No 468 / December 2021

Facts & Findings

KONRAD ADENAUER STIFTUNG

# Science advice to government in the United Kingdom

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- The United Kingdom has a well-established system for providing science advice to government. These structures and functions have performed well in many past crises.
- The Government Chief Scientific Adviser plays a central role. He or she coordinates the groups that provide scientific advice to government, has direct access to ministers, and takes the lead in communicating science advice to the public. The Chief Medical Officer performs a similar role on public health issues.
- During the Covid-19 pandemic, the science advisory system was adapted to new challenges. Despite weaknesses in the overall UK response, the science advice system broadly worked well in the pandemic. Therefore, the question arises to what extent it could be a model for scientific policy advice in Germany.

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## The Government Chief Science Advisor and the UK's science advice model

Government Chief Scientific Adviser

The UK's model is relatively unusual in organising its system of science advice around a prominent figurehead, the Government Chief Scientific Adviser (GCSA).[1]

The first cross-departmental GCSA was appointed in 1964, but independent scientists have advised individual departments since the 1920s. The GCSA role in the UK system is a demanding and multifaceted one. He or she is responsible for providing independent advice to the prime minister and cabinet on scientific issues (on public health matters, this function is shared with the chief medical officer, discussed below). The GCSA also has an important executive function as head of the science profession within the civil service, responsible for the effective use of science across government and determining future research funding priorities. The GCSA co-chairs the Council for Science and Technology, a high-powered group of eminent academics and science executives which provides cross-cutting advice to the Prime Minister.[2]

The personality of the GCSA and their relationship with the prime minister play an important role in shaping how science advice is provided to government. Different GCSAs have interpreted the role in different ways, with some putting more emphasis on their status as an independent adviser, rather than close confidant of the prime minister.

Outside of emergencies, the UK government's system of science advice is built around two structures, both overseen by the GCSA: the network of chief scientific advisers, which supports departmental operations, and the Government Office for Science (GO-Science), which delivers strategic insight.

Network of chief scientific advisers

There are 24 chief scientific advisers (CSAs) in the network, representing all UK ministries, other government agencies, and the devolved administrations. The network holds weekly meetings chaired by the GCSA to discuss departmental science priorities and relevant policy topics. Research by the Institute for Government has found that the influence of CSAs within their departments is variable.[3] Some have large teams and substantial resources, such as in the Department of Environment, Food and Rural Affairs; others work only part time as scientific advisers, with limited support.

GO-Science is a semi-autonomous office within the Department for Business, Energy and Industrial Strategy (BEIS). It provides scientific advice to ministers and houses Foresight project teams, which conduct horizon-scanning research on strategic issues and policy challenges. One of the main goals of the Foresight projects is to identify medium and long-term risks and ensure appropriate contingency planning is in place.[4]

Government Office for Science

GO-Science Foresight projects, alongside contributions from the GCSA and the network of departmental chief scientific officers, are used in the preparation of the National Risk Register, and its classified version, the National Risk Assessment, which provide an overview of the biggest threats facing the UK and "reasonable worst-case scenarios."[5]

The GCSA also has an important role in advising on priorities for research funding. This part of the GCSA's portfolio was expanded further in June 2021 when he was appointed National Technology Adviser, tasked with supporting the National Science and Technology Council (NSTC), chaired by the prime minister. The aim of the NSTC is to improve government insight into cutting-edge technology, so it can identify what is needed to develop the UK's science and technology capability.[6]

## The Chief Medical Officer

Chief Medical Officer

The Chief Medical Officer (CMO) is the key adviser to the government on matters of public health.[7] The position was created by an act of parliament in 1855. Like the GCSA, the CMO must balance a dual role as senior government adviser and independent expert and public health advocate. But the CMO does not have executive responsibilities analogous to the GCSA; he or she does not typically oversee public medical research (although he or she will advise on research spending by the Department of Health) or the operation of the National Health Service.

The CMO's role as the 'nation's doctor' means he or she will tend to make regular interventions in the media on public health issues. The CMO has a statutory duty to produce an annual report on the state of public health and to support work to improve public health across England. The annual report provides a survey of public health as well as detailed analysis of one or more specific public health issues, where the CMO believes policy intervention is required. The CMO may publish additional independent reports on public health issues. These often include policy recommendations and can be critical of the current government policy. For instance, Dame Sally Davies, the predecessor of current CMO Professor Chris Whitty, used a 2019 report to criticise a lack of government action on obesity.[8]

The devolved administrations in Scotland, Wales and Northern Ireland have their own CSAs and chief medical officers, reflecting the fact that health is a devolved competency in all four nations. Within the UK government, the CMO is supported by three deputy chief medical officers.

## Science advice in an emergency

Scientific Advisory Group for Emergencies

When the government requires science advice to respond to an emergency, the Civil Contingencies Committee will activate the Scientific Advisory Group for Emergencies (SAGE).[9] SAGE is a group of independent scientists, government scientists and other civil servants. It is responsible for integrating research and analysis from across government, academia and industry to provide a consensus view to ministers on the science behind emergencies. It is not a standing committee, and its membership varies depending on the nature of the emergency and the type of expertise required.

The GCSA is the chair of SAGE (in a health emergency this role is shared with the chief medical officer) and takes a lead role in selecting its membership. The guidelines for operating SAGE state that it should not duplicate other advisory groups; should include repre-

sentatives from a wide range of relevant disciplines; and, should avoid overly relying on too narrow a group of experts.[10]

Civil Contingencies Secretariat

SAGE is supported by officials drawn from the Civil Contingencies Secretariat (CCS), who take minutes of meetings, and coordinate and filter questions to the scientific group from across government. The SAGE secretariat also plays an important role in converting the papers and advice reviewed by SAGE into briefs for ministers. Outside of crises, the CCS has a standing role to plan for possible emergencies, review contingency preparedness and maintain resilience.

Subcommittees

Where appropriate, the GCSA can establish subcommittees, composed largely or exclusively of independent experts, to feed in research on specific themes to SAGE. In the coronavirus pandemic, SAGE has drawn on a range of specialist subcommittees, including on epidemiological modelling (the Scientific Pandemic Influenza-Modelling, SPI-M) and behavioural science (the Scientific Pandemic Influenza Group on Behaviours, SPI-B).

Key channels

The GCSA (and CMO, in a health emergency) take a leading role in delivering the consensus view from SAGE to the prime minister and the Civil Contingencies Committee, meaning that they are among the key channels through which science advice is communicated to the government. The GCSA and CMO are also the only officials who can speak publicly on behalf of SAGE. Independent members of the scientific group are permitted to give media interviews but cannot speak on behalf of the expert group or the government.

The GCSA and the CMO (in a health emergency) are therefore the key channels through which science advice is synthesised and delivered to the prime minister and cabinet. The GCSA and CMO also play a leading role in communicating the science advice underpinning the government's emergency response to the public.

## Changes to science structures in the Covid-19 crisis

The GCSA and CMO are long-standing features of the UK science advice system, but the structures they oversee continue to evolve, particularly in response to crises.

Evolving structures

SAGE was conceived as an *ad hoc* group to provide advice in the early stages of a crisis. It was not foreseen that it would acquire the semi-permanent role it has played during the Covid-19 crisis.[11] As a result, SAGE adapted its operations in notable ways during the Covid-19 pandemic, reflecting the unprecedented scope, severity, and, above all, the long duration of the public health crisis. Two particularly important changes related to transparency and the size of SAGE.

Prior to the pandemic, SAGE had only published a list of its members and meeting minutes after the crisis had concluded. This policy proved unsustainable in the context of a prolonged health crisis. In May 2020, the government committed to releasing SAGE minutes, along with a list of attendees, within one month of the meeting, and earlier where possible.[12] The number of attendees at SAGE also expanded rapidly in the first four months of the pandemic, from around 20 in February 2020 to as many as 70 by June that year. This was in part to include a greater range of scientific specialisms, but it was also to accommodate many observers and officials from across government.

The size of the SAGE secretariat also grew rapidly, from five civil servants at the start of the pandemic to over 100 officials by March 2020. This surge in capacity led to an improvement in the process for commissioning science advice and submitting questions to SAGE, which

did not function well at the start of the crisis.[13] In May 2020, the government established a separate Joint Biosecurity Centre to provide real-time monitoring and analysis about infection outbreaks, allowing SAGE to focus on more strategic issues and medium-term modelling.[14]

## Potential challenges and advantages of the UK science advice framework

International prototype

The UK has been a pioneer in the development of structures to provide science advice to government. The UK's guidelines for the use of scientific and engineering advice in policy making, first published in 1997 and subsequently revised,[15] are seen as setting a blueprint for the principles of handling science advice in government.[16] The GCSA is seen as the international prototype for the position, which, while still unusual, has been adopted by more countries in recent years.[17] However, the Covid-19 pandemic has highlighted both the advantages of the UK's science advice system, and potential weaknesses of the model.

Widely known public figures

One of its most notable strengths is that the GCSA and CMO can act as a public face for the science community in a crisis. During the Covid-19 pandemic, the GCSA and CMO have become widely known public figures. At times they took part in press conferences on a near-daily basis, responding to the unprecedented public demand for reliable scientific information. They provide a clear point of public accountability and a source of regular advice and insight on the government's unfolding understanding of the virus. Outside of emergencies, the GCSA and CMO can use their public profiles to advocate for stronger government action on major policy issues, such as climate change.

High efficiency

The direct relationship between the GCSA and the prime minister provides a clear channel for science advice to be delivered to the most senior level of government. During the coronavirus pandemic, the science advice structure has worked relatively effectively at drawing in findings from a wide range of committees and synthesising this into a consensus position within SAGE, which was then delivered to the prime minister and cabinet by the GCSA and CMO. In the early stages of the crisis, however, SAGE struggled to incorporate epidemiological evidence from abroad, and was also hampered by a lack of real-time data on the extent of domestic infections.[18]

The clear line of accountability for government science advice also facilitated scrutiny. During the Covid-19 crisis, the GCSA and CMO have regularly been called to give evidence to parliamentary select committees, allowing members of parliament to interrogate the underlying science advice without being mediated by ministers.

Difficult balancing act

However, the role of GCSA and CMO involves a difficult balancing act. The GCSA and CMO are civil servants, but they have a duty to provide independent scientific advice to the government and to the public. At times this may include advice that may be politically difficult for ministers, or even undermine the case for the government's policy decisions. For example, SAGE minutes released in October 2020 revealed that the GCSA and CMO had recommended a short 'circuit breaker' lockdown in September to control case numbers. This recommendation was rejected by the government.[19]

The difficulties can be compounded by the tendency of ministers to blur the line between science advice and policy decisions. In the early stages of the Covid-19 pandemic, for example, UK ministers regularly claimed that they were 'following the science', and the GCSA and CMO held joint press conferences with ministers. Ministers had an understandable desire to reassure the public by drawing on the authority of the scientific community. But it made it

more difficult for the government's top science advisers to make statements that appeared to go against government policy and made them vulnerable to accusations that they were not sufficiently independent.

Honest broker and trusted adviser

This tension between the need to be both an 'honest broker' and 'trusted adviser' can be mitigated when there is a strong relationship between the GCSA and CMO and senior ministers, and in particular the prime minister. The prime minister needs to show that they value independent advice but take clear responsibility for their own decisions – an approach Boris Johnson, the current prime minister, has failed to take. This can make it easier for the GCSA and CMO to take an independent line without being perceived as undermining the government's crisis response. Establishing these relationships well ahead of an emergency should form part of a government's contingency planning.

Public communications

Given the critical importance of public communications in a crisis, the GCSA and CMO require support to handle the media, which are likely to focus heavily on any difference in messaging between senior advisers and ministers. The Covid-19 crisis has also underlined the importance of setting clear principles for public communications in an emergency, including mechanisms to ensure that the GCSA and CMO can maintain an independent stance (for example, guidance on whether the GCSA should address the media alongside ministers, or hold separate press conferences).

Managing prolonged crisis

The Covid-19 pandemic has also ignited a public debate about how the UK science advice system should be structured to manage a prolonged crisis involving complex policy trade-offs. As noted above, the number of experts attending SAGE rose substantially in the first months of the pandemic. However, the UK at present lacks a robust framework for integrating other forms of expertise – in particular economic analysis – with epidemiological and behavioural modelling produced by SAGE. Some experts have proposed creating a new institution to develop tools to synthesise economic and epidemiological modelling, while the Institute for Government recommended that a stronger framework is needed to bring these disciplines together at the centre of government.[20]

The UK government's response in the early stages of the pandemic, when the UK government was slow to implement 'lockdown' measures, suggests that there are not currently adequate mechanisms to challenge an emerging consensus within SAGE and the broader science advice structures. This is not a new problem – inquiries into previous crises, such as the H1N1 (Swine Flu) pandemic, have found that the science advice structures did not allow for sufficient challenge of the model results provided by public health experts.[21] One approach, suggested by the Institute for Government, is to make regular use of 'red teams' – groups of experienced former officials and scientific advisers tasked with challenging scientific research and the underlying assumptions.[22] The experience of the UK in the Covid-19 pandemic, and in earlier crises, also underlines the importance of ensuring that ministers and senior civil servants are equipped to understand and effectively interrogate the limitations of the science advice they receive from the GCSA, CMO, and other experts.[23]

## Conclusion

Strengths and weaknesses

The Covid-19 pandemic has revealed the strengths and weaknesses of the UK science advice system. The UK has performed poorly during the coronavirus crisis, suffering among the highest death tolls and one of the deepest economic contractions of any wealthy country. Analysts will be unpicking the causes of this failure for years to come. Like many nations, the UK struggled with uncertainty and a lack of information in the early stages of the pandemic. But initial assessments suggest that bad advice was not a prominent failure; poor decision making, and a wider lack of resilience in the UK state and wider population, appear more important factors in the UK's performance.[24]

The roles, processes and institutions within the UK's science advice structures were all well established at the start of the crisis. This allowed it to generate a large amount of high-quality advice very quickly. Its focus on high-profile individuals ensured expert advice remained prominent throughout the crisis, even when decision makers were less minded to follow it. However, countries looking to learn from the UK's structures should note the tension at the heart of the role of GCSA, who must deliver independent and at times difficult advice to the government, while retaining the confidence and support of senior ministers.

1 The current Government Chief Scientific Adviser is Professor Sir Patrick Vallance. He is a former president of research and development at the multinational pharmaceutical firm GlaxoSmithKline. Prior to this, he was a clinical academic and professor of medicine at University College London.

2 Wilsdon J, Allen K, Paulavets K, *Science advice to governments: diverse systems, common challenges*, Briefing Paper for the International Network for Government Science Advice 2014 Auckland Conference, retrieved 24 August 2021, https://www.ingsa.org/wp-content/uploads/2014/08/Science_Advice_to_Governments_Briefing_Paper_25-August.pdf

3 Haddon C, Sasse J, *How government can work with academia*, Institute for Government, 2018, retrieved 24 August 2021, https://www.instituteforgovernment.org.uk/publications/how-government-can-work-academia

4 House of Lords Committee on Science and Technology, The role and function of departmental Chief Scientific Advisers: Fourth report of session 2010-12 (HL 264), The Stationery Office, 2012, retrieved 24 August 2021, https://publications.parliament.uk/pa/ld201012/ldselect/ldsctech/264/264.pdf

5 The most recent National Risk Register, published in 2020, is available at: https://www.gov.uk/government/publications/national-risk-register-2020

6 https://www.gov.uk/government/news/prime-minister-sets-out-plans-to-realise-and-maximise-the-opportunities-of-scientific-and-technological-breakthroughs

7 The current Chief Medical Officer is Professor Chris Whitty. He has a background in epidemiology and was previously professor of public and international health at the London School of Hygiene and Tropical Medicine. Prior to his appointment as CMO, he was chief scientific adviser at the Department for International Development.

8 Davies S, *Time to solve childhood obesity: an independent report by the Chief Medical Officer*, Department of Health and Social Care, 2019, retrieved 24 August 2021, https://www.gov.uk/government/publications/time-to-solve-childhood-obesity-cmo-special-report

9 The Civil Contingencies Committee, known as COBR or COBRA, is convened to handle national emergencies or major disruption. It facilitates high-level co-ordination between ministers and enables rapid decision making in the initial phase of an emergency response. For more information, see: https://www.instituteforgovernment.org.uk/explainers/cobr-cobra

10 Cabinet Office, *Enhanced SAGE Guidance: A strategic framework for the Scientific Advisory Group for Emergencies (SAGE)*, The Stationery Office, 2012, retrieved 24 August 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/80087/sage-guidance.pdf

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12 Scientific Advisory Group for Emergencies, *SAGE: Coronavirus response – publication scheme*, Corporate Report, 2020, retrieved on 24 August 2021, https://www.gov.uk/government/publications/scientific-advisory-group-for-emergencies-sage-coronavirus-covid-19-response-publication-scheme/sage-coronavirus-response-publication-scheme. The one-month publication target has not always been met.

13 https://www.instituteforgovernment.org.uk/sites/default/files/publications/science-advice-crisis_0.pdf

14 Thomas A, *Joint Biosecurity Centre*, Institute for Government Explainer, 2020, retrieved on 24 August 2021, https://www.instituteforgovernment.org.uk/explainers/joint-biosecurity-centre

15 Government Office for Science, *The Government Chief Scientific Adviser's Guidelines on the Use of Scientific and Engineering Advice in Policy Making*, The Stationery Office, 2010, retrieved 24 August 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/293037/10-669-gcsa-guidelines-scientific-engineering-advice-policy-making.pdf

16 Wilsdon J, Allen K, Paulavets K, *Science advice to governments: diverse systems, common challenges*

17 OECD, *Scientific Advice for Policy Making: The Role and Responsibility of Expert Bodies and Individual Scientists*, OECD Science, Technology and Industry Policy Papers, No. 21, OECD Publishing, retrieved 24 August 2021, http://dx.doi.org/10.1787/5js33l1jcpwb-en. Canada appointed its first chief scientific adviser in 2017.

18 Farrar J and Ahuja A, *Spike: the virus vs the people – the inside story*, Profile Books, 2021.

19 Schraer R, 'Covid SAGE documents: the scientific evidence and what No 10 then did.', BBC News, 14 October 2020, retrieved 24 August 2021, https://www.bbc.co.uk/news/health-54528983

20 House of Commons Treasury Committee, *Oral evidence: economic impact of coronavirus* (HC 882), 2020, retrieved 24 August 2021, https://committees.parliament.uk/oralevidence/1098/html/; Sasse T, Haddon C and Nice A, Science advice in a crisis, Institute for Government.

21 Hine D, *An independent review of the UK response to the 2009 influenza pandemic*, The Stationery Office, 2010, retrieved 24 August 2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/61252/the2009influenzapandemic-review.pdf

22 Sasse T, Haddon C and Nice A, *Science advice in a crisis*, Institute for Government.

23 Hine D, *An independent review of the UK response to the 2009 influenza pandemic*.

24 https://www.instituteforgovernment.org.uk/sites/default/files/publications/science-advice-crisis_0.pdf

## Imprint

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**The Institute for Government** is an independent think tank based in London that works to make government more effective.

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Publisher: Konrad-Adenauer-Stiftung e. V. 2021, Berlin
Design: yellow too, Pasiek Horntrich GbR
Typesetting: Janine Höhle, Konrad-Adenauer-Stiftung e. V.
Produced with financial support from the German Federal Government.

ISBN 978-3-98574-019-2