. (41,42) This so-called “animal transformation myth” was spread through shocking cartoons and humorous texts in newspapers and brochures. A popular illustration from this time, for example, shows people developing horns or cow legs after being vaccinated.(42) Another big problem was that people misunderstood the side effects. People who did not want to be vaccinated blamed vaccination for diseases such as syphilis, tuberculosis and even sudden deaths, even though there was no scientific evidence.(42) They took a few cases of vaccinated individuals who later fell ill and falsely presented these as proof that vaccines were dangerous. This misinformation spread quickly because it evoked strong emotions and caused people to question the safety of vaccines. In response to this rising scepticism, pro vaccine advocates, public health officials and Jenner himself began to counter misinformation by publishing medical papers explaining the scientific basis of vaccination. Jenner published and presented the clinical results and testimonials of successful vaccinations in his papers. In addition to fears that had no scientific basis, religious and ethical arguments also played a major role in the rejection of smallpox vaccination. Many religious people thought that vaccination went against what God wanted.(40) They thought that diseases were a punishment from God and that vaccination was trying to counteract this. Some people also disliked the idea of using animal products because they thought they were dirty.

One key reason this misinformation spread so effectively was the lack of a structured process to verify or fact-check claims in the media. Newspapers, brochures and leaflets could print almost anything without checking whether it was true. As a result, myths and misinformation spread easily and were firmly believed by many people.(43) Important figures, such as William Tebb, a British businessman, author, and wide-ranging social reformer, were instrumental in starting movements like the anti-vaccination society of America.(40) They used their positions to spread false information and persuade the public to oppose vaccination programs.(44) They highlighted stories about how vaccines had harmed people and governmental overreach, denying their personal liberty and choice.(40,45)

Back in 1853, Britain passed a law that made it mandatory for babies to be vaccinated within the first three months of life.(46) This led to massive protests because many people felt that compulsory vaccination was an attack on their freedom. In the U.S., the issue reached the Supreme Court in 1905 in the case of Jacobson v. Massachusetts. The court sided with the state, saying that “the state of Massachusetts acted constitutionally within its police powers to pass a law to protect the health and safety of the public.”(47) It was a significant win for those advocating for widespread vaccination, but it also highlighted the controversy surrounding the issue.(48)

The success of the smallpox eradication programme demonstrated the efficacy of coordinated global health efforts. The eradication of smallpox by 1980 marked the first time a disease had been successfully eradicated through human intervention.(41) The achievement was characterised by many difficulties and especially by the spread of misinformation and the persistence of vaccine hesitancy, showing once again the slowing effects of misinformation.(42)

## SPANISH FLU PANDEMIC

The Spanish Flu Pandemic of 1918-1919 also illustrates how misinformation can exacerbate a global health crisis. This flu outbreak infected hundreds of millions of people worldwide and killed around 50 to 100 million people.(49) The government tried to control what people thought, but false information spread quickly.

During the First World War, many governments tried to make the public believe that the flu was not that bad so that people would not panic. It made people think that the virus was not dangerous, and this caused it to spread faster. There was no information that was true and consistent, so instead there were many rumours of cures that turned out to be ineffective: remedies like onions, garlic, whiskey and cigarette smoking.(50)

The pandemic spread so quickly because governments were not working together and there was no centralised source for accurate information. Local authorities gave different advice as result of no central health authority in many countries. Meanwhile, advertisers exploited the crisis for profit. Companies ran ads that instilled fear in people, using tactics like testimonials, exaggerations, and even fabricated scientific claims to promote their products such as Chymol, Formamit, and Lifebuoy Soap.(50)

## HIV/AIDS-EPIDEMIC

The outbreak of the HIV/AIDS epidemic in the early 1980s is another important example of how a lack of understanding and widespread misinformation can lead to harmful health, and especially social consequences. "In 1981, doctors in the USA wrote for the first time about the occurrence of a new disease in previously healthy, young, homosexual men. One year later, the first cases were reported in Germany."(51) This marked the beginning of a global epidemic. During the early years of the HIV/AIDS pandemic, particularly in the 1980s, public and scientific understanding, especially of immunodeficiency, was far more limited than it is today. Poor media reporting further contributed to a vacuum." This was quickly followed by a veritable flood of new information, which was not always correct, and therefore had to be carefully checked."(51) Spreading false facts, like AIDS commonly transmitted through spitting or biting, contributed to misconceptions.

Accurate information plays an important role in improving the understanding and prevention of HIV and AIDS. Trusted sources, such as the World Health Organization, UNAIDS, and national health authorities, provide factual information on HIV transmission, prevention, and treatment.(52) Misinformation can be found in many forms, from news media to websites, and can influence medical decisions and people's behaviour when managing their health.(53)

A study on young adults' HIV health literacy showed that young adults at a U.S. university had limited knowledge about HIV, with an average score of 77% on the HIV Knowledge Questionnaire, and a particularly low score of 54% for participants aged 18-19.(54)

This limited health literacy is not unique to the United States, misinformation is spread by news media, government sources, and even some parts of the medical community in other countries as well. The internet has become both a valuable and a harmful tool when it comes to HIV information.(55) Research shows that people who search for medical information online have a higher chance of making decisions based on the search result. Users can be strongly influenced by the credibility of the source they read and change their decisions.(56) For example, people living with HIV and taking supplements tend more to the use the internet to get health information and believe things about HIV remedies that are not true.(57)

Wrong or misleading information contribute to why people have a misconception about HIV/AIDS. This may be because they do not know much about the subject or because they do not understand the science, or because they have seen targeted disinformation campaigns. These misconceptions can lead to stigma, fear, and poor health decisions. For example, some groups claim that: “HIV can't cause AIDS” and “AIDS drugs are poison”, which can discourage individuals from getting the right treatment.(58)

The media has also played a role in spreading false information and create stigma. A review from the National AIDS trust (NAT) has shown that UK media coverage still contains HIV myths and stigmatizing language. “NAT examined 400 online news stories from recent months. 13% of national stories contained misinformation or stigmatising language. And in local news, more than a third (35%) of stories that mentioned HIV transmission gave incorrect information.”(53)

Promoting these validated sources and improving health literacy would ensure that people have access to the information they need to make informed decisions about their health.

## MMR-VACCINE

The MMR (measles, mumps, and rubella) vaccine controversy in 1998 underlines and visualises once again the impact of medical misinformation on public health. The controversy was sparked by a fraudulent study published by Andrew Wakefield and colleagues in The Lancet. It falsely suggested a link between the MMR vaccine and “associating it with an increased risk of autism.”(59) As a result of the publication, widespread fear among parents developed, and the vaccination rates decreased significantly. Subsequently, outbreaks of diseases such as measles and mumps in English speaking countries occurred, which could be prevented by vaccination.(60,61) In the United Kingdom, the proportion of children receiving MMR vaccination fell from over 90% in 1998 to only 79% in 2003, with some regions recording only 61% of vaccinations.(62)

Years later, the persistence and long-term effects of the MMR vaccine controversy became evident. Despite the scientific consensus that has emerged to undo the claims of the original study, vaccine scepticism remains a significant problem on a global scale. The anti-vaccination movements were still active and often cited Wakefield's discredited study as evidence against vaccination. Still in 2019 the World Health Organization (WHO) has reported a 30% increase in measles cases worldwide, due in part to vaccine hesitancy stemming from misinformation about vaccines.(63)

There is a strong agreement in the scientific community about the safety and efficacy of the MMR vaccine. Many countries have introduced stricter vaccination guidelines and public health campaigns to educate parents about vaccine safety. The ongoing pandemic has added complexity to these efforts by sparking renewed debate about the safety and efficacy of vaccines on various platforms. Despite a wealth of scientific research addressing these concerns and reaffirming the safety of vaccines. However, a high level of scepticism towards the vaccines remains, among other things due to the constant stream of new misinformation.(64,65)

## COVID-19 PANDEMIC

The COVID-19 pandemic is the latest example of how medical misinformation can exacerbate a global health crisis. It was the first pandemic in this modern age of technology, with constant coverage of the pandemic spread and news over the world. The WHO referred to the situation as an "infodemic," referring to the flood of information both accurate and inaccurate that overwhelmed public discourse during the pandemic. This unprecedented flow of content caused confusion, delayed effective responses and increased public anxiety.(66,67) as the following examples show:

Disinfectants as a treatment or prevention measure: At the beginning of the pandemic, false information spread that the use of disinfectants could prevent infection. On 5 June, the Center for Disease Control reported a sharp increase in calls to the Poison Control Centre about exposure to disinfectants in the home.(68)

Unverified claims and conspiracy theories: At the beginning of the pandemic, misinformation about the origins, prevention methods and treatments of the virus spread. Claims that 5G networks cause COVID-19 or that eating certain foods could prevent infection gained traction on social media platforms, leading to widespread public confusion and harmful behaviour. Those Misinformation hindered public efforts and influenced scientific communication on prevention methods.(69) According to an investigation of the BBC there occurred at least 800 deaths and about 5,800 hospital admission due to false information on social media, the number of unreported cases is probably much higher.(70)

The spread of ivermectin was another example of the harmful effect of misinformation on social media and other digital platforms. Ivermectin, a drug originally developed to treat parasitic infections, attracted a lot of attention as a potential therapeutic option in the wake of the SARS-CoV-2 pandemic. A considerable number of individuals began self-medicating with ivermectin, often using formulations intended for veterinary use rather than those approved for human consumption. This phenomenon resulted in a high number of adverse reactions and hospitalizations due to toxicity.(71) Despite the fact that it has an established safety profile for approved uses, the promotion of ivermectin for the treatment of SARS-CoV-2 was largely based on studies that were limited in scope and often flawed. In light of these concerns, health authorities such as the WHO and the US Food and Drug Administration (FDA) have consistently advised against the use of ivermectin outside of clinical trials, underscoring the importance of evidence-based medicine in pharmaceutical decision-making.(72,73) However, as more rigorous studies, including randomized controlled trials, were conducted, the consensus began to shift towards a lack of substantial benefit of ivermectin in the treatment of SARS-CoV-2. “Dr. Kory, a co-founder of the Frontline COVID-19 Critical Care Alliance (FLCCC Alliance)”(74), became one of the most vocal proponents of ivermectin. He testified in front of the U.S. Senate in December 2020, advocating for its use and claiming it was an effective treatment for COVID-19. His testimony received wide media coverage and was shared extensively on social media, further spreading the misinformation.(75)

Trends in search behaviour: Google Trends data showed a strong increase in health-related searches during the pandemic.(76) The lack of robust content review mechanisms exposes users to misleading and harmful advice. For example, searches for unproven treatments skyrocketed, leading to increased demand for products with no scientific basis.

Vaccine scepticism: False narratives about the safety of vaccines, including exaggerated claims of serious side effects and conspiracy theories suggesting government or corporate surveillance, significantly hindered vaccination efforts. Social media influencers and algorithm-driven content prioritization reinforced these narratives and further entrenched mistrust. The vaccine scepticism fuelled by these falsehoods prolonged the pandemic and increased morbidity and mortality rates worldwide.(77)

Global Impact: The impact of the infodemic was not limited to a single region; misinformation quickly spread across borders and influenced health behaviours and policies worldwide. In some regions, conspiracy theories led to protests against public health measures, further complicating efforts to contain the virus. The global nature of the infodemic highlighted the interconnectedness of digital platforms and the urgent need for coordinated international responses.(78) The extent of spread of misinformation about COVID-19 is shown in a graphic form a source analysis the origin of COVID-19 misinformation. And the result showed that “India (15.94%), the USA (9.74%), Brazil (8.57%) and Spain (8.03%) are the four most misinformation affected countries.”(66)

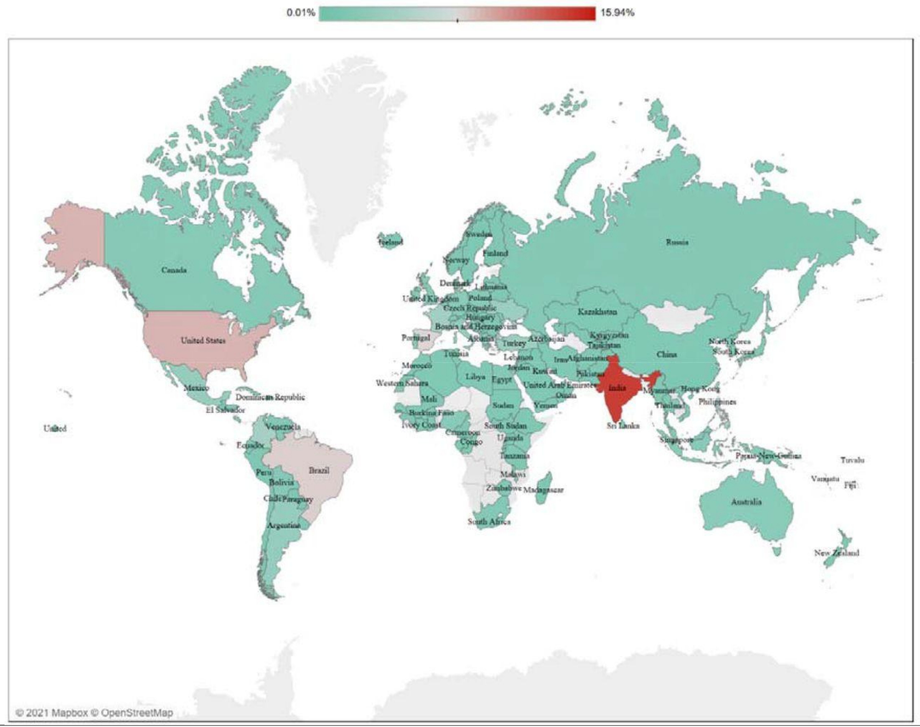

Fig. 1: Amount of medical Misinformation on Social Media**(66)**

# 6. ETHICAL CRITERIA FOR HEALTH INFORMATION

The risks mentioned in the last chapters clearly show that there is an ethical responsibility when it comes to health information on social media. This applies not only to the content, but also to how and to whom it is communicated. And you also have a responsibility if you are active on these platforms. Because every time you like or share something, the post is included in the algorithm and becomes visible to more people. When looking at the public health criteria, “the following points are important in the literature: Factual accuracy, completeness, balance, transparency, participation of the target group, respect of the human dignity, social justice and proportionality.”(22)

## FACTUAL ACCURACY, COMPLETENESS AND BALANCE

Health information found online has a strong influence on people's behaviour and decisions. It is therefore vital that such content is factually accurate, well researched and truthful key characteristics of evidence-based information. Equally important is the quality of the information. That is the reason every journal has its own editorial policies and publication ethics to “ensure authors and contributors take responsibility for the final published material”(79). In addition to presenting the expected benefits, trustworthy sources should also explain possible downsides to avoid creating unrealistic expectations. People should be informed about what might happen if they do or do not follow specific recommendations, and alternative options should be discussed openly. Above all, the communication must remain balanced, objective and easy to understand.(22)

The impact of medical information on their user has been shown by a study form 2020 among Polish adults, which concluded that the "Internet caused 45% of HI (Health Internet)-users to make an appointment to see a doctor, and 40% of them had questions concerning diagnosis and treatment."(80) However, while many online platforms, such as Wikipedia or health insurance websites, are generally considered reputable, the quality of some articles can still vary and sometimes fall short of these evidence-based medicine criteria. For example, because "Wikipedia allows anonymous editing; editors are not required to provide any identification or an email address."(81) This lack of verification can undermine the credibility of articles on websites. Additionally, promotional content found on certain health websites should be critically examined, as it often lacks the transparency, depth and balance expected in high-quality medical communication.

## TRANSPARENCY

As a rule, authorities must be clearly recognisable as the author in all publications, the author's qualifications must be stated, and a contact address must be provided. Publications by other authors do not always fulfil these criteria. In order to protect the public, it should be made clear when content comes from individuals or groups without appropriate medical expertise. Information sources and the dates of underlying data should be clearly documented. (82–84)

This is often not clear in the articles, as the difference between advertising and objective scientific information is often difficult for laypeople to recognize. Often, no disclosure is made about potential conflicts of interest, such as financial connections between the authors and companies involved. This concern applies to both commercial and non-commercial entities that supported the publication with funding, services or materials.

Health information frequently needs to communicate complex topics, such as healthy eating or benefits of preventive check-ups. However, this complexity often conflicts with the "KISS" principle used in advertising, which emphasizes simplicity and clarity. "keep it short and simple."(22) As a result, key details are sometimes left out or oversimplified, and even misleading messages may be tolerated.(85) This can easily be illustrated by some campaigns on prevention and early detection: in this context, the term "early cancer detection" is very often used alongside "safety" and "reassurance", for example in appeals for the early detection of bowel, prostate and breast cancer. The term "early detection" can be misleading, as it often suggests that these examinations can entirely prevent malignant tumours. However, these tests cannot prevent cancer, but aims to detect changes, such as early-stage tumour or precancerous lesions, at a point where treatment is still possible. In the best case, a tumour or precursor is found at a stage that allows a cure, in the worst case it is already too advanced or incurable. Therefor the WHO differentiates between Screening and early diagnosis.(86) Furthermore, possible negative consequences, e.g that false-positive screenings can lead to increased cancer diagnoses years later, as a result of medical overuse should be addressed. The potential downsides of early screening procedures are often overlooked when only the expected benefits are highlighted. It was found that woman “with a false-positive screening result had an increased risk of screen-detected and interval cancer“(87) for 12 years after the misleading result.(87) This is not only misleading but can also be harmful, “as it misleads the target persons under false assumptions into utilising invasive examinations with potentially negative consequences”.(88)

## PARTICIPATION OF THE TARGET GROUP

There is a huge number of health information on the internet. This includes many useless and superfluous articles, but also topics that are important for the majority of the population and can and should contribute to improving the general health of the population. On the one hand, it is important to filter out which topics people are interested in and, on the other hand, to set topics that are of great benefit or indispensable to the population, regardless of their interests.(89) This can be achieved if an essential element of New Public Health and the WHO vision of health promotion is taken into account: “the active involvement of citizens in the planning, design and evaluation of (public) health programmes (participation).”(88)

Governments in Europe and North America have been trying to do this for around 20 years. The new concept of modern public health aims to prevent avoidable disease, disability and even death, but also to improve the environment and conditions for future and present generations. By engaging citizens not only at the national level but also internationally in the design, evaluation, and selection of health information topics, they aim to enhance the acceptance of health recommendations. “This can ensure that health communication meets the needs and priorities of the population and at the same time is appropriate for the target group - in terms of content, language, design and culture.”(88)

One very good example of successfully reaching the target audience with early mass media is the american non-smoking campaign, “the national ‘truth’ campaign.”(90) At the invitation of an advertising agency, 500 teenagers were invited by a professional agency to co-develop the goals and strategies for a large-scale awareness campaign that aimed to challenge the manipulative tactics of the tobacco industry. At the same time, the initiative also sparked the formation of youth-led movements actively protesting against tobacco industry and its persuasive tactics. “They received sustained support in terms of empowerment” (22,91) a “social process through which individuals gain understanding and control over their lives”.(88,92)

However, there is still a considerable need for action here, as participation has so far only taken place in a small proportion of health information. Most health information materials are still published without being tested for clarity or relevance by the intended audience. This leads to the continued dissemination of content that many people find confusing or even misleading.(93)

## RESPECT OF THE HUMAN DIGNITY

Sober and neutral information on the internet meets with little response and is therefore often designed to interest the user with an emotional message. Especially when it comes to motivating the population to adopt a certain socially desirable health behaviour, this is often reinforced by persuasive messages with emotional components such as shock, fear, humour or sexuality. This also goes hand in hand with the selection of motifs, people and role models. In the best case, information is presented in this way as attractive and desirable.(22,94) “Preliminary market research is often used to identify and specifically address unconscious motives and fears of the target persons. This form of communication is not aimed at respecting the individual and increasing their ability to control and make decisions.”(22) Authors in different countries proceed with varying degrees of sensitivity. This can lead to the manipulation of the target group, the perpetuation of stereotypes, but also to the violation or stigmatisation of individual groups of people.

While discriminatory stereotypes such as traditional gender roles, which suggest a subordinate position for women, for example, are very rare in German-speaking countries, sexual connotations can certainly be observed among private authors.(95) In 2004, the Breast Health Institute used a close-up of a female cleavage or breast in an awareness campaign for the early detection of breast cancer with the subtitle: “75% of all men look first at a woman's breasts. Your gynaecologist should be there.”(22) The Michael Stich Foundation took a similar approach in 2007 as part of an HIV campaign: “It's breast milk that makes babies die.”(22,88)

A further problem can be observed in connection with prevention measures for infectious diseases, such as HIV education work. In North America, attempts have been made in recent years to prevent the spread of HIV by focussing on those affected as a target group. The intention behind this is certainly a positive one: HIV-positive people should be motivated to behave in such a way that they do not pass on the virus. This approach is known as “prevention for positives.” However, this approach may unintentionally convey the idea that individuals with HIV are entirely to blame for transmission. Such an implication can led to guilt or a sense of shame among those affected and may erode public empathy. To avoid these consequences, some countries, Germany among them, have decided not to pursue this strategy.(96) Nevertheless, humour should also be used with caution when communicating health information.

In 2007, the Swiss Foundation for Health Promotion launched a campaign on the subject of “obesity” with humorous illustrations. The sentence “Switzerland is getting fatter and fatter” (22) was written underneath images of oversized children's utensils such as a tricycle with a huge saddle or a school chair with a very wide seat. Critics argued that such imagery ridiculed individuals with obesity and reinforced harmful stereotypes. Medical professionals raised concerns that the campaign stigmatized rather than supported those affected by weight-related health issues.(88)

Empowerment can't be achieved through all forms of health communication. The information should enable the user to voluntarily and consciously influence their health behaviour and contribute to shared decision-making with the doctor. To achieve this, communication must remain respectful and avoid any form of manipulation, exclusion, or humiliation. Health messages should never shame or mock individuals or groups.(88)

## SOCIAL JUSTICE

It is well known that health information on the internet does not reach all users equally. Research results confirm that population groups that are already very health-conscious are more interested in health issues. They are also more easily convinced of the need for measures. People with a lower socio-economic status, who are often in poorer health, are also difficult to reach with preventive mass media campaigns.(97) Even access to information available online can be “more difficult for socially disadvantaged people because they lack the financial means for an Internet connection or because they lack the skills to navigate the World Wide Web effectively.”(22,98) As a result, the abundance of available information does not bridge social divides but may actually widen the gap in health literacy between more and less educated groups.(88,98)

A leaflet from the Bavarian Ministry of Health on bowel cancer prevention from 2002 can serve as an example: It lists dietary fibre, omega-3 fatty acids, carotenoids and secondary plant substances as cancer-inhibiting substances. This list is probably too scientific and incomprehensible for people with little education. Other “studies found that only 3% of asthma leaflets could be understood by people with a low level of education.”(22) The same applies to campaigns that use humour or sarcasm. This health information cannot reach educationally disadvantaged groups or people with language problems.

This makes it all the more important to tailor health information as precisely as possible to the population group that has the corresponding information needs and is to be addressed. Measures for this would be to take into account the cultural characteristics of the respective groups and to adapt the language and design of the campaign to educationally disadvantaged groups and migrants. Higher costs should also be accepted. Therefore, health messages must not only be informative and culturally sensitive but also embedded in supportive environments and accessible channels, because even easily understandable, culturally adapted health information cannot effectively influence health behaviour if the framework conditions are contrary to this.(22,99) This means that accompanying circumstances such as poverty, single-parent status, an inhospitable living environment or difficult access to the healthcare system must be focussed on. This also means that serious contributions on health topics are not only “dealt with in more sophisticated news formats and magazines. Health communication could reach less educated groups better if the relevant information were also conveyed in entertainment programmes or everyday television series”.(100) This could counteract the socially unequal distribution of health knowledge.(88)

## PROPORTIONALITY

The higher costs of a campaign aimed at all sections of the population must be considered in terms of cost-effectiveness. This means that the targeted health communication must be in an appropriate cost-benefit ratio to the expected effects. The relationship to other health measures must also be within an acceptable framework.(101)

However, appropriateness also relates to health communication itself. Efforts should be made to avoid sensationalism, misrepresentation, and the unnecessary medicalisation of everyday experiences. Health content is frequently framed in dramatic or alarming ways to boost attention and media reach. The strategy, that fear outperforms facts, stands in stark contrast to the ethical standards and informational responsibility expected of professional journalism. How health topics are chosen and presented can frequently create a misleading impression of potential health risks.(22,102) For example, the topic of “harmfulness of smoking”(22), which is important for the health of the population as a whole, has long been found on health websites, has lost its novelty value and encourages correspondingly few users to click on the relevant pages. It therefore tends to be neglected in the media.(22) In contrast, topics such as electro smog or genetic engineering, are often perceived as more controversial or uncertain and tend to attract greater attention, generate more media interest due to their perceived risk and sensational potential.(22,102) This quickly leads to an imbalance in coverage, where less relevant but more provocative health topics dominate public discourse.(103) If factual information is further framed in a sensational or distorted way, it can quickly cross the line into disinformation.(104) In some cases, this can escalate into exaggerated alarmism that causes more fear than clarity. In particular, when it comes to natural bodily functions or lifestyle-related traits, these should not be prematurely labelled or treated as medical conditions. “Life processes - such as ageing and associated phenomena like hair loss or erectile dysfunction - are sometimes deliberately pathologized.”(22) By framing health topics in a certain way and spreading them through websites or news articles, conditions can start to seem like diseases that require treatment. This shifts how people understand what it means to be ill and what counts as being healthy.(22)

# 7. STAKEHOLDER ROLES AND RESPONSIBILITIES

A total of four stakeholders can be described on the topic of medical misinformation on social media. The government and public health organisations, the operators of social media platforms, healthcare professionals and the users themselves. Governments and public health organisations provide the basis for dealing with social media and information through guidelines, regulations and education campaigns. The social media operators, Meta, Alphabet, Microsoft and co. naturally bear a special responsibility as operators regarding information, user safety and combating misinformation. however, as they are also companies, their economic interests are often in conflict with the limitation of information. Healthcare professionals also play an important role in educating users and patients and validating information. but users themselves are also important actors, as they influence the algorithm with every like and comment.

## THE GOVERNMENT AND PUBLIC HEALTH ORGANIZATIONS

The state is walking a fine line. The task is very comprehensive and complex. It is the responsibility of the government and public health organisations to issue guidelines and laws for dealing with medical misinformation on social media. On the one hand, they should serve as a basis and reliable source of accurate medical information. Users should find well-researched and substantiated information on their accounts. On the other hand, they should actively combat misinformation and try to prevent the origin of misinformation. In 2018, the European Union introduced the Code of Practice on Disinformation and was refined in 2022, which covers the following aspects: transparency of political advertising, closure of fake accounts and bot-driven amplification, a tool for reporting disinformation for users, improving the visibility of authoritative content.(105) Later the Digital Service Act was also introduced to further strengthen the responsibility of social media operators and increase user safety.(106) In addition, public health organisations such as the Robert Koch Institute play a central role. Their task is to provide the population with neutral and independent information, monitor and observe diseases, make scientifically sound recommendations and much more.(107)

From an ethical perspective, the state has the task of promoting the health of society (beneficence) and preventing potential harm (non-maleficence) by combating misinformation. In doing requires constant balancing, re-evaluation and adaptation to continuously evolving information systems such as social media. A measure to combat misinformation must be scientifically sound, supported by evidence and explained in an understandable way so that the public can develop trust in health initiatives and make informed decisions. Health information should be designed, that it influences the population on the one hand, but does not manipulate it on the other.(108)

This is particularly difficult in the case of newly emerging events such as COVID-19, as the state of knowledge is constantly changing and there is considerable scientific uncertainty. It is therefore important to openly communicate the basis on which current health recommendations are made, and that current knowledge may be limited. This is the only way to gain and maintain the trust of the public. Any corrections or deletions of incorrect information that are too rapid or too pronounced could lead to excessive behaviour in some people, as they see their misinformation confirmed by the government control measures. A study by Nyhan and Reifler in 2010 showed such effects.(109) Acting too quickly could also be at the expense of a sound scientific basis for health information, which would also have negative consequences.

The COVID-19 pandemic also provides examples of this due to the preprint culture at that time. However, creating independent review institutions, accountability systems and offering transparency of decision trees and ethical considerations could be a promising way to promote public trust. The UK's Scientific Advisory Group for Emergencies (SAGE), for example, utilises this strategy.

All efforts must also take into account the various cultural and ethnic aspects of the population. The WHO takes this approach, for example, by adapting vaccination programmes with cultural sensitivity. During the COVID-19-Pandemic, the WHO worked with religious and community leaders in countries like Nigeria and Malawi to promote and boost the vaccine uptake in areas with high levels of hesitancy.(110) In Europe, multilingual campaigns were launched to reach migrant communities and make vaccine information more accessible.(111) Health initiatives should also reach all sections of society equally and fairly and beyond national borders, as the internet spreads its content worldwide in a very short space of time. Particularly vulnerable groups at home and abroad are often difficult to reach due to language barriers, poverty, lack of education, digital underuse or poor public healthcare provision. This represents a particularly significant challenge and can be described as an ethical imperative. Furthermore, the limited resources of the healthcare sector must also be kept in mind. The costs of combating misinformation must be critically weighed against the benefits and the fact that this money is not available for other, possibly equally important, aspects of healthcare. Ethics in public health interventions must also take this aspect into account.

## THE OPERATORS OF SOCIAL MEDIA PLATFORMS

Several factors are decisive for the operators of social media platforms. Firstly, the financial aspect is very important, as the platforms must be economically profitable. This is largely achieved through the advertising displayed on the websites. The more interesting advertising a platform can attract, the more profitable it becomes. However, advertising customers can only be acquired and retained through a large reach and many followers or users. This means that social media platforms benefit indirectly from every user interaction, every click, every like and every post or comment on the site. The length of time users spend on the site also plays a role for advertisers.(108)

The tension that emerges here is the profitability of the company versus social responsibility. The platforms' algorithms favour and push posts with high user interaction and then show them to more and more users. As false information is often shorter, easier to understand and more engaging, it often attracts more interactions than correct information. Users rate, comment and forward this information at high speed and in large numbers. This means that the platforms also benefit from false information.(108) The operators are faced with the dilemma of having to evaluate, limit, comment on and, if necessary, delete this flow of information, which is against their economic interests. It is therefore not surprising that the platforms are often criticised for not doing enough to combat misinformation and take more responsibility for protecting users from harmful content.(112) In order to guarantee this protection, the platforms would not only have to check and validate large volumes of posts, but they would also have to have staff trained in this area in order to be able to recognise and justify the difference between misinformation and scientifically sound information. Network operators usually do not have these capacities. So majority of the posts are checked by the algorithm.(108) They therefore often work with data scientists and social scientists to recognise the way in which misinformation is shared. If the operators know what is happening on their network and who is communicating with whom, AI models can be used to identify false reports and minimise illegal content with a high degree of accuracy using machine learning.(113) This in turn raises other ethical questions: does censorship of posts restrict the autonomy and freedom of expression of users or should the aspect of expected harm avoidance be valued more highly?(108) A current example of possible harm to health is the new trended “Paracetamol” challenge in January and February, in which young people attempted to “deliberately ingest larger quantities of paracetamol than permitted”(114) without dying and then “post their record on social media”.(114)

Another problem is who decides when a post is so erroneous that it should be considered disinformation and deleted? Who sets the standards for authorised and prohibited content? Should this task be performed by the state through state institutions or by each individual company itself through the staff it employs? Is it the responsibility of the state to appoint qualified personnel or the platform operator? Meta, for example, one of the world's largest technology companies and operator of the largest social media services such as Facebook, Instagram, WhatsApp and Messenger, announced at the beginning of January this year that it would be discontinuing its fact-checking programme. The programme had restricted users' freedom of expression too much.(108)

The legal regulations of the individual countries naturally play a major role in such a decision. In the USA, such a decision was made possible by the change of government. The EU is still busy drawing up such political guidelines. As guidelines need to be drawn up in the area of tension between key ethical issues, particularly with regard to transparency, fairness, regulation and the protection of users, a fine balance needs to be struck, taking into account the interests of all parties involved.

## HEALTHCARE PROFESSIONALS

Healthcare professionals play a critical and one of the most important roles in the fight against misinformation and disinformation on social media. They are at the interface between clinical practice and information democracy. As described in previous chapters, the hierarchy between patients and healthcare professionals has changed dramatically: Whereas patients used to rely on the doctor's knowledge, they now have the opportunity to find information on the internet and social media and validate the doctor's statements. This is where the importance of digital expertise comes into play, as the quality of the sources is crucial.(115) It is particularly important to maintain the credibility of doctors and statistical accuracy. All of this is not easy to consider, as many aspects are also in ethical conflict with each other. On the one hand, healthcare professionals have a responsibility to promote public health, including by correcting misinformation on social media, but on the other hand, professional boundaries become blurred.(115) As social media is also used in everyday and private life, it is difficult to maintain a clear distinction: What someone posts or sends as a joke can be perceived as critical again in everyday professional life. There is also a conflict with respect for the autonomy of patients. By improving and thus deleting the post, the autonomy of the user is disturbed. The user has the right to post their opinion and thoughts, regardless of whether they are completely correct or not. Deleting this opinion could then also be interpreted as paternalism.(115) Even if the intention of the healthcare professionals of the beneficence approach is very good, to create more public health literacy by improving information in social media, there is always the problem on the internet, especially in social media, that information is understood and interpreted differently by users. According to the principle of non-maleficence, no harm should be done, but misinterpretation of the post can cause harm, fear and mistrust among users. A good example of this is the picture of a doctor in Nevada, USA, during the COVID-19 pandemic, who posted a photo of himself in full protective clothing in front of an empty patient bed to show that the clinic had increased bed capacity for severe COVID-19 cases. However, the image was interpreted differently by many users, namely that the pandemic was just a hoax and that the situation in hospitals was being deliberately misrepresented.(116)

## USERS OF SOCIAL MEDIA PLATFORMS

Users also play a central role in the fight against misinformation on social media. The opportunity to share your own knowledge with other users is an enormously positive factor that contributes to the common good of society. And many users are well aware of the fact that they should not share or like false information. The difficulty is that users often do not recognise what is a false report.(117) In addition, the algorithms of the platforms work in such a way that false reports are most likely to be shown to people who will approve of the content of this information, such as the “echochambers” described in previous chapters.(108)These people are thus reinforced in their mistaken belief and spread the information further, often with the best of intentions, as they do not recognise the false content. It is therefore important to improve users' media skills. After all, surveys in Switzerland show that users are aware that misinformation is spread by individuals rather than by media institutions or authorities.(118) In this respect, media literacy shows a clear correlation with school education. People with a high school diploma are among the most competent users, whereas a secondary school diploma leads to lower media competence. In terms of age, twenty to thirty-year-olds in particular appear to have greater media literacy, as they have been in contact with online news and social media since childhood.(119) On the one hand, every user has the right to express their opinion freely, but this freedom ends where others could be harmed.

However, the author of a post cannot know how their information will be understood and interpreted. They cannot know what consequences their contributions will have. It is therefore important to raise users' awareness of misinformation. Education about trustworthy sources, authors and distribution channels is necessary across all age groups.(120)

Educated and economically disadvantaged population groups in particular need to be adequately addressed and trained. The ethnic specificities already mentioned in the above chapters must also be taken into account in order to provide the entire population with comprehensive and needs-based information. Human well-being must be the goal of these efforts.

## 7.1 ETHICAL FRAMEWORKS

The ethical obligations of the different stakeholders in the fight against medical misinformation differ according to the different ethical theories: the deontological approach, consequentialism and virtue ethics.

### DEONTOLOGICAL APPROACH

The deontological approach focuses on the moral obligation to follow social norms like moral obligations to the population. Actions are seen only in terms of right or wrong, regardless of their consequences. The roots of this type of action lie in the theory of Immanuel Kant.

From a governmental perspective, they would have to look after the health of the population, provide truthful health information, and intervene in the case of actions or information that could be detrimental to people's health. The principles of beneficence (to maintain the health of the population) and non-maleficence (to prevent foreseeable harm) must be taken into account. Whatever the political orientation of the country, these principles must be followed.

Almost the same can be said of healthcare professionals. Their role lies between daily clinical practice and the vast field of digital information systems. They must protect, teach and educate their patients. They must always act with integrity, honesty and truthfulness towards them. They must treat them according to current guidelines and the principles of evidence-based medicine. However, doing so may jeopardise patients' autonomy and trust. Special care is needed when posting information online, as the boundaries between professional and personal rules are blurred.

For social media, this deontological principle includes the duty of beneficence towards users. This means that they must abandon their goal of profit maximisation, because they must delete any medical misinformation without regard to likes, followers or advertising revenue. Their algorithmic business model is not morally neutral, and precise censorship is unpopular and very expensive. But to continue with their model of economic maximisation would violate their moral duty to prevent foreseeable harm to the public.

## CONSEQUENTIALISM

From a consequentialist perspective, which evaluates actions solely on the basis of their outcomes in terms of harms and benefits, the primary ethical goal for all stakeholders should be to minimise medical harm and maximise public health benefits.

This means that it would be ethically acceptable for governments to restrict freedom of speech or access to medical information in certain cases. Such action would clearly violate the government's duty to respect people's individual rights. But if these measures prevent greater harm to the general public, it is a kind of ethical imperative in consequentialism. Even if that means deleting all harmful information, whether it is spread knowingly or through ignorance, poverty, language barriers or lack of education. In addition, access must be restricted, especially as misinformation is known to spread faster in any kind of under-resourced community.

In the end, the government has to keep an eye on its financial margins. So there has to be a trade-off between measurement and cost. Only if the benefits outweigh the costs will any intervention be allowed by consequentialism.

For social media, consequentialism is a massive tension. They clearly profit from the very behaviour of people who support misinformation. The design of their profits is on the basis of algorithms that try to keep the user interacting with as many likes and followers as possible on their platform. This is what they thrive on, because it means wide reach and appeal to paying and advertising customers. So, they accept shorter, more emotional, more polarising and more viral information, which is known to spread faster, and have no interest in restricting the freedom of users. According to consequentialism, the harm to the population that results from this business model is not as important as their economic interests.

Healthcare professionals have an ambiguous role. They are caught between the risk of confrontation and the benefit of accurate communication. They must treat patients according to guidelines, explain public health information and correct misinformation. They must also build and maintain a relationship of trust. Such evidence-based behaviour may cause discomfort because it violates patient autonomy. But from a consequentialist perspective, strategic and empathic correction of misinformation is necessary if it leads to better health behaviour. But it is a fine line to walk and requires a sure instinct, because intention does not guarantee ethical success.

### VIRTUE ETHICS

Virtue ethics evaluates the moral quality of an action based on the character and intentions of the person doing it. An action is considered ethical if it reflects what a wise, honest and morally exemplary person would do.

For governments, this approach means that they must communicate clearly, transparently, honestly and responsibly in addition to being efficient. The aim must be to inform the population and provide clear guidelines for medical care, explaining the limitations and also the limits of the recommendations. Existing uncertainties must be addressed, weighted and, if necessary, corrected. In this way, public trust can be gained and maintained. In view of the fact that medicine is in flux and the current state of knowledge may be subject to change in the future, it is important to proceed cautiously without exaggerating, fear tactics or assigning blame.

Social media platforms should realise their moral duty towards their users. Their corporate responsibility should not be limited to the growth and ecological progress of the company, but virtuous behaviour and responsibility should be raised as a maxim above these considerations. Democratic discourse in relation to digital health recommendations is essential. The lack of fact-checking, for example, should be interpreted as a weakness rather than a self-confident attitude. A rethink is needed towards transparency about the standards of fact-checking, public oversight, cultural competence and appreciation of users.

Healthcare professionals have a difficult task. They have to master both medical knowledge at the cutting edge of science and at the same time have the empathy and ability to communicate with a wide variety of people on this basis. They should show compassion, honesty, respect and humility towards patients. At the same time, however, they must also be absolutely clear and unambiguous with regard to the information provided. They must act with integrity in personal contact and online. On social media in particular, it is important to anticipate how information can be misunderstood and misinterpreted and what consequences such misinterpretation can have. Virtue ethics offer the best approach to this challenging task.

## 8. ETHICAL RESPONSIBILITY DISCUSSION AND CONCLUSION

The role of health communication and digital health literacy is crucial and cannot be overstated. Being informed about health conditions, associated risks, and possible interventions plays a vital role in improving both public health outcomes and individual well-being. By equipping individuals with knowledge, they are empowered to make informed and independent decisions about their health. This is particularly significant in contexts where patients are responsible for covering the costs of their medical care. Public health experts usually see the open exchange of medical knowledge as beneficial and ethically unproblematic. The main difficulty isn't spreading health-related content, but making sure it's presented in a way that’s relevant, understandable and responsibly framed for the public.(22,88)

Medical misinformation is not a newly found term or phenomenon. It has been present for a long time and you can observe many peaks in history where the amount and the possible damage of misinformation is clearly visible, obstructing public health efforts, delaying critical interventions, and contributing to unnecessary morbidity and mortality.(49,104) The only new factor today is social media, multiplication the speed and scale which misinformation can spread.(15,38) By looking closer to the historical cases, the smallpox vaccine resistance, the Spanish flu pandemic, the MMR vaccine controversy, the HIV/AIDS-Epidemic and the most recent event the COVID-19 Pandemic shows recurring pattern of the form and effect of misinformation.(40,41)

One of the most effective factors on which misinformation is based is the Factor Fear and Distrust, especially in new medical interventions. Already with the introduction of the smallpox vaccine, the people were scared by the news that they will grow horns or develop cow-like skin after vaccination. The Newspapers fuelling this fear and distrust by publishing exaggerated illustrations.(42) Fast forward to the COVID-19 pandemic, we have seen similar pattern with the new introduction of the vaccine. Social media became a breeding ground for conspiracy theories, with claims that the vaccine contained microchips for government surveillance.(70)

Another recuring pattern is uncertainty of the public, which results in unproven cures. During the Spanish Flu the government downplayed the severity of the pandemic to uphold the public moral during World War I instead of adequately informing the public. Meanwhile with the lack of official guidance and misinformation questionable cures like onions, garlic and whiskey spread and were promoted as effective.(50) Similar Pattern was recognizable during the COVID-19 pandemic, when there was little information about the spreading virus, misinformation about possible treatments like ivermectin spread very fast, despite having no scientific basis.(72,73)

The basis for the success of the misinformation stayed the same for hundreds of years, it only went from ink and often local news to digital on social media and potential to spread around the world. The Misinformation often spread faster than public health official can intervene. Another problem is, once the statement, like MMR vaccine study from Andrew Wakefield, is shared in the internet, it is nearly impossible to complete remove it.(32)

The number of health-related searches on the Internet every day is estimated to be around seven million searches. Approximately “4.5% of total Internet Searches worldwide are related to eHealth.”(121) Users can find information on almost any topic on the World Wide Web. In 2024, an unmanageable amount of data was available on around 1.1 billion (2024) websites worldwide.(122)

According to a survey by Bitkom, the German digital industry association, around half (53%) of the population in Germany use the internet to research health-related issues before consulting a doctor. This trend is particular noticeable among women (61%) compared to men (45%), based on responses from 1,193 people aged sixteen and over. There was also a higher use of digital health resources after a visit to the doctor, with 61% of respondents, including 64% of women and 59% of men, seeking further information about symptoms, medical diagnoses or prescribed treatments. The motivations for online health research vary, with 66% looking for a second opinion, 62% looking for alternative treatments and 57% looking for more in-depth information. The survey highlighted communication barriers in doctor-patient interactions, with nearly 31% of respondents admitting that they had difficulty understanding their doctor's explanations and 20% struggling to remember key details from their consultation. As a result, digital health information can act as a valuable adjunct to the doctor's visit, improving clarity and equipping patients with the knowledge they need to make informed healthcare decisions.(123)

This means that the doctor-patient relationship is increasingly developing in the direction of equal rights, informed consent and more collaborative hierarchic. Before many patients often felt a “sense of powerlessness during doctor visits”(124), because of the complexity of the disease topics, which lead to fewer questions of the patient and which then could have led to negative consequences on doctor patient relationship and health outcomes.(124,125) Nowadays the patient comes to the consultation with up-to-date, highly specific and detailed information from the internet. This may be a mixture of reputable and true information and misinformation from less reputable websites. Whether the well-informed patient is a win-win situation for both the patient and the practice remains to be seen. One of the key factors will be how the doctor responds. “The doctor will have to make a conscious decision as to whether this information can be integrated into the current consultation: How much time does it take to evaluate the information? Does he know its source and content? The patient may have more sophisticated information than the doctor. Given the abundance of information and the speed with which new knowledge is published, it is not a shortcoming if the doctor is unable to evaluate this information immediately. However, it is a sign of his expertise if he offers to read the patient's computer printouts and discuss the content at a later appointment. The same approach makes sense if the information is complex or of particular importance to the patient."(126)

In some areas, the traditional knowledge gap between doctors and patients is beginning to narrow, as more individuals seek out detailed health information beforehand. However, their expertise will become even more essential. Patients who are well-informed tend to approach consultations with greater confidence and expect clear, and skilful communication. Instead of one-sided conversations, they are increasingly looking for open, balanced dialogue in which both parties contribute actively.(126)

In the face of this paradigm shift, physicians face the challenge of staying informed about health-related information on the Internet, evaluating the credibility and reliability of sources, and differentiating accurate information from misinformation.(127) As medical knowledge expands really fast, it's unrealistic to expect doctors to be up to date on every condition at all times. Especially when patients bring in detailed findings from the internet.(128) Studies have shown that doctors who were themselves well informed about online health resources also responded positively to patients who acknowledged their previous online research.(129)

In most cases, the doctors actively support their patients' use of online health resources and even recommend reliable websites. This creates a win-win situation. An example of such websites is the recommended health website form University Health&Counseling.(130) Patients are encouraged to take the initiative and take responsibility for their own health, and there is often more time for dialogue in the practice. On the other hand, physicians who are less familiar with digital health tools sometimes react more critically to patients bringing online research into the consultation.(124) Accordingly, these patients did not receive information about trustworthy information sites. Patients of these doctors tend to remain uninformed and are less likely to develop empowerment.(129)

It will therefore be the doctor's task to filter out the sites that provide competent and detailed information from the mass of health information that is poor, incomplete or even incorrect.(131) To ensure effectiveness, medical networks, portals, and information services need to be accessible to both healthcare professionals and the people. To help users assess the reliability and relevance of the content, quality must be both guaranteed and clearly recognizable.(132)

One approach to ensuring this is through quality seals and certifications for websites. In 1995, the Health On the Net Foundation (HON), a Swiss organization, introduced a certification service, initially offered for free, to verify the credibility of websites providing medical information.(133) The service has had NGO status with the United Nations since 2002. According to Loss & Nagel (2009) HON has developed the 'HON Code of Conduct' (HONcode for short), which can be used to certify Internet content according to formal criteria of reliability and credibility. The HONcode is based on the following criteria: expertise (authors' qualifications), complementarity (complementary to medical advice), data protection, attribution (references to sources and dates), verifiability (balanced and verifiable scientific information), transparency and contact information, disclosure of funding and advertising policy (separation of advertising and editorial content).(22) HON also provided a search engine to help people find HON-certified sources online. The Foundation ceased its services in December 2022.

In 2003, Germany saw the establishment of the Aktionsforum Gesundheitsinformationssystem (afgis) e.V., a network of institutions, businesses, and individuals, aimed at enhancing the quality of online health information. Afgis assumes the function of a quality and qualification network that develops “strategies, criteria, procedures and instruments for quality assurance and quality management of health-related information in the digital media”.(134)

Website providers can have their website certified according to the ten transparency criteria of afgis for a fee and then receive a logo on their website. This shows consumers that this is trustworthy and quality-checked health information. Like the HONcode, the afgis logo assesses various aspects, including the provider, purpose, and target audience, as well as the author and sources. It also evaluates content creation and maintenance, feedback opportunities, internal quality assurance, the distinction between advertising and editorial content, financing and sponsorship, collaborations and networking, and data protection, including data usage policies.(134)

Another approach is taken by the American company WebMD, founded in 1998, which publishes online news and information on health and well-being.(135) This includes a tool for checking symptoms, resources for finding doctors, pharmacy details, drug-related information, and doctor-authored blogs on various health topics. It also offers a secure space for storing personal medical records. WebMD collaborates with a diverse group of medical professionals and subject-matter experts, many of whom have backgrounds in research, teaching, or clinical care. Due to its reputation as a leading source of health information for the public, the platform draws contributors connected to well-known academic institutions and healthcare systems. Health information is continually reviewed to ensure that it is scientifically accurate, meets current standards of care and is free of bias. Furthermore, the site undergoes regular accreditation by URAC (Utilization Review Accreditation Commission), ensuring compliance in areas such as transparency, health content quality, safety, and privacy. It is financially supported through advertising, third-party contributions, and sponsorships, while remaining freely accessible to the public.(135)

Due to the considerable importance of good medical information for the population, probably the greatest economic benefit is achieved here with the least investment of resources. In 2000, the Internet Healthcare Coalition held a summit in Washington, hosted by the World Health Organization/Pan American Health Organization (WHO/PAHO). Around fifty invited experts from various countries took part in the event, working together to establish the foundation for a draft Code of Practice for eHealth. The guiding principles were structured around eight key themes: honesty, sincerity, quality, informed consent, privacy, professionalism in eHealth, responsible partnership, and accountability. "The aim of the eHealth Code of Ethics is to ensure that people worldwide can realise the potential of the internet in managing their own health and the health of those entrusted to their care with confidence and a full understanding of the known risks."(136)

The German Network for Evidence-based Medicine (ebM e.V.) has also taken up the issue in its position paper "Good Practice Health Information 2.0." The association includes health insurers, academic bodies, self-help groups, and medical professionals. The document outlines key standards for developing evidence-based content and is intended to assist organisations, authors, and publishers in creating transparent, trustworthy, and user-focused medical information.(137)

As a result of Germany's healthcare reform in 2004, the Institute for Quality and Efficiency in Healthcare (IQWiG) was created to evaluate the pros and cons of medical treatments from the patient's perspective. Through scientific reports and easily understandable health information, it provides insights into the advantages and disadvantages of various diagnostic and treatment methods.(138). The recommended standards for medical websites aimed at both professionals and patients. They include neutrality of perspective, absence of commercial influence, the presence of recognized certification marks such as HON or afgis, clear and accessible contact details, up-to-date content, and language that is appropriate for a general audience with no medical training.(138) IQWiG has set up the Internet portal to make the information accessible to a broad section of the population.(139) Here you will find the Institute's studies presented in generally understandable language and organised by subject area. The possibilities and assistance for potential authors would therefore certainly be available to set up a site that complies with ethical standards. Ensuring that providers of health information adhere to ethical standards presents a challenge. Governments can be held responsible for ensuring that their publications and initiatives provide accurate and non-discriminatory health information. However, commercial providers sometimes present health information in a way that seems objective and scientific, while in reality serving to promote their services or products. Important risks and limitations may be minimized or left out, which can mislead users and distort informed decision-making.(22) "It is not uncommon for providers of medical services or products to share information that may appear to be scientifically sound or professionally presented, but is primarily designed to promote their own offerings. In some cases, potential risks and side effects are downplayed or even omitted. This type of information can be misleading to patients."(22) Although private foundations aim to serve the public good through their campaigns, their autonomy makes it difficult to ensure compliance with specific standards.(22) It is interesting to note, for example, that the popular online encyclopaedia Wikipedia, despite offering freely editable content and being officially deemed unsuitable for scientific citation, is still held in high regard by both physicians and patients.(81) These and similar sites are generally well known and are predominantly categorised as trustworthy. On the other hand advertising funding and a lack of transparency regarding the validity of the information is a problem.(81) Other reputable sources for health topics are online contributions from governmental and non-governmental authorities, organisations, competence networks and professional associations. These sites generally do not require certification but still fulfil high quality standards. However, online contributions from such sources still only represent a small proportion of the total number of health pages. A major issue lies in the large number of websites driven by specific interests, often manipulative and lacking proper quality control.(140) It's important to acknowledge that evidence-based medicine is not always met with full acceptance. Some criticism relates to the controlled conditions of clinical trials, selective publication practices, and the complexity of interpreting findings across diverse patient populations. The Problem is the fact that clinical trial data can be interpreted in different ways, depending on the context or perspective.(22)

To summarise, it can be said that there is now a lot of trustworthy health information on the Internet from numerous reputable institutions and that ethical guidelines and certificates are also available for authors to develop a good quality offering. "A good internet service would not only be a sign of competence, but also a service that can increase the relationship of trust between patients and their doctor and strengthen the weight of the doctor's recommendation."(126) This analysis concerns the supply side, but the supply can only be as good as the demand for it. And this shows that, on the one hand, there is the question of coordination and centralised quality assurance. On the other hand, the population often does not have the appropriate health literacy, which also includes critical information and communication skills. A great help would be a superordinate source of information where patients can get a real overview of the existing offers from reputable sources.(141) Additionally the public would have to be informed about the existence and significance of existing certificates, which is certainly not unproblematic. The pure need for information about medical content, the public's need for dialogue with other laypeople should not be underestimated. Many patients use public health forums and influencer sites for this purpose, which in no way fulfil the above-mentioned quality criteria. These open and unmoderated communication spaces allow patients to discuss everyday medical experiences and questions in a public space. For many population groups, this is also easier and more comprehensible “than following the abstract results of evidence-based medicine that is not transparent to the layperson, for example in the form of meta-analyses”(22) Patients often trust the experiences of fellow sufferers more than medical expertise. Sharing experiences, emotional support and encouragement take centre stage here. This can be “helpful in a positive sense, because the psychosocial and narrative dimension of illness is taken into account here in particular”.(129) Online forums can also be dangerous, as they can lead to misunderstandings and misconceptions as well as harmful behaviour. Hundreds of users of the American health forum “Patients like me”(3)for example, “started a medical self-experiment to test whether a certain drug would improve an incurable nerve disease. It hardly helped them at all, but the self-testers suffered from side effects ranging from concentration disorders to depressive moods.”(142)

One solution for online forums could be moderation. A team of experts reviews the stories of all patients. Only if the information helps other users and does not unsettle them is it published. In this way, the personal experiences of those affected and the expertise of medical professionals could be combined for the benefit of the public.(142) The special nature of online communication brings other challenges. Some of the ethical requirements listed are difficult to implement on websites. “For example, it is important to require that health information is detailed and evidence-based, and that all scientific sources are cited, but at the same time this can result in material that, because of its scope and presentation, may put off people with a low level of education or little interest in health issues.“(22) Several reputable websites have already responded to this need. Their content is often available in plain language, sometimes in sign language, and often in multiple languages to ensure accessibility for people with limited health literacy. However, it's worth asking whether avoiding emotional appeals or visual campaigns altogether is always the best strategy. Particularly in industries that heavily promote products such as cigarettes, sweets or fast food, purely fact-based prevention efforts may fall short, especially if advertising continues to build positive associations with harmful behaviours.(22)

All these examples used in previous chapters show one thing: even though the way misinformation travels has changed, the pattern behind it has remained the same. Fear, uncertainty and lack of trust in medical or political authorities have always been the spark and the driving force. In the past it was the fear of growing horns; today it is the fear of microchips in vaccines; the basic structure has remained similar. Misinformation spreads quickly, especially when official communication comes too late, is confusing or appears manipulative. And once misinformation is out there, it is almost impossible to fully correct it. What we can learn from past events is that misinformation in all its forms isn't harmless. It delays treatment, spreads fear and can cause harm to the public. At the same time, it raises important questions for all stakeholders: What are the responsibilities and roles of governments, social media platforms and health professionals? And what should take precedence, the need to prevent harm or the right to freedom of expression? These difficult issues require careful judgement, transparency and a balance between individual rights and collective protection. This requires a coordinated European approach and clear guidelines that define who is responsible for what, whether it is the role of governments, platforms or public health institutions.

# 9. REFERENCES

1. Health Communication [Internet]. [cited 2025 Feb 22]. Available from: https://www.societyforhealthcommunication.org/health-communication

2. Team MO. Healthcare Communication: From Paper to Pixels [Internet]. Medi-Ops. 2023 [cited 2025 Feb 22]. Available from: https://www.medi-ops.com/evolution-of-healthcare-communication/

3. PatientsLikeMe [Internet]. [cited 2025 Feb 23]. PatientsLikeMe. Available from: https://www.patientslikeme.com/

4. U.S. Department of Health and Human Services. Office of the Surgeon General. [cited 2025 Jan 15]. Health Misinformation. Available from: https://www.hhs.gov/surgeongeneral/priorities/health-misinformation/index.html

5. HiveMind. The Commons Social Change Library. 2024 [cited 2025 Jan 17]. Disinformation and 7 Common Forms of Information Disorder - The Commons. Available from: https://commonslibrary.org/disinformation-and-7-common-forms-of-information-disorder/

6. COVID-19 Mythbusters – World Health Organization [Internet]. [cited 2025 Mar 21]. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters

7. World Health Organization [Internet]. 2024 [cited 2025 Jan 15]. Disinformation and public health. Available from: https://www.who.int/news-room/questions-and-answers/item/disinformation-and-public-health

8. Islam MS, Sarkar T, Khan SH, Kamal AHM, Hasan SMM, Kabir A, et al. COVID-19–Related Infodemic and Its Impact on Public Health: A Global Social Media Analysis. 2020 Oct 7 [cited 2025 Mar 21];103(4). Available from: https://www.ajtmh.org/view/journals/tpmd/103/4/article-p1621.xml

9. World Health Organization [Internet]. [cited 2025 Jan 15]. Infodemic. Available from: https://www.who.int/health-topics/infodemic

10. Von der Pandemie zur Infodemie | Verbraucherzentrale.de [Internet]. [cited 2025 Jan 15]. Available from: https://www.verbraucherzentrale.de/corona/von-der-pandemie-zur-infodemie-54483

11. Gharpure R. Knowledge and Practices Regarding Safe Household Cleaning and Disinfection for COVID-19 Prevention — United States, May 2020. MMWR Morb Mortal Wkly Rep [Internet]. 2020 [cited 2025 Mar 21];69. Available from: https://www.cdc.gov/mmwr/volumes/69/wr/mm6923e2.htm

12. Statista Research Department. Statista. 2024 [cited 2025 Jan 15]. Social Media - Anzahl der Nutzer weltweit bis 2024 | Statista. Available from: https://de.statista.com/statistik/daten/studie/739881/umfrage/monatlich-aktive-social-media-nutzer-weltweit/

13. Yaqub M. Average Time Spent On Social Media (Latest Numbers) [Internet]. [cited 2025 Jan 15]. Available from: https://www.businessdasher.com/average-time-spent-on-social-media/

14. Gordon D. Forbes. 2021 [cited 2025 Jan 15]. 1 In 10 Americans Turn To Social Media For Health Information, New Survey Shows. Available from: https://www.forbes.com/sites/debgordon/2021/10/06/1-in-10-americans-turn-to-social-media-for-health-information-new-survey-shows/

15. Dizikes P. MIT News. 2018 [cited 2025 Jan 15]. Study: On Twitter, false news travels faster than true stories | MIT News | Massachusetts Institute of Technology. Available from: https://news.mit.edu/2018/study-twitter-false-news-travels-faster-true-stories-0308

16. Klerings I, Weinhandl AS, Thaler KJ. Information overload in healthcare: too much of a good thing? Zeitschrift für Evidenz, Fortbildung und Qualität im Gesundheitswesen. 2015;109(4–5):285–90.

17. Hossain MM. AMCIS 2024 TREOs Conference. 2024 [cited 2025 Jan 15]. Information Overload in Healthcare. Available from: https://aisel.aisnet.org/treos_amcis2024/124/

18. Levin-Zamir D, Bertschi I. Media Health Literacy, eHealth Literacy, and the Role of the Social Environment in Context. Int J Environ Res Public Health. 2018 Aug 3;15(8):1643.

19. Athey S, Grabarz K, Luca M, Wernerfelt N. Digital public health interventions at scale: The impact of social media advertising on beliefs and outcomes related to COVID vaccines. Proceedings of the National Academy of Sciences. 2023 Jan 31;120(5):e2208110120.

20. Chirumamilla S, Gulati M. Patient Education and Engagement through Social Media. CCR. 2021 May 7;17(2):137–43.

21. George DR, Rovniak LS, Kraschnewski JL. Dangers and Opportunities for Social Media in Medicine. Clinical Obstetrics & Gynecology. 2013 Sep;56(3):453–62.

22. Loss J, Nagel E. Probleme und ethische Herausforderungen bei der bevölkerungsbezogenen Gesundheitskommunikation. Bundesgesundheitsbl. 2009 May;52(5):502–11.

23. Ventola CL. Social media and health care professionals: benefits, risks, and best practices. P T. 2014 Jul;39(7):491–520.

24. Eckert K, Sopory P, Day A. Evidence Syntheses to Support the Guideline on Emergency Risk Communication Q10: What are the best social media channels and practices to promote health protection measures and dispel rumours and misinformation during events and emergencies with public health implications? [Internet]. Wayne State University: World Health Organization; 2016 Dec [cited 2025 Mar 1]. Available from: https://www.who.int/docs/default-source/meeting-reports/systematic-review-question-10.pdf?sfvrsn=6e9254f3_2

25. European Commission [Internet]. [cited 2025 Jan 15]. Contact tracing and warning apps during COVID-19 - European Commission. Available from: https://commission.europa.eu/strategy-and-policy/coronavirus-response/travel-during-coronavirus-pandemic/contact-tracing-and-warning-apps-during-covid-19_en

26. UBC Faculty of Medicine. Understanding TikTok’s impacts on public health [Internet]. University of British Columbia, Faculty of Medicine; 2021 Nov [cited 2025 Feb 22]. Available from: https://www.med.ubc.ca/news/understanding-tiktoks-impacts-on-public-health/

27. British Heart Foundation [Internet]. [cited 2025 Jan 15]. Heart Month 2025 - BHF. Available from: https://www.bhf.org.uk/how-you-can-help/support-our-campaigns/heart-month

28. Learn more about the #ThisIsOurShot Movement [Internet]. This Is Our Shot. [cited 2025 Feb 23]. Available from: https://thisisourshot.info/about-us/

29. Ghahramani A, Prokofieva M, De Courten MP. Health promotion campaigns using social media: association rules mining and co-occurrence network analysis of Twitter hashtags. BMC Public Health. 2025 Jan 7;25(1):67.

30. Run For Heroes [Internet]. [cited 2025 Jan 15]. About Us | Learn About Our Journey | Run For Heroes. Available from: https://runforheroes.org.uk/about-us/

31. Kostygina G, Tran H, Binns S, Szczypka G, Emery S, Vallone D, et al. Boosting Health Campaign Reach and Engagement Through Use of Social Media Influencers and Memes. Social Media + Society. 2020 Apr;6(2):2056305120912475.

32. Vosoughi S, Roy D, Aral S. The spread of true and false news online. Science. 2018 Mar 9;359(6380):1146–51.

33. Aouati O, Freguglia P, Heiss R, Patras S, Pavlou P, Pelsy F, et al. How to reduce the impact of disinformation on Europeans' health.

34. MIT Technology Review [Internet]. [cited 2025 Mar 21]. The Facebook whistleblower says its algorithms are dangerous. Here's why. Available from: https://www.technologyreview.com/2021/10/05/1036519/facebook-whistleblower-frances-haugen-algorithms/

35. Cinelli M, De Francisci Morales G, Galeazzi A, Quattrociocchi W, Starnini M. The echo chamber effect on social media. Proceedings of the National Academy of Sciences. 2021 Mar 2;118(9):e2023301118.

36. Pstuff) DLR PhD (Psych. Social Fragmentation: Causes, Impacts, and Potential Path Forward [Internet]. Psych Pstuff. 2023 [cited 2025 Feb 16]. Available from: https://medium.com/psych-pstuff/social-fragmentation-causes-impacts-and-potential-path-forward-28c212785411

37. Desai AN, Ruidera D, Steinbrink JM, Granwehr B, Lee DH. Misinformation and Disinformation: The Potential Disadvantages of Social Media in Infectious Disease and How to Combat Them. Clinical Infectious Diseases. 2022 May 15;74(Supplement_3):e34–9.

38. Wilson MK, Woods M. Trust in public health in a world of misinformation. American Journal of Health-System Pharmacy. 2024 Nov 21;zxae356.

39. Yang M. Journal retracts study that promoted hydroxychloroquine as Covid treatment. The Guardian [Internet]. 2024 Dec 18 [cited 2025 Mar 8]; Available from: https://www.theguardian.com/world/2024/dec/18/hydroxychloroquine-covid-treatment-journal-study-retracted

40. The College of Physicians of Philadelphia. History of Vaccines. 2022 [cited 2025 Jan 15]. History of Anti-Vaccination Movements | History of Vaccines. Available from: https://historyofvaccines.org/vaccines-101/misconceptions-about-vaccines/history-anti-vaccination-movements/

41. WHO. World Health Organization. [cited 2025 Jan 15]. History of smallpox vaccination. Available from: https://www.who.int/news-room/spotlight/history-of-vaccination/history-of-smallpox-vaccination/

42. Beaveridge K. Health e-News. 2021 [cited 2025 Jan 15]. From syphilis to autism, how the anti-vaccination movement of today is an echo of the past. Available from: https://healthenews.mcgill.ca/from-syphilis-to-autism-how-the-anti-vaccination-movement-of-today-is-an-echo-of-the-past/

43. Taylor JE. Spreading the News:Even with the growth of newspapers in the 18th century, early Americans were navigating a sea of contradictions. 2024 Jan 19 [cited 2025 Feb 23]; Available from: https://www.colonialwilliamsburg.org/discover/resource-hub/trend-tradition-magazine/trend-tradition-winter-2024/spreading-the-news/

44. Wolfe RM. Anti-vaccinationists past and present. BMJ. 2002 Aug 24;325(7361):430–2.

45. Wikipedia, The Free Encyclopedia [Internet]. [cited 2025 Jan 15]. National Anti-Vaccination League - Wikipedia. Available from: https://en.wikipedia.org/wiki/National_Anti-Vaccination_League

46. The Health Foundation. Policy Navigator. [cited 2025 Jan 15]. United Kingdom Vaccination Act 1853 | Policy Navigator. Available from: https://navigator.health.org.uk/theme/united-kingdom-vaccination-act-1853

47. Hudson Jr DL. The First Amendment Encyclopedia. 2020. Jacobson v. Massachusetts (1905). Available from: https://firstamendment.mtsu.edu/article/jacobson-v-massachusetts/

48. Gostin LO. *Jacobson v Massachusetts* at 100 Years: Police Power and Civil Liberties in Tension. Am J Public Health. 2005 Apr;95(4):576–81.

49. Roser M. Our World in Data. 2020. The Spanish flu: The global impact of the largest influenza pandemic in history. Available from: https://ourworldindata.org/spanish-flu-largest-influenza-pandemic-in-history

50. Martini M, Gazzaniga V, Bragazzi NL, Barberis I. The Spanish Influenza Pandemic: a lesson from the history 100 years after 1918. Journal of Preventive Medicine and Hygiene. 2019 Apr 2;Vol 60:E64 Pages.

51. RKI. Robert Koch-Institut. 1981 bis 1990: AIDS – die politische Dimension in den 1980er Jahren. Available from: https://www.rki.de/DE/Content/Institut/Geschichte/Bildband_Salon/1981-1990.html

52. UNAIDS. UNAIDS. 2017. Accurate and credible UNAIDS data on the HIV epidemic: the cornerstone of the AIDS response. Available from: https://www.unaids.org/en/resources/presscentre/featurestories/2017/july/20170710_data

53. National AIDS Trust. National AIDS Trust. 2017. HIV fake news: NAT sets out to tackle misinformation. Available from: https://nat.org.uk/news/hiv-fake-news-nat-sets-out-tackle-misinformation/

54. HIV health literacy and knowledge of young adults studying at a US university. hiv [Internet]. 2021 Jan 1 [cited 2025 Jan 13];21(2). Available from: https://hivnursing.net/index.php/hiv/article/view/182/162

55. Young SD, Garett R. The Impact of Misinformation and Health Literacy on HIV Prevention and Service Usage. 2022;33(1):e1–5.

56. Chen YY, Li CM, Liang JC, Tsai CC. Health Information Obtained From the Internet and Changes in Medical Decision Making: Questionnaire Development and Cross-Sectional Survey. Journal of Medical Internet Research. 2018 Feb 12;20(2):e9370.

57. Kalichman SC, Cherry C, White D, Jones M, Kalichman MO, Detorio MA, et al. Use of dietary supplements among people living with HIV/AIDS is associated with vulnerability to medical misinformation on the internet. AIDS Res Ther. 2012;9(1):1.

58. Denying science. Nat Med. 2006 Apr;12(4):369–369.

59. Napier G, Lee D, Robertson C, Lawson A, Pollock KG. A model to estimate the impact of changes in MMR vaccine uptake on inequalities in measles susceptibility in Scotland. Stat Methods Med Res. 2016 Aug;25(4):1185–200.

60. DeStefano F, Shimabukuro TT. The MMR Vaccine and Autism. Annu Rev Virol. 2019 Sep 29;6(1):585–600.

61. Whalen J, Mckay B. Fifteen Years After Autism Panic, a Plague of Measles Erupts. The Wall Street Journal [Internet]. 2013 Jul 19; Available from: https://commed.vcu.edu/IntroPH/Communicable_Disease/2013/AutismPanic_Plagueo%20Measles%20Erupts_WSJ.pdf

62. Spurgeon D. Measles could take hold as UK vaccination levels drop. BMJ. 2003 Aug 16;327(7411):360-e-0.

63. World Health Organization [Internet]. 2019 [cited 2025 Jan 17]. Ten threats to global health in 2019. Available from: https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019

64. European Centre for Disease Prevention and Control. Countering online vaccine misinformation in the EU/EEA [Internet]. Stockholm: ECDC; 2021. Report No.: Countering online vaccine misinformation in the EU/EEA. Available from: https://www.ecdc.europa.eu/en/publications-data/countering-online-vaccine-misinformation-eu-eea

65. European Centre for Disease Prevention and Control. Catalogue of interventions addressing vaccine hesitancy [Internet]. Stockholm: ECDC; 2017 Apr [cited 2025 Mar 2]. Available from: https://www.ecdc.europa.eu/en/publications-data/catalogue-interventions-addressing-vaccine-hesitancy

66. Al-Zaman MdS. Prevalence and source analysis of COVID-19 misinformation of 138 countries [Internet]. 2021 [cited 2025 Jan 18]. Available from: http://medrxiv.org/lookup/doi/10.1101/2021.05.08.21256879

67. Verma G, Bhardwaj A, Aledavood T, De Choudhury M, Kumar S. Examining the impact of sharing COVID-19 misinformation online on mental health. Sci Rep. 2022 May 16;12(1):8045.

68. Nelson T, Kagan N, Critchlow C, Hillard A, Hsu A. The Danger of Misinformation in the COVID-19 Crisis. Mo Med. 2020;117(6):510–2.

69. Ahmed W, Vidal-Alaball J, Downing J, López Seguí F. COVID-19 and the 5G Conspiracy Theory: Social Network Analysis of Twitter Data. J Med Internet Res. 2020 May 6;22(5):e19458.

70. BBC News. BBC News. 2020. Hundreds dead because of Covid-19 misinformation. Available from: https://www.bbc.com/news/world-53755067

71. Cima G. Journal of the American Veterinary Medical Association News. 2021 [cited 2025 Jan 17]. People ingesting veterinary-use ivermectin in attempts to prevent, cure COVID-19 | American Veterinary Medical Association. Available from: https://www.avma.org/javma-news/2021-10-01/people-ingesting-veterinary-use-ivermectin-attempts-prevent-cure-covid-19

72. Schraer R, Goodman J. BBC News. 2021. Ivermectin: How false science created a Covid 'miracle' drug. Available from: https://www.bbc.com/news/health-58170809

73. Food and Drug Administration. Food and Drug Administration. 2021 [cited 2025 Jan 17]. FDA Advisory No.2021-0526 || Public Health Warning on the Purchase and Use of Ivermectin Veterinary Products for COVID-19 - Food and Drug Administration. Available from: https://www.fda.gov.ph/fda-advisory-no-2021-0526-public-health-warning-on-the-purchase-and-use-of-ivermectin-veterinary-products-for-covid-19/

74. Kyrylenko V. The New American. 2024 [cited 2025 Mar 2]. Free Speech Rally Held Outside U.S. Supreme Court in Washington, D.C. Available from: https://thenewamerican.com/us/free-speech-rally-held-outside-u-s-supreme-court-in-washington-d-c/

75. Newswise [Internet]. 2020. Dr. Pierre Kory, President of the FLCCC Alliance, Testifies Before Senate Committee on Homeland Security and Governmental Affairs Looking into Early Outpatient COVID-19 Treatment. Available from: https://www.newswise.com/articles/dr-pierre-kory-president-of-the-flccc-alliance-testifies-before-senate-committee-on-homeland-security-and-governmental-affairs-looking-into-early-outpatient-covid-19-treatment

76. Google. Google Trends. 2019. Covid-19 - Google Trends Data.

77. Loomba S, De Figueiredo A, Piatek SJ, De Graaf K, Larson HJ. Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. Nat Hum Behav. 2021 Feb 5;5(3):337–48.

78. Chu AM, Chong ACY, Lai NHT, Tiwari A, So MKP. Enhancing the Predictive Power of Google Trends Data Through Network Analysis: Infodemiology Study of COVID-19. JMIR Public Health Surveill. 2023 Sep 7;9:e42446.

79. Frontiers | Policies and publication ethics [Internet]. [cited 2025 Feb 4]. Available from: https://www.frontiersin.org/guidelines/policies-and-publication-ethics

80. Bujnowska-Fedak MM, Węgierek P. The Impact of Online Health Information on Patient Health Behaviours and Making Decisions Concerning Health. International Journal of Environmental Research and Public Health. 2020 Jan;17(3):880.

81. Reliability of Wikipedia. In: Wikipedia [Internet]. 2025 [cited 2025 Feb 4]. Available from: https://en.wikipedia.org/w/index.php?title=Reliability_of_Wikipedia&oldid=1273378035#Other_false_information

82. Sam-Agudu NA, Abimbola S. Using scientific authorship criteria as a tool for equitable inclusion in global health research. BMJ Glob Health [Internet]. 2021 Oct 13 [cited 2025 Feb 15];6(10). Available from: https://gh.bmj.com/content/6/10/e007632

83. ICMJE | Recommendations | Defining the Role of Authors and Contributors [Internet]. [cited 2025 Feb 4]. Available from: https://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html

84. Kington RS, Arnesen S, Chou WYS, Curry SJ, Lazer D, Villarruel and AM. Identifying Credible Sources of Health Information in Social Media: Principles and Attributes. NAM Perspectives [Internet]. 2021 Jul 16 [cited 2025 Feb 15]; Available from: https://nam.edu/identifying-credible-sources-of-health-information-in-social-media-principles-and-attributes/

85. Dearnell A. Forbes. [cited 2025 Feb 15]. The Key To Successful Presentations: K.I.S.S. (Keep It Short And Simple). Available from: https://www.forbes.com/sites/adriandearnell/2018/06/13/the-key-to-successful-presentations-k-i-s-s-keep-it-short-and-simple/

86. Gaggero C. Promoting cancer early diagnosis [Internet]. WHO; [cited 2025 Feb 4]. Available from: https://www.who.int/activities/promoting-cancer-early-diagnosis

87. Román M, Hofvind S, von Euler-Chelpin M, Castells X. Long-term risk of screen-detected and interval breast cancer after false-positive results at mammography screening: joint analysis of three national cohorts. Br J Cancer. 2019 Jan;120(2):269–75.

88. Öffentliches Gesundheitswesen | Ethische Fragen von Digital Public Health | springermedizin.de [Internet]. [cited 2025 Feb 1]. Available from: https://www.springermedizin.de/oeffentliches-gesundheitswesen/ethische-fragen-von-digital-public-health/17580746

89. Tulchinsky TH, Varavikova EA. Expanding the Concept of Public Health. The New Public Health. 2014;43–90.

90. Duke JC, Vallone DM, Allen JA, Cullen J, Mowery PD, Xiao H, et al. Increasing Youths' Exposure to a Tobacco Prevention Media Campaign in Rural and Low-Population-Density Communities. Am J Public Health. 2009 Dec;99(12):2210–6.

91. Hicks JJ. The strategy behind Florida's "truth" campaign. Tob Control. 2001 Mar 1;10(1):3–5.

92. Minkler M, Wallerstein N. 3. Improving Health through Community Organization and Community Building: Perspectives from Health Education and Social Work. In: Minkler M, editor. Community Organizing and Community Building for Health and Welfare [Internet]. Rutgers University Press; 2019 [cited 2025 Feb 25]. p. 37–58. Available from: https://www.degruyter.com/document/doi/10.36019/9780813553146-005/html

93. Craigie M, Loader B, Burrows R, Muncer S. Reliability of Health Information on the Internet: An Examination of Experts' Ratings. J Med Internet Res. 2002 Jan 17;4(1):e2.

94. Guttman N. Ethical Issues and Considerations in Health and Risk Message Design. In: Oxford Research Encyclopedia of Communication [Internet]. 2017 [cited 2025 Feb 15]. Available from: https://oxfordre.com/communication/display/10.1093/acrefore/9780190228613.001.0001/acrefore-9780190228613-e-214

95. Guttman N. Ethical Issues in Health Promotion and Communication Interventions. In: Oxford Research Encyclopedia of Communication [Internet]. 2017 [cited 2025 Feb 15]. Available

from: https://oxfordre.com/communication/display/10.1093/acrefore/9780190228613.001.0001/acrefore-9780190228613-e-118

96. WPAB. A Sample Proposal on “Launching Anti-Stigma Campaigns for HIV-Positive Individuals” - fundsforNGOs - Grants and Resources for Sustainability [Internet]. 2025 [cited 2025 Feb 15]. Available from: https://www.fundsforngos.org/all-proposals/a-sample-proposal-on-launching-anti-stigma-campaigns-for-hiv-positive-individuals/

97. Li C, Guo Y. The Effect of Socio-Economic Status on Health Information Literacy among Urban Older Adults: Evidence from Western China. Int J Environ Res Public Health. 2021 Mar 28;18(7):3501.

98. Gilmour JA. Reducing disparities in the access and use of Internet health information. a discussion paper. Int J Nurs Stud. 2007 Sep;44(7):1270–8.

99. Bautista-Gomez MM, Zuluaga LS, Medina-Tabares MF. CULTURAL ADAPTATION OF HEALTH INTERVENTIONS FOR ETHNIC COMMUNITIES IN VULNERABLE SETTINGS: A QUALITATIVE DATA SYNTHESIS. New Trends in Qualitative Research. 2024 Sep 5;20(3):e920–e920.

100. Freimuth VS, Quinn SC. The Contributions of Health Communication to Eliminating Health Disparities. Am J Public Health. 2004 Dec;94(12):2053–5.

101. Guilkey DK, Hutchinson P, Lance P. Cost-effectiveness analysis for health communication programs. J Health Commun. 2006;11 Suppl 2:47–67.

102. Dempster G, Sutherland G, Keogh L. Scientific research in news media: a case study of misrepresentation, sensationalism and harmful recommendations. JCOM. 2022 Mar 7;21(1):A06.

103. Pribble JM, Goldstein KM, Fowler EF, Greenberg MJ, Noel SK, Howell JD. Medical news for the public to use? What’s on local TV news. Am J Manag Care. 2006 Mar;12(3):170–6.

104. Borges do Nascimento IJ, Pizarro AB, Almeida JM, Azzopardi-Muscat N, Gonçalves MA, Björklund M, et al. Infodemics and health misinformation: a systematic review of reviews. Bull World Health Organ. 2022 Sep 1;100(9):544–61.

105. The 2022 Code of Practice on Disinformation | Shaping Europe’s digital future [Internet]. 2025 [cited 2025 Feb 22]. Available from: https://digital-strategy.ec.europa.eu/en/policies/code-practice-disinformation

106. Das EU-Gesetz über digitale Dienste [Internet]. 2022 [cited 2025 Feb 22]. Available from: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/digital-services-act_de

107. BMG [Internet]. [cited 2025 Feb 22]. Robert Koch-Institut (RKI). Available from: https://www.bundesgesundheitsministerium.de/service-benutzerhinweise/behoerden-im-geschaeftsbereich/robert-koch-institut.html

108. Sell T, Hosangadi D, Smith E. National Priorities to Combat Misinformation and Disinformation for COVID-19 and Future Public Health Threats: A Call for a National Strategy [Internet]. Baltimore, MD: Johns Hopkins Center for Health Security; 2021. Available from: https://centerforhealthsecurity.org/sites/default/files/2023-02/210322-misinformation.pdf

109. Nyhan B, Reifler J. When corrections fail: The persistence of political misperceptions. Political Behavior. 2010;32(2):303–30.

110. Melillo S, Strachan R, O’Brien CJ, Wonodi C, Bormet M, Fountain D. Effects of local faith-actor engagement in the uptake and coverage of immunization in low- and middle-income countries: A literature review. han-j-cjgh. 2022 Jun 20;9(1):2–32.

111. Tjaden J, Haarmann E. Promoting COVID-19 vaccination uptake among migrant communities on social media [Internet]. Berlin: University of Potsdam and International Organization for Migration; 2022. Available from: https://gmdac.iom.int/sites/g/files/tmzbdl1416/files/documents/social-media-study_germany_gmdac_uni-potsdam.pdf

112. Social media platforms generate billions in annual ad revenue from U.S. youth | Harvard T.H. Chan School of Public Health [Internet]. 2023 [cited 2025 Feb 22]. Available from: https://hsph.harvard.edu/news/social-media-platforms-generate-billions-in-annual-ad-revenue-from-u-s-youth/

113. Brandstetter T. Max-Planck-Gesellschaft. 20224 [cited 2025 Feb 22]. Datenwissenschaften schaffen Fakten. Available from: https://www.mpg.de/23611161/datenwissenschaften-social-media

114. Arzneimittelkommission der deutschen Ärzteschaft [Internet]. 2025 [cited 2025 Feb 22]. Information von Pharma Deutschland: Gefährliche „Paracetamol Challenge“. Available from: https://www.akdae.de/arzneimittelsicherheit/drug-safety-mail/newsdetail/drug-safety-mail-2025-07

115. Busl KM, Rubin MA, Tolchin BD, Larriviere D, Epstein L, Kirschen M, et al. Use of Social Media in Health Care—Opportunities, Challenges, and Ethical Considerations. Neurology. 2021 Sep 21;97(12):585–94.

116. AP News [Internet]. 2020 [cited 2025 Feb 21]. Nevada doctor’s selfie used to claim COVID-19 is a hoax. Available from: https://apnews.com/article/fact-check-reno-doctor-selfie-6d26d70305a1599bf3ce82bf874a9934

117. Arin KP, Mazrekaj D, Thum M. Ability of detecting and willingness to share fake news. Sci Rep. 2023 May 5;13(1):7298.

118. Louis P. Fake News: die Medien stehen in der Verantwortung [Internet]. SichtWeisen. 2021 [cited 2025 Feb 22]. Available from: https://sichtweisen-ibk.org/2021/11/fake-news-die-medien-stehen-in-der-verantwortung/

119. Deutschlandfunk Nova [Internet]. 2021 [cited 2025 Feb 22]. Fake News - schwieriger zu erkennen als gedacht. Available from: https://www.deutschlandfunknova.de/beitrag/studie-zu-fake-news-schwieriger-zu-erkennen-als-gedacht

120. Economists Have a Method for Reducing Fake News on Social Media | Duke Today [Internet]. 2022 [cited 2025 Feb 22]. Available from: https://today.duke.edu/2022/08/economists-have-method-reducing-fake-news-social-media

121. Schneider JA, Holland C. eHealth Search Patterns: A Comparison of Private and Public Health Care Markets Using Online Panel Data. Journal of Medical Internet Research [Internet]. 2017

Apr 1 [cited 2025 Feb 22];19(4). Available from: https://www.sciencedirect.com/org/science/article/pii/S1438887117001108

122. Statista [Internet]. [cited 2025 Feb 1]. Webseiten - Anzahl weltweit 2024. Available from: https://de.statista.com/statistik/daten/studie/290274/umfrage/anzahl-der-webseiten-weltweit/

123. Bitkom e.V. Jeder Zweite recherchiert seine Krankheitssymptome im Netz | Presseinformation | Bitkom e. V. [Internet]. 2020 [cited 2025 Feb 1]. Available from: https://www.bitkom.org/Presse/Presseinformation/Jeder-Zweite-recherchiert-seine-Krankheitssymptome-im-Netz

124. Li S, Wang K. Sharing Online Health Information With Physicians: Understanding the Associations Among Patient Characteristics, Directness of Sharing, and Physician-Patient Relationship. Front Psychol [Internet]. 2022 Mar 30 [cited 2025 Feb 15];13. Available from: https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2022.839723/full

125. Nassehi D, Gripsrud BH, Ramvi E. Theoretical Perspectives Underpinning Research on the Physician-Patient Relationship in a Digital Health Practice: Scoping Review. Interactive Journal of Medical Research. 2024 May 15;13(1):e47280.

126. Ärzteblatt DÄG Redaktion Deutsches. Deutsches Ärzteblatt. 2004 [cited 2025 Feb 1]. Der online informierte Patient: Offener Dialog gesucht. Available from: https://www.aerzteblatt.de/archiv/44225/Der-online-informierte-Patient-Offener-Dialog-gesucht

127. Wang Z, Zhang X, Han D, Zhao Y, Ma L, Hao F. How the use of an online healthcare community affects the doctor-patient relationship: An empirical study in China. Front Public Health [Internet]. 2023 Apr 6 [cited 2025 Feb 15];11. Available from: https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2023.1145749/full

128. Tan SSL, Goonawardene N. Internet Health Information Seeking and the Patient-Physician Relationship: A Systematic Review. Journal of Medical Internet Research. 2017 Jan 19;19(1):e5729.

129. Bechmann S. Dentalwelt. 2018 [cited 2025 Feb 1]. Gefährdet das Internet die Arzt-Patient-Beziehung? Available from: https://dentalwelt.spitta.de/management/gefaehrdet-das-internet-die-arzt-patient-beziehung/

130. Recommended Health Websites | University Health Service [Internet]. [cited 2025 Feb 15]. Available from: https://uhs.umich.edu/websites

131. O’Mathúna DP. How Should Clinicians Engage With Online Health Information? AMA J Ethics. 2018 Nov 1;20(11):E1059-1066.

132. Office of Dietary Supplements - How To Evaluate Health Information on the Internet: Questions and Answers [Internet]. [cited 2025 Feb 27]. Available from: https://ods.od.nih.gov/HealthInformation/How_To_Evaluate_Health_Information_on_the_Internet_Questions_and_Answers.aspx

133. Boyer C. European Federation for Medical Informatics. [cited 2025 Feb 1]. HON – Health On the Net Foundation. Available from: af

134. afgis. Aktionsforum Gesundheitsinformationssytem. 2021 [cited 2025 Feb 1]. afgis-Transparenzkriterien - Zertifizierung. Available from: https://www.afgis.de/zertifizierung/transparenzkriterien

135. WebMD [Internet]. [cited 2025 Feb 1]. WebMD - Better information. Better health. Available from: https://www.webmd.com/default.htm

136. Rippen H, Risk A. e-Health Code of Ethics. J Med Internet Res. 2000 May 24;2(2):e9.

137. Deutsches Netzwerk Evidenzbasierte Medizin. Gute Praxis Gesundheitsinformation 2.0 [Internet]. Berlin: Deutschen Netzwerks Evidenzbasierte Medizin e.V.; 2015 [cited 2025 Feb 15]. Available from: https://www.ebm-netzwerk.de/de/veroeffentlichungen/weitere-publikationen

138. BMG [Internet]. [cited 2025 Feb 15]. Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen. Available from: https://www.bundesgesundheitsministerium.de/service/begriffe-von-a-z/i/institut-fuer-qualitaet-und-wirtschaftlichkeit-im-gesundheitswesen.html

139. Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen (IQWiG). gesundheitsinformation.de. 2023 [cited 2025 Feb 15]. Das IQWiG. Available from: https://www.gesundheitsinformation.de/

140. Services D of H& H. Finding reliable health information [Internet]. Department of Health & Human Services; [cited 2025 Feb 15]. Available from: http://www.betterhealth.vic.gov.au/health/servicesandsupport/finding-reliable-health-information

141. Chen X, Hay JL, Waters EA, Kiviniemi MT, Biddle C, Schofield E, et al. Health Literacy and Use and Trust in Health Information. J Health Commun. 2018;23(8):724–34.

142. Habich I. Gesundheitsforen im Internet ohne Risiken nutzen. Der Spiegel [Internet]. 2013 Jun 1 [cited 2025 Feb 22]; Available from: https://www.spiegel.de/gesundheit/diagnose/gesundheitsforen-im-internet-ohne-risiken-nutzen-a-901097.html