

Evidence-Based Decision Making In Healthcare

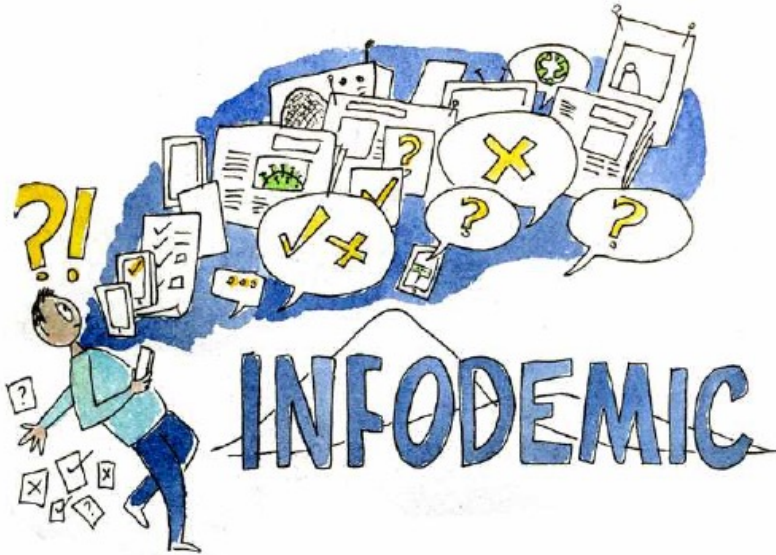
Combating Misinformation and Disinformation

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Misinformation and Disinformation

- Misinformation = false information that is presented as fact without an intent to deceive or mislead
- Disinformation = false information that is presented as fact with an intent to deceive or mislead
- For purposes of this topic, will simply refer to it as “misinformation”

“Infodemic”



- Term used by World Health Organization
- An overabundance of information—some accurate and some not—that occurs during an epidemic
- Spreads via digital & physical systems
- Hard for people to find trustworthy sources and reliable guidance

Harms: COVID Protection Measures

Meanwhile, those who deny asymptomatic spread or believe the flu or auto accidents are more deadly than COVID-19 are much less likely to wear a mask or isolate themselves from non-household members, according to our survey results. These gaps remain after controlling for demographic characteristics of respondents, such as party identification, gender, age, race, employment status, and education. Those denying asymptomatic spread are 27 percentage points less likely to always wear a mask when indoors and out in public after controlling for these factors, whereas those who attribute more deaths to flu than COVID-19 are 13 percentage points less likely to wear a mask.

Monthly data from 35,000 U.S. adults in Franklin Templeton-Gallup Economics of Recovery Study, December 2020
<https://www.brookings.edu/research/how-misinformation-is-distorting-covid-policies-and-behaviors/>

Harms: Vaccination

- Vaccine misinformation now fueling outbreaks of infectious diseases that were previously considered 'eliminated' in the United States
- In 2022
 - Large measles outbreak in Ohio
 - Paralytic polio in New York

Damage from One Study

- Study published in The Lancet in 1998, suggesting that measles, mumps, rubella vaccination is linked to autism and colitis
- Led to massive declines in vaccination in UK and Ireland, leading to measles resurgence there and in other countries

Early report

Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith

Summary

Background We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

Methods 12 children (mean age 6 years [range 3-10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible. Biochemical, haematological, and immunological profiles were examined.

Findings Onset of behavioural symptoms was associated by the parents, with measles, mumps, and rubella vaccination in eight of the 12 children, with measles infection in one child, and otitis media in six. All 12 children had intestinal abnormalities ranging from lymphoid nodular hyperplasia to orchoid ulceration. Histology showed patchy chronic inflammation. In 11 children and reactive ileal lymphoid hyperplasia in seven, but no granulomas. Behavioural disorders included autism (nine), disintegrative syndrome (one), a possible postviral or vaccinal encephalitis (one). There were no focal neurological abnormalities and EEG tests were normal. Abnormal laboratory results were significantly raised urinary thymine/uracil acid compared with age-matched controls ($p < 0.001$), low haemoglobin in four children, and low serum IgA in six children.

Interpretation A distinct associated gastrointestinal disease and developmental regression in a group of previously healthy children, which was generally associated in time to a possible environmental trigger.

Lancet 1998; **351**: 637-41
See Commentary page

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Introduction

We saw several children who, after a period of apparent normality, lost acquired skills, including communication. They all had gastrointestinal symptoms, including abdominal pain, diarrhoea, and vomiting, and, in some cases, food intolerance. We describe the clinical findings, and gastrointestinal features of these children.

Patients and methods

12 children, consecutively referred to the department of paediatric gastroenterology from a history of a pervasive developmental disorder with loss of acquired skills and intestinal symptoms, and abdominal pain, vomiting, and food intolerance, were investigated. All children were admitted to the ward for a week, accompanied by their parents.

Clinical investigations

Each history, including details of immunisations and exposure to infectious diseases, and assessed the children. In 11 cases, the history was obtained by the senior clinician (JW-S). Neurological and psychiatric assessments were done by consultant staff (JH, MD) with HMS-4 criteria.¹ Developmental history included a review of prospective developmental records from parents, health visitors, and general practitioners. Four children did not undergo psychiatric assessment in hospital; all had been assessed previously elsewhere, so these assessments were used as the basis for their behavioural diagnosis.

After bowel preparation, ileocolonoscopy was performed by SHM or MAT under sedation with midazolam and pethidine. Paired frozen and formalin-fixed mucosal biopsy samples were taken from the terminal ileum, ascending, transverse, descending, and sigmoid colons, and from the rectum. The procedure was recorded by video or still images, and were compared with images of the previous seven consecutive paediatric colonoscopies (four normal colonoscopies and three on children with ulcerative colitis), in which the physician reported normal appearances in the terminal ileum. Barium follow-through radiography was possible in some cases.

Also under sedation, cerebral magnetic-resonance imaging (MRI), electroencephalography (EEG) including visual, brain stem auditory, and sensory evoked potentials (where compliance made these possible), and lumbar puncture were done.

Laboratory investigations

Thyroid function, serum long-chain fatty acids, and cerebrospinal-fluid lactate were measured to exclude known causes of childhood neurodegenerative disease. Urinary methylmalonic acid was measured in random urine samples from eight of the 12 children and 14 age-matched and sex-matched normal controls, by a modification of a technique described previously.² Chromatograms were scanned digitally on computer, to analyse the methylmalonic-acid zones from cases and controls. Urinary methylmalonic-acid concentrations in patients and controls were compared by a two-sample *t* test. Urinary creatinine was estimated by routine spectrophotometric assay.

Children were screened for antiendospore antibodies and boys were screened for fragile-X if this had not been done

How the link was fixed

The *Lancet* paper was a case series of 12 child patients; it reported a proposed “new syndrome” of enterocolitis and regressive autism and associated this with MMR as an “apparent precipitating event.” But in fact:


- Three of nine children reported with regressive autism did not have autism diagnosed at all. Only one child clearly had regressive autism
- Despite the paper claiming that all 12 children were “previously normal,” five had documented pre-existing developmental concerns
- Some children were reported to have experienced first behavioural symptoms within days of MMR, but the records documented these as starting some months after vaccination
- In nine cases, unremarkable colonic histopathology results—noting no or minimal fluctuations in inflammatory cell populations—were changed after a medical school “research review” to “non-specific colitis”
- The parents of eight children were reported as blaming MMR, but 11 families made this allegation at the hospital. The exclusion of three allegations—all giving times to onset of problems in months—helped to create the appearance of a 14 day temporal link
- Patients were recruited through anti-MMR campaigners, and the study was commissioned and funded for planned litigation

BMJ 2011, 342;c5347

Attempts to Debunk Extensive

- Wakefield's license revoked after documentation of fraud, ethical violations, financial conflicts
- Massive epidemiologic studies in US, Europe, and elsewhere have shown zero association between MMR and autism
- Nevertheless, misinformation "sticks"

Cancer Misinformation and Harmful Information on Facebook and Other Social Media: A Brief Report

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Abstract

There are few data on the quality of cancer treatment information available on social media. Here, we quantify the accuracy of cancer treatment information on social media and its potential for harm. Two cancer experts reviewed 50 of the most popular social media articles on each of the 4 most common cancers. The proportion of misinformation and potential for harm were reported for all 200 articles and their association with the number of social media engagements using a 2-sample Wilcoxon rank-sum test. All statistical tests were 2-sided. Of 200 total articles, 32.5% (n = 65) contained misinformation and 30.5% (n = 61) contained harmful information. Among articles containing misinformation, 76.9% (50 of 65) contained harmful information. The median number of engagements for articles with misinformation was greater than factual articles (median [interquartile range] = 2300 [1200-4700] vs 1600 [819-4700], $P = .05$). The median number of engagements for articles with harmful information was statistically significantly greater than safe articles (median [interquartile range] = 2300 [1400-4700] vs 1500 [810-4700], $P = .007$).

Use of Alternative Medicine for Cancer and Its Impact on Survival

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Abstract

There is limited available information on patterns of utilization and efficacy of alternative medicine (AM) for patients with cancer. We identified 281 patients with nonmetastatic breast, prostate, lung, or colorectal cancer who chose AM, administered as sole anticancer treatment among patients who did not receive conventional cancer treatment (CCT), defined as chemotherapy, radiotherapy, surgery, and/or hormone therapy. Independent covariates on multivariable logistic regression associated with increased likelihood of AM use included breast or lung cancer, higher socioeconomic status, Intermountain West or Pacific location, stage II or III disease, and low comorbidity score. Following 2:1 matching (CCT = 560 patients and AM = 280 patients) on Cox proportional hazards regression, AM use was independently associated with greater risk of death compared with CCT overall (hazard ratio [HR] = 2.50, 95% confidence interval [CI] = 1.88 to 3.27) and in subgroups with breast (HR = 5.68, 95% CI = 3.22 to 10.04), lung (HR = 2.17, 95% CI = 1.42 to 3.32), and colorectal cancer (HR = 4.57, 95% CI = 1.66 to 12.61). Although rare, AM utilization for curable cancer without any CCT is associated with greater risk of death.

Strategies to Combat Misinformation

- None would meet GRADE criteria for high quality
- Primarily based on
 - Observational studies
 - Expert consensus
- A challenge not just for health, but for democracy

Why It's So Hard to Combat

- Defining fact vs. falsehood is imperfect, since some scientific “facts” are later proven “false”
- Fact checking does not reach everyone exposed to misinformation
- Getting people to believe fact checks is challenging
- Effective interventions hard to scale across large, diverse populations
- Testing effectiveness complicated

Science-Based Information

- Use techniques discussed in previous lecture
- Stick to facts, while acknowledging uncertainty
- Provide context
- Reduce cognitive burden
- Use credible messengers
- Tell stories to add emotion to facts

“Truth” Sandwich

- Coined by linguist George Lakoff
- More of a “lie” sandwich with the truth as the bread and the lie as the filling in between
- Start with truth. The first frame gets the advantage.
- Indicate the lie. Avoid amplifying the specific language if possible.
- Return to truth. Always repeat truths more than lies.

Health Literacy and Inoculation

- Science education
- Teach people to recognize misinformation tactics
 - Excessively emotional language
 - Incoherence
 - False dichotomies
 - Scapegoating
 - *ad hominem* attacks

PSYCHOLOGICAL SCIENCE

Psychological inoculation improves resilience against misinformation on social media

Jon Roozenbeek^{1*}, Sander van der Linden¹, Beth Goldberg², Steve Rathje¹, Stephan Lewandowsky^{3,4}

Online misinformation continues to have adverse consequences for society. Inoculation theory has been put forward as a way to reduce susceptibility to misinformation by informing people about how they might be misinformed, but its scalability has been elusive both at a theoretical level and a practical level. We developed five short videos that inoculate people against manipulation techniques commonly used in misinformation: emotionally manipulative language, incoherence, false dichotomies, scapegoating, and ad hominem attacks. In seven preregistered studies, i.e., six randomized controlled studies ($n = 6464$) and an ecologically valid field study on YouTube ($n = 22,632$), we find that these videos improve manipulation technique recognition, boost confidence in spotting these techniques, increase people's ability to discern trustworthy from untrustworthy content, and improve the quality of their sharing decisions. These effects are robust across the political spectrum and a wide variety of covariates. We show that psychological inoculation campaigns on social media are effective at improving misinformation resilience at scale.

Community Engagement

- Trusted messengers
 - Hyperlocal
 - Identify culturally, linguistically, ethnically
- Must have a history with the community, rather than new to them

Counter-Arguments

- Is it *legal* for government to combat misinformation?
- Is it *ethical* for government to combat misinformation?

Certainly, allowing the government to police false claims has real risks. Although some claims are demonstrably false, others are less so, and regulators may err in distinguishing among them. Especially in the scientific realm, the knowledge that makes statements demonstrably true or false evolves. In addition, some people who disseminate false statements know they are lies, whereas others believe they are true. Thus, there is a risk of suppressing speech that ultimately proves to be truthful, and of chilling discourse by making people worry about whether they can back up their claims.

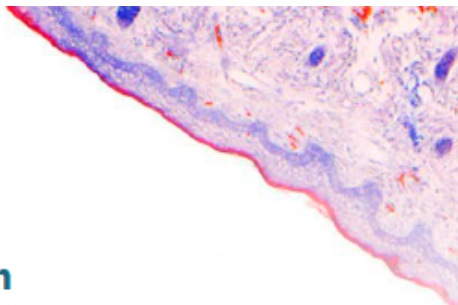
But these problems also apply to areas where courts allow regulation of false statements. Lawmakers have found ways of addressing them, such as by requiring the government to prove certain things about the statement or the speaker's state of mind. These measures could also be applied to vaccine misinformation.

<https://jamanetwork.com/journals/jama-health-forum/fullarticle/2790169>

If courts are concerned about disruption of government processes and tangible harm to individuals, they should recognize that vaccine misinformation causes both. Furthermore, if courts allow the government to restrict false speech to prevent economic harms such as being defrauded, should they not also allow speech restrictions to prevent loss of life? If officials may ban false advertising to prevent people from ingesting unsafe, unproven treatments, why can they not also ban false statements to prevent people from forgoing safe, proven vaccines?

At a minimum, courts ought to permit prohibitions on false information disseminated with reckless disregard for its falsity that materially influences people's vaccination decisions. And yet, the current Supreme Court is unlikely to do so. The risks associated with allowing the government to suppress information about a contested scientific issue would be considered too great.

<https://jamanetwork.com/journals/jama-health-forum/fullarticle/2790169>



VIEWPOINT: PEER-REVIEWED ARTICLE

Science and Ethics of “Curing” Misinformation

Isabelle Freiling, PhD, Nicole M. Krause, MA, and Dietram A. Scheufele, PhD

Abstract

A growing chorus of academicians, public health officials, and other science communicators have warned of what they see as an ill-informed public making poor personal or electoral decisions. Misinformation is often seen as an urgent new problem, so some members of these communities have pushed for quick but untested solutions without carefully diagnosing ethical pitfalls of rushed interventions. This article argues that attempts to “cure” public opinion that are inconsistent with best available social science evidence not only leave the scientific community vulnerable to long-term reputational damage but also raise significant ethical questions. It also suggests strategies for communicating science and health information equitably, effectively, and ethically to audiences affected by it without undermining affected audiences’ agency over what to do with it.

Why Not Combat Misinformation

- Complex problem with no high quality studies proving benefit
- Scientists cannot just "stick to the facts," since the choice of which facts to present involves judgement
- Scientists often wade into questions of policy, rather than just technical merit

Why Not Combat Misinformation

- “Inoculation” techniques ethically questionable
- Derived from wartime propaganda methods
- Population has not consented to inoculation
- Will undermine credibility of scientists if public believes
 - It is being manipulated
 - Scientists are silencing dissenting voices