

How Covid-19 spreads: narratives, counter-narratives and social dramas

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Abstract

This paper offers a critique of UK government policy based on mode of transmission of SARS-CoV-2 (which in turn followed misleading advice from the World Health Organisation) through the lens of policymaking as narrative. Two flawed narratives—“Covid is droplet- not airborne-spread” and “Covid is situationally airborne” (that is, airborne transmission is unusual but may occur during aerosol-generating medical procedures and severe indoor crowding)—quickly became dominant despite no evidence to support them. Two important counter-narratives—“Covid is unequivocally airborne” and “Everyone generates aerosols; everyone is vulnerable”—were sidelined despite strong evidence to support them. Tragic consequences of the flawed policy narrative unfolded as social dramas. For example, droplet precautions became ritualised; care home residents died in their thousands; public masking became a libertarian lightning rod; and healthcare settings became occupational health battlegrounds. In a discussion, we call for bold action to ensure that the science of SARS-CoV-2 transmission is freed from the shackles of historical errors, scientific vested interests, ideological manipulation and policy satisfying.

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Policymaking as narrative

Policymaking is a contact sport involving competing narratives (about problems, how they arose, and how they will be resolved), institutions (especially government and its bureaucratic machinery) and interests (financial, political, ideological).^{1 2} Policy may—ideally—“follow science” but a key question is *whos* science and why? Science shapes policy narratives via an “inside track” (e.g. official advisory committees) and to a lesser extent by an “outside track” (e.g. less mainstream scientists, citizen movements).³

Pandemic policymaking has been characterised not by clearly-identified knowledge gaps which science obligingly fills but by toxic clashes between competing scientific and moral narratives. Policymakers have risked losing control of the “dramaturgy of political communication” (page 78⁴).

Getting the mode of transmission for a contagious disease right matters, because preventive strategies follow (Table 1).⁵ Being honest about scientific uncertainty also matters, because—among other reasons—it is hard to back-track after declaring a policy “evidence-based”.

Table 1: Droplet versus airborne transmission: implications for public health and healthcare worker protection

1a. Droplet transmission

If an infectious pathogen spreads predominantly through large respiratory droplets that fall quickly, the most important public health measures are to prevent exposure to the pathogen by wearing masks and avoiding close contact with infected individuals.

In this paper, we contrast inside-track narratives of SARS-CoV-2 transmission from the World Health Organisation, UK government and their official scientific advisers with outside-track counter-narratives offered by aerosol scientists. We examine related events that unfolded as social dramas⁶—hand-cleansing rituals, care home deaths, public masking and occupational health and safety.

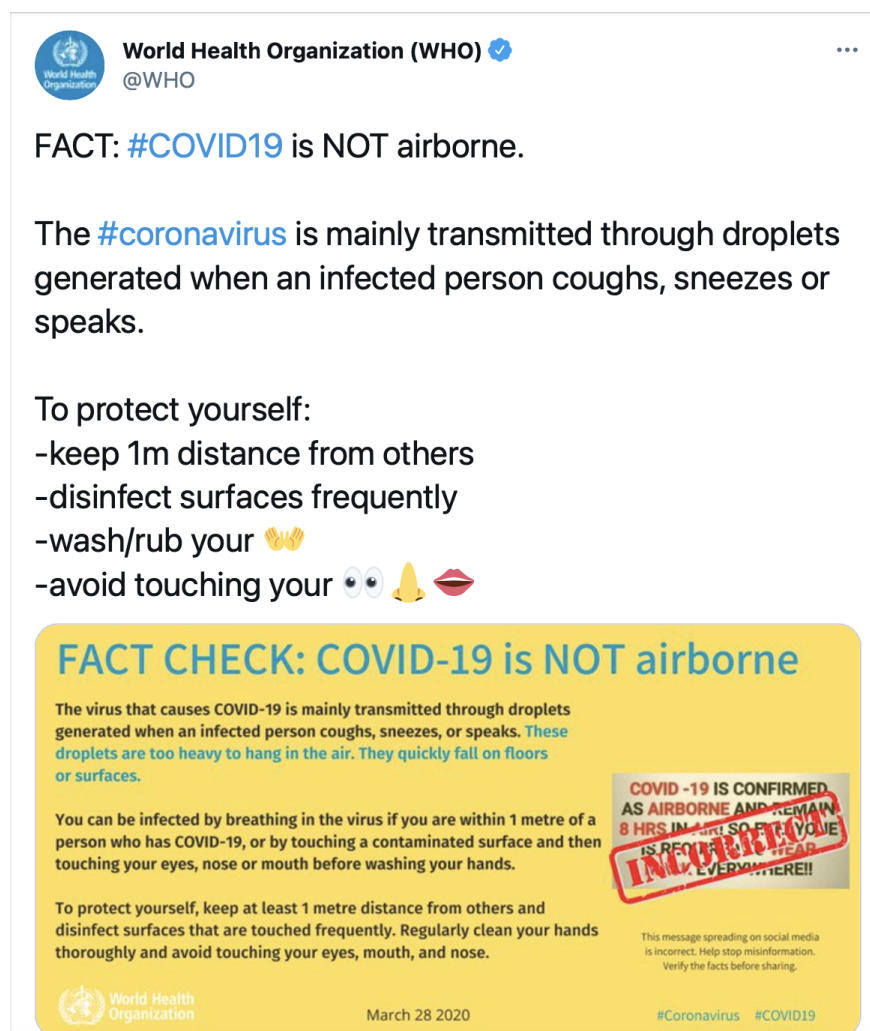
Narratives and counter-narratives

“Covid is droplet-, not airborne-, spread”

On 11th February 2020, the World Health Organisation’s Director-General announced that “corona[virus-19] is airborne”.⁷ After a prompt, he corrected himself and declared firmly that the virus was not airborne but transmitted by droplets (e.g. via coughs, sneezes and contaminated objects). The World Health Organisation has long considered airborne diseases to be potential bioterrorist threats⁸ (Dr Adnahom apologised for using “the military word”), and there was a dire international shortage of respirator-grade personal protective equipment.⁹

The World Health Organisation’s early public information campaign promoted droplet measures—handwashing, respiratory hygiene and disinfection of surfaces and objects (Table 1, column a). It also reassured the public that the virus was not airborne (Figure 1).¹⁰ Droplet transmission was assumed rather than scientifically substantiated,^{11 12} mainly because infection prevention and control clinicians—whose day jobs included enforcing droplet controls in hospitals, especially by promoting handwashing—predominated in key committees.¹³

Figure 1: ‘Covid is not airborne’ tweet from World Health Organisation, 28th March 2020



The UK government’s narrative reproduced the World Health Organisation’s (Box 1). It did not reflect nuanced discussions in the Scientific Advisory Group on Emergencies (SAGE), some of whose members had published concerns that respiratory viruses in general¹⁴ and coronaviruses in particular¹⁵ may be airborne and had raised the possibility of other transmission routes on 18th February 2020.¹⁶ Rather, it reflected advice from a small group of infection prevention and control experts (known as the “IPC Cell”) from Public Health England, Public Health Wales, NHS Scotland and Public Health Agency Northern Ireland (see Appendix on bmj.com). Like their World Health Organisation counterparts, these clinicians adhered to a droplet-but-not-airborne narrative.¹⁷ An inquiry criticised the UK government for modelling its pandemic response on an influenza scenario and assuming—wrongly, it turned out¹⁸—that influenza was transmitted via droplets not aerosols (page 19¹⁹).

Box 1: Early announcements about preventing transmission of SARS-CoV-2 from UK and Japan

Public Health England (posted 3rd March 2020, updated 30th March 2020, withdrawn 1st May 2020)²⁰

“There are general principles you can follow to help prevent the spread of respiratory viruses, including:

- *washing your hands more often - with soap and water for at least 20 seconds or use a hand sanitiser when you get home or into work, when you blow your nose, sneeze or cough, eat or handle food*
- *avoid touching your eyes, nose, and mouth with unwashed hands*
- *avoid close contact with people who have symptoms*
- *cover your cough or sneeze with a tissue, then throw the tissue in a bin and wash your hands*
- *clean and disinfect frequently touched objects and surfaces in the home”*

This narrative assumes a droplet mode of transmission and implies a high level of certainty.

Japanese Prime Minister’s office, 9th March 2020²¹

“What we ask of you

The locations where mass infections were confirmed so far are places where the following three conditions were met simultaneously: (1) closed space with poor ventilation, (2) crowded with many people and (3) conversations and vocalization in close proximity (within arm’s reach of one another). It is believed that more people were infected in such places. Therefore, we ask that you predict locations and settings where these three conditions could occur simultaneously and avoid them.

We do not have enough scientific evidence yet on how significantly such actions can reduce the risk of spreading infection. However, since places with poor ventilation and crowded places are increasing infections, we ask that you take precautions even before scientific evidence for clear standards is found.” (page 2)

This narrative assumes the *possibility* of airborne transmission and asks citizens to share the uncertainty and act in a precautionary way.

The droplet-but-not-airborne narrative emphasised randomised control trial evidence (see appendix on bmj.com);²² it drew implicitly on the *hierarchy of evidence* —a formalisation of the assumed superiority of randomised trials,²³ which “... typically serve[s] the needs and realities of clinical medicine, but not necessarily public policy” (page 665).²⁴ It did not acknowledge the *hierarchy of controls* —a more public health-oriented framework which favours system-level interventions aimed at pathogen elimination, followed by environmental controls aimed at making air and water safe, and both of these over interventions to influence human behaviour.⁵ Since randomised trials are not considered appropriate in the science of building design and ventilation,²⁵ this mindset led policymakers to reject a wealth of wider evidence which we discuss in the next section.

“Covid is unequivocally airborne”

Aerosol scientists study how fluids and particles travel in the air. Some had specialised in how respiratory pathogens—including tuberculosis, influenza and other coronaviruses such as SARS and MERS—travel. They had shown, using laboratory studies, real-world case studies and computer modelling, that these

pathogens are transmitted by aerosols and require airborne mitigation measures (Table 1, column b),^{26 27} and that coughs and sneezes generate turbulent gas clouds different-sized particles which can travel long distances.^{28 29}

From early 2020, evidence accumulated from a range of study designs to support the hypothesis that, like most other respiratory pathogens—and perhaps more so than other coronaviruses—SARS-CoV-2 is transmitted through the air (Box 2).^{18 30-32}

Box 2: 10 streams of evidence in support of airborne transmission of SARS-CoV-2

Summarised from various sources^{18 30-32}

1. Superspreading events: the virus is often transmitted at mass events from one or a few people to many people.^{33 34}
2. Long-range transmission: the virus spreads in shared air among people who have never physically met or touched any common surface.³⁵
3. Asymptomatic and presymptomatic transmission: a high proportion of people who pass on the virus have no symptoms at the time.³⁶⁻³⁸
4. Indoor dominance: transmission is many times greater indoors than outdoors,³⁹ and ventilation reduces transmission.⁴⁰
5. Nosocomial infections occur despite strict contact-and-droplet precautions, and reduce when airborne precautions are added.⁴¹
6. Whilst SARS-CoV-2 is difficult to isolate from air,⁴² viable SARS-CoV-2 has been detected in the laboratory⁴³ and in real-world settings where infected people had been.^{44 45}
7. SARS-CoV-2 has been detected in air filters in building ducts (could only have got there via airborne route).⁴⁶
8. Transmission between animals has occurred when their cages were connected via air ducts.⁴⁷
9. The virus exhibits overdispersion (one person with Covid-19 may infect no-one; another may infect dozens).⁴⁸
10. Empirical evidence supporting droplet or fomite transmission is surprisingly sparse.^{11 12}

Countries such as Japan,²¹ where aerosol scientists were part of the inside track with the ear of government,¹³ had introduced airborne precautions early in the pandemic (Box 1). But in most Western countries, the aerosol narrative—at least initially—fell on deaf policy ears.

By July 2020, aerosol scientists were alarmed that official advice was based on over-simplistic and incorrect models of transmission (which had perpetuated for decades in the infection control literature⁴⁹), and wrote an open letter to the World Health Organisation offering to help.⁴⁰

“Covid is ‘situationally’ airborne”

The World Health Organisation’s early guidance on protecting healthcare workers from Covid-19 recommended a standard level of protection for most activities but a higher level for so-called “aerosol-generating” ones,⁵⁰ reflecting a long-established (but perhaps flawed) research tradition.⁵¹ Its Infection Prevention and Control Research and Development Expert Group for COVID-19 (IPCRDEG-C19) did not include any aerosol scientists and did not welcome the open offer of help. A new scientific brief was quickly published, reiterating the dominance of droplet transmission in most circumstances but acknowledging airborne transmission in certain situations—aerosol-generating medical procedures and crowded, poorly-ventilated indoor settings.⁵²

This “situationally airborne” narrative has persisted despite evidence against it (next section), and has far-reaching implications. If aerosols transmit only when certain procedures are being performed, only a small fraction of healthcare staff need higher-grade protection, and only when performing particular procedures. If that assumption is incorrect, staff (especially non-medical and less senior ones) and patients in most healthcare facilities are under-protected.⁵³

“Everyone generates aerosols; everyone is vulnerable”

A systematic review revealed wide disagreement among guideline panels about which procedures and activities should count as “aerosol generating” (and hence earn respirator-grade protection for the person doing them).⁵⁴ Many procedures (e.g. taking a nasopharyngeal swab) were inconsistently classified, some aerosol-generating acts (e.g. coughing) were not procedures, and several procedures were classified as aerosol-generating only because they induced coughing.⁵⁴

A detailed review of the physiology and aerodynamics of respiratory acts concluded that coughing, sneezing, breathing (especially if laboured), speaking (especially loudly) and singing generated significant amounts of aerosol; well-documented super-spreader events for Covid-19 involved a critical triad of poor ventilation, crowding and loud vocalisation.³⁴

These findings raise some paradigm-challenging questions. Should respirator-grade protection be worn by everyone—including other patients—*whenever patients are coughing* ? Should more attention be paid to measures higher up the hierarchy of controls, such as ventilation or filtration of air, or ensuring that fewer people share air and for shorter periods⁵?

In the sections which follow, we consider some dramatic consequences of the government’s decision to deny, dismiss or downplay the importance of airborne transmission of SARS-CoV-2.

Social dramas

Droplet precautions became ritualised

The official droplet-but-not-airborne narrative materialised as artefacts (e.g. posters, disinfectant dispensers, 2-metre distancing markers) and social practices (actions accepted and expected in particular contexts).⁵⁵ Droplet-directed practices became ubiquitous among individuals, who washed hands and forearms assiduously for 20 seconds, quarantined and disinfected their post, and stayed a measured distance apart, and also in institutions, who installed and policed the various artefacts and practices.

These rituals of purification⁵⁶ powerfully reinforced the official narrative. “Clean” and “contaminated” came to be demarcated in terms of how recently and thoroughly hands had been sanitised and how far a droplet was assumed to travel (Table 1, column a). They also served to downplay or obscure the narrative of aerosol transmission—which demarcated “clean” and “contaminated” in terms of air purity, with practices oriented to controlling indoor crowding and time spent indoors, ventilating or filtering air, and optimising quality and fit of masks (Table 1, column b). These material and enacted features of policy discourse served to further silence the “Covid-is-airborne” narrative.

Care home residents died in their thousands

On 23rd March 2020, with up to 500,000 deaths and an overwhelmed National Health Service predicted,⁵⁷ the UK Prime Minister announced a national lockdown (“stay at home”, “protect the NHS”). Hospitals had switched into urgent discharge mode from 19th March, sending patients back to care homes without routine pre-discharge testing. Between March and June 2020, 18,104 deaths involving Covid-19 and 11,169 additional deaths above the 5-year UK average occurred in care home residents.⁵⁸

Amnesty International depicted the UK's care home crisis as a gross breach of human rights in which thousands of vulnerable people had been treated as expendable.⁵⁹ The crisis was also largely avoidable. Public Health England's guidance for care homes had emphasised a situationally-airborne narrative.⁶⁰ Since aerosol-generating procedures were rarely undertaken in care homes, these settings had been considered low priority for personal protective equipment.

Under-emphasis of the importance of ventilation and no routine use of masks are likely to have greatly amplified transmission between infectious residents and care home staff. In Hong Kong, by contrast, surgical masks were mandated for all care home staff by late January 2020 and no excess care home deaths occurred in wave 1.⁶¹

Public masking became a libertarian lightning rod

Libertarianism is a political ideology which favours individual choice, freedom and a retreat from state and institutional control.⁶² Libertarians resist imposed rules and like to “do their own research” rather than trust scientists or government. Uncertainty and conflict about the value and place of public masking allowed libertarian messages and practices to flourish.

At its 4th February 2020 meeting, the Scientific Advisory Group on Emergencies advised masks for symptomatic Covid-19 patients to reduce transmission “if tolerated”.⁶³ This group had acknowledged the potential for asymptomatic transmission of SARS-CoV-2 on 28th January 2020,⁶⁴ but did not make the logical leap to recommend masking asymptomatic people as source control. Indeed, in official meetings between January and April 2020, either public masking was not mentioned or arguments against it—lack of efficacy, harm, wastage—were tabled (see Appendix on bmj.com). Public announcements⁶⁵ and professional videos⁶⁶ issued by Public Health England between February and June 2020 presented masking as ineffective and potentially harmful, on the grounds that people might take compensatory risks or self-contaminate when they put on or removed their mask (the “donning” and “doffing” of infection control jargon⁶⁶). They provided no evidence to support these claims.

The contested efficacy of facemasks in controlling SARS-CoV-2 transmission can be explained in terms of how much of the evidence base one is prepared to consider.⁶⁷ An influential inside-track narrative appeared to conflate absence of relevant randomised controlled trial evidence with evidence that masking was ineffective.²² Outside-track scientists argued for the precautionary principle, on the grounds that there was—as early as March 2020—indirect and mechanistic evidence (notably, around asymptomatic transmission) and strong theoretical arguments for public masking, and huge potential risks associated with delay.^{68 69}

Mask mandates were finally introduced in England on 15th June 2020 (public transport) and 24th July 2020 (all public places). By that time, public opinion was polarised and many believed it was an ineffective measure.^{70 71} Whereas most Asian countries had high public compliance with early masking policies and extremely low death rates, many Western countries introduced masking late and had many more deaths, though causal links are complex and confounders many.⁷²

Masking policies in UK, as in US, met with a strong libertarian backlash aligned with populist political leaders, right-wing Christianity, anti-authoritarian social media groups and—latterly—anti-vaccination groups.⁷³⁻⁷⁶ In this context, masks came to symbolise pointless restriction of individual freedom, mindless compliance with authoritarian governments, and even blasphemy.⁷⁷

Healthcare settings became occupational health battlegrounds

As a novel respiratory pathogen, SARS-CoV-2 was initially classified as a High Consequence Infectious Disease (HCID) by the Four Nations Public Health Agencies.⁷⁸ Consequently, staff caring for suspected or confirmed Covid-19 patients required filtering facepiece [FFP3] respirators or equivalent.⁷⁹ This reflected guidance from the UK Health Security Agency (previously Public Health England) and Health and Safety Executive on other coronaviruses^{80 81} and avian influenza,⁸² and legal requirements for employers to protect

their workers against airborne biohazards.⁸³ The Health and Safety Executive had concluded in 2008 that surgical masks “*should not be used in situations where close exposure to infectious aerosols is likely*”.⁸⁴

However, minutes from the New and Emerging Respiratory Virus Threats Advisory Group in March 2020 reflect growing concern about shortages of respirators and the Department of Health and Social Care’s request for “adapted” guidance that recommended surgical masks in most circumstances.⁸⁵ The Deputy Chief Medical Officer agreed to meet with the Chair of the Advisory Committee on Dangerous Pathogens,⁸⁵ whose members: “were unanimous in supporting the declassification of COVID-19 as a HCID” (paragraph 2.11).⁸⁵

A letter to UK healthcare organisations dated 28th March 2020, sent jointly from NHS England and NHS Improvement, Public Health England and the Academy of Medical Royal Colleges, affirmed that because of rising Covid-19 cases and because “more was understood about the behaviour of the virus and its clinical outcomes” (i.e. in view of the assumed droplet-but-not-airborne narrative),⁸⁶ respirator-grade protection would now be restricted to aerosol-generating procedures.⁸⁶

The number of UK health and care workers infected with SARS-CoV-2 at work is not officially documented. Press reports claim that by mid 2021, around 1500 had died of Covid-19⁸⁷ and 120,000 had developed long covid (some of whom remained on long-term sick leave).⁸⁸ In April 2020, excess deaths were noted amongst healthcare staff (especially men and minority ethnic groups) working outside intensive care units,⁸⁹ and this impression was confirmed in subsequent academic publications.^{90 91} In early 2021, the British Medical Association⁹² and the Royal College of Nursing^{93 94} demanded respirator-grade protection for all staff working with Covid-19 patients.

The latest guidance from the UK Health Security Agency continues to promote a situationally-airborne narrative and restrict respirator use to aerosol-generating procedures.⁹⁵ Its guidance cites contradictory sources— from the World Health Organisation (which reserves respirator-grade protection for aerosol-generating procedures),⁵² and US Centers for Disease Control and Prevention (which recommends respirator-grade protection during all Covid-19 patient care).⁹⁶ There remains wide variation in infection control policies in different NHS trusts (perhaps because some interpret the guidance as mandatory); those which provide respirator-grade protection appear to have significantly lower nosocomial infection rates for Covid-19.⁹⁷

Discussion

At the root of the UK’s limited success in controlling transmission of SARS-CoV-2 lay flawed droplet-but-not-airborne and situationally-airborne narratives. By presenting elements of the pandemic as social dramas, we have argued that these narratives, and the false certainty with which they were conveyed, produced ineffective public health measures, contributed to shocking levels of care home deaths, exacerbated toxic discourse on masking, and justified withholding adequate protection from healthcare staff (especially less senior doctors and non-medical personnel).

Why did the flawed narratives prevail? One explanation is psychological. Individuals are unlikely to change their beliefs in light of complex and contravening evidence, because this requires effort and presents an aversive state for most people.⁹⁸ Policymakers are known to exhibit *satisficing*— that is, narrowing the parameters within which their decisions must make sense and be accountable, especially when threats are complex and urgent.⁹⁹

Another explanation is scientific elitism. Scientists in infection control have amassed considerable scientific capital (i.e. influence, status, accolades); their favoured methods (randomised controlled trials) are greatly valued; and they have much to lose if they discard their long-held droplet narrative and concede the importance of other kinds of evidence.¹³ The inside track for pandemic policymaking in the UK and World Health Organisation was narrow and partisan, enabling an unusual degree of symbolic violence¹⁰⁰ to be wielded

against outside-track scientific voices and precluding the kind of interdisciplinary deliberation that might have allowed a full and fair consideration of important competing narratives.^{13 101 102}

There are also political explanations. Droplet precautions are, by and large, under the control of individuals and hence resonate with neoliberal and libertarian discourses about individual freedom, personal responsibility and restraint of the state. Airborne precautions require strategic actions from those responsible for public safety, aligning with a more socialist-leaning political discourse.²⁵ The World Health Organisation’s tweet (Figure 1) emphasises how to protect *yourself* rather than what to expect of your employer, your child’s school or your government.

Finally, there is populism, whose modus operandi is cherry-picking evidence that supports the policy drive and valorises anti-science sentiment under the guise of bringing power to people.⁷⁶ Populism drew on public desires to return to normalcy and further marginalised aerosol science by depicting its recommended measures²⁵ as obscure, unaffordable and an enemy of the public interest.

The narratives and dramas presented in this paper are not exhaustive. The framing of protection as a matter of individual responsibility, for example, also accommodates the current political narrative of “learning to live with Covid-19”,¹⁰³ in which good citizens stoically accept the endemicity of a—hopefully attenuating—virus in exchange for greater individual freedoms.

The Covid-19 pandemic can be framed as what Marcel Mauss calls a “total social fact”,¹⁰⁴ a phenomenon which affects all domains and layers of society (economic, legal, political, religious) and requires us to draw evidence from across multiple scientific and other sub-fields.¹⁰⁵ In such circumstances, the combination of policymakers’ cognitive biases and satisficing behaviour, scientists’ desire to protect their interests, and politicians’ alignment with individualist values and populist sentiment proved perilous.

As we approach the second anniversary of the UK’s first case of Covid-19, airborne transmission of SARS-CoV-2 and the mitigations needed to address it (column b in Table 1) remain misunderstood and under-recognised. Extraordinarily, a recent UK inquiry into errors made in the pandemic did not mention masks or ventilation at all.¹⁹

Bold action is now needed to ensure that the science of SARS-CoV-2 transmission is freed from the shackles of historical errors, scientific vested interests, ideological manipulation and policy satisficing. Policymakers should actively seek to broaden the scientific inside track to support interdisciplinarity and pluralism as a route to better policies, greater accountability and a reduction in the huge inequities that the pandemic has generated.

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