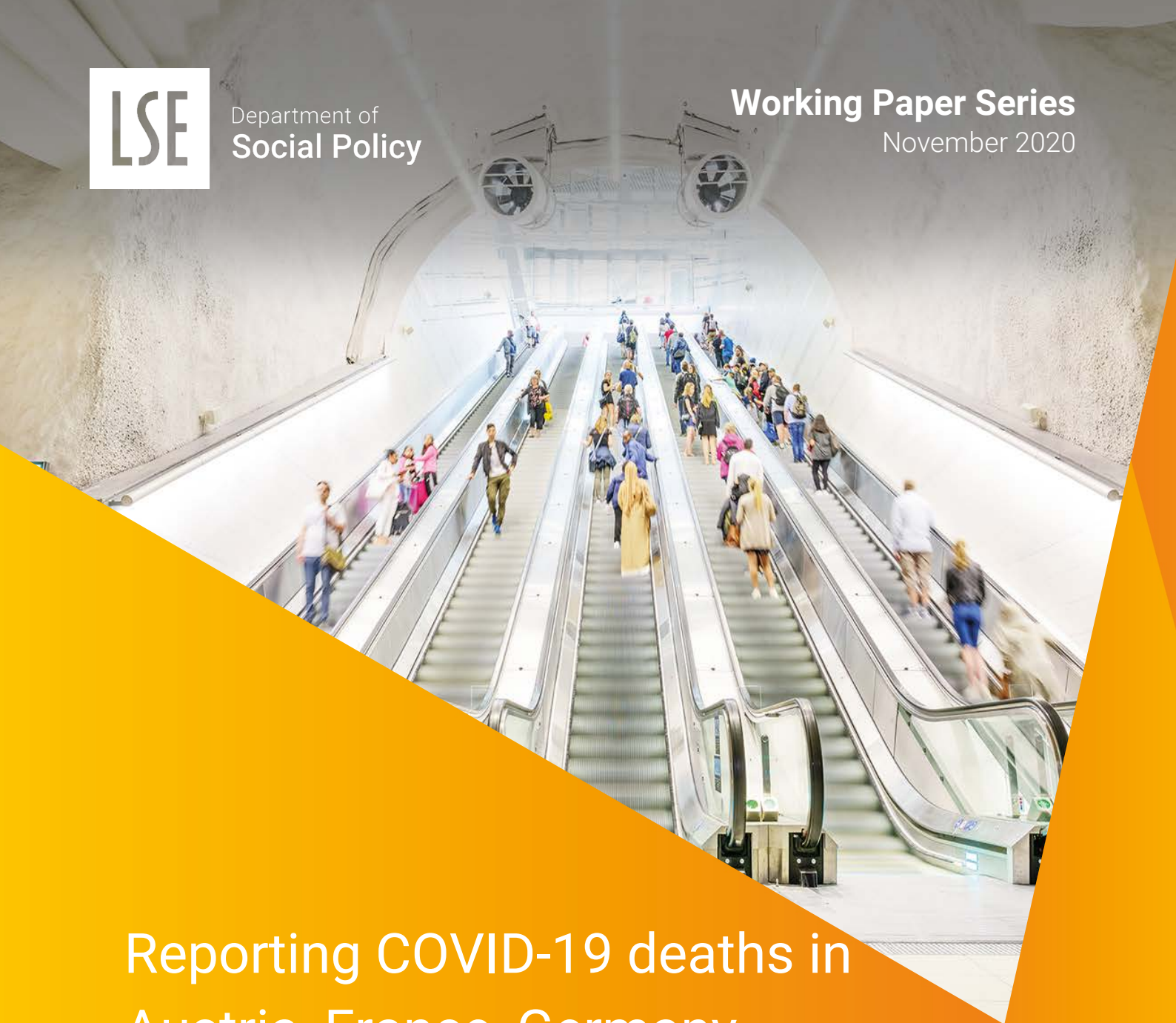




Reporting COVID-19 deaths in Austria, France, Germany, Italy, Portugal and the UK

Working Paper 10-20

**Anne West, Thomas Czepionka, Monika Steffen,
Stefanie Ettelt, Simone Ghislandi, Céu Mateus**

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Department of Social Policy
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Table of contents

Abstract	1
Acknowledgments	1
Authors	1
Introduction	2
1 COVID-19: The European context.....	3
2 Comparing national legislative provision and guidance.....	4
3 Comparing the recording of deaths and death certificates	5
4 Comparing the reporting of deaths at a national level	7
5 Limitations of comparability.....	8
6 Discussion and implications for policy.....	9
References.....	11
COVID-19 Country dashboards/overviews.....	12
Annex 1 EEA/EU and UK COVID-19 cases, deaths, incidence, testing.....	13
Annex 2 Austria Country Report: Thomas Czypionka, Isabel Pham.....	15
Annex 3 France Country Report: Monika Steffen	19
Annex 4 Germany Country Report: Stefanie Ettelt.....	26
Annex 5 Italy Country Report: Simone Ghislandi	30
Annex 6 Portugal Country Report: Céu Mateus	34
Annex 7 United Kingdom Country Report: Anne West.....	37

Abstract

The reporting of deaths associated with the SARS-CoV-2 virus has had a high policy profile during the COVID-19 pandemic. This in turn is related to how deaths are counted. In this paper we focus on six European countries: Austria, France, Germany, Italy, Portugal and the United Kingdom and seek to address the following research questions: How do countries vary in terms of legislative provision, recording of deaths and reporting deaths? And what limits the comparability of data across countries? The methods comprised an analysis of policy documents in each of the six countries. Our findings reveal differences between countries in terms of legislative provision, recording deaths, and reporting deaths. These differences have an impact on the comparability of data on deaths associated with COVID-19 across countries. Our findings suggest that there is a case for data collection and statistics to be harmonised, which would facilitate accurate comparison between countries. However, reporting is also related to testing capacity for COVID-19, so this is not simply a question of comparable data being available, rather a question of the overall functioning of the public health system.

Keywords: Comparative health policy, comparative administration, data for policy making, data harmonization, COVID-19, comparable health data.

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Authors

Thomas Czypionka is Head of Health Economics and Health Policy Department at the Institute for Advanced Studies in Vienna. He is also Visiting Senior Research Fellow at the Department of Health Policy, LSE.

Stefanie Ettelt is an Honorary Associate Professor at the London School of Hygiene and Tropical Medicine.

Simone Ghislandi is Associate Professor of Public and Health Economics at the Social and Political Science Department of Bocconi University, Milan.

Céu Mateus is Professor of Health Economics at Lancaster University.

Monika Steffen is Research Professor Emeritus at the CNRS (French National Centre for Scientific Research), affiliated to the PACTE Social Science Laboratory, Science-Po Grenoble (School of Political Studies), University Grenoble-Alps, Grenoble, France.

Anne West is a Professor in the Department of Social Policy at the London School of Economics and Political Science.

Introduction

As a result of the COVID-19 pandemic, much attention has been focused on the reporting of deaths associated with the SARS-CoV-2 virus. This in turn is related to how deaths are counted. During the pandemic, individual countries have provided data on the number of deaths associated with COVID-19 that are then reported to international agencies (see for example, ECDC, 2020c) in real time; in addition, national statistical offices analyse data provided on death certificates. As regards death certificates, the World Health Organization (WHO) provides guidance on recording deaths due to COVID-19: 'Deaths due to COVID-19 are different from COVID-19-related (or COVID-19-associated) deaths. These may be deaths due to accidental or incidental causes, or natural causes when COVID-19 is not identified as the underlying cause of death...' The guidance also states that 'COVID-19 should be recorded on the medical certificate of cause of death for ALL decedents where the disease caused, or is assumed to have caused, or contributed to death' (WHO, 2020, p. 1). The focus on causation is important as people may die *with* but not *of* COVID-19.

Although death certificates are not used for reporting real-time deaths related to COVID-19, data relating to causes of death are routinely provided to international statistical agencies. Such data can be used to make comparisons between countries, as is the case with influenza, AIDS and many other diseases of transmissible as well as non-transmissible nature. It is thus important to understand how the reporting systems function in different countries in the specific unprecedented context of COVID-19. In Europe, a physician normally submits information relating to the causes of death electronically or in paper format. The information is provided on the medical certificate of causes of death (hereafter, for convenience, termed death certificate) and is coded using the International Statistical Classification of Diseases and Related Health Problems (ICD) (currently the tenth version – ICD10). The purpose of the coding is to select the underlying cause of death, which is the disease/injury that initiated the train of events leading directly to death. Although international definitions are harmonised, the statistics may not be fully comparable among countries, as classifications may vary when the cause of death is multiple or difficult to evaluate, and because of different notification procedures (Eurostat, n.d; 2020). The variation between countries and different notification procedures are particularly relevant in the context of the COVID-19 pandemic.¹

Whilst international comparisons are routinely made regarding deaths from COVID-19, with or without relevant caveats, there are notable differences as regards the legislative context and the administrative processes employed that determine what is reported. Public health delivery systems vary markedly across Europe and structural differences may influence how they operate (see Mays et al., 2010).

In this paper, we seek to assess the approaches used to report deaths associated with COVID-19 in a sample of European countries. We focus specifically on six countries: Austria, France, Germany, Italy, Portugal and the UK. In order to understand the reporting systems in place, we address the

¹ The WHO has issued a new code for COVID-19 – U07. New ICD-10 codes for COVID-19 have been introduced by the WHO, U07.1 COVID-19, virus identified and U07.2 COVID-19, virus not identified (WHO, 2020).

legislation enacted and other legislative provision related to recording COVID-19 cases and deaths; how deaths associated with SARS-CoV-2 are reported on death certificates; and how data on deaths are reported nationally. For each country, a separate report has been produced (see Annexes 2 to 7) drawing on legislative provision, policies, academic papers, and media reports (see Cypionka and Pham, 2020; Ettelt, 2020; Ghislandi, 2020; Mateus, 2020; Steffen, 2020; West, 2020). It is important to stress that the paper is not concerned primarily with statistics or epidemiology, but with legislative provision, policy, practice, and administration.

The countries were selected in order to represent a diversity of countries in terms of the reported deaths from/with COVID-19 (ECDC, 2020b). During the period when this research was carried out (April to August 2020) testing rates varied between countries and over time, with relatively high testing rates across much of the period in Portugal (600-900 per 100,000 population), Austria (400 to 600) and Germany (400 to 500). The rates were generally lower in France and fluctuated in Italy; no data were available for the UK (ECDC, 2020), but were acknowledged to be low compared with Germany (Rough, 2020).

Specifically, the paper aims to answer the following research questions: How do countries vary in terms of legislative provision, recording of deaths and reporting deaths? And what limits the comparability of data across countries? In so doing we aim to understand better why the debates about comparability are complex and also unravel some of the administrative complexities that exist.

The following section outlines the European context regarding the COVID-19 pandemic. The subsequent sections, which focus on our six case study countries, assess three different domains: legislative provision; recording of deaths by physicians; and reporting of deaths nationally. In each section we compare and contrast the countries' systems and policies in response to the pandemic, and provide illustrative examples. The penultimate section discusses the limits to comparability of data based on the analysis we have undertaken. The final section discusses the findings, noting convergence over time, and implications for policy.

COVID-19: The European Context

Between 31st December 2019 and 2nd August 2020, over 17,800,000 cases of COVID-19 were reported worldwide, including over 685,000 deaths. European Union/European Economic Area (EU/EEA) countries and the United Kingdom (UK) reported over 1,700,000 cases including over 182,000 deaths (European Centre for Disease Prevention and Control (ECDC), 2020a).

In this paper we focus on the period of the COVID-19 pandemic between March and August 2020. According to the ECDC, the EU/EEA and the UK reached a peak in nationally reported cases in the first week of April 2020. From the end of the second week of April until the first week of June, the trend declined, after which it reached a plateau. Between mid-July and the beginning of August there was a resurgence of newly reported infections. It is important to note that reporting of cases is dependent on a number of factors, one of which is the testing rate (ECDC, 2020c). Whilst our focus is not on testing, it is important to note that rates have varied over time and between

countries: in the week beginning 26th July 2020 for example, of our six case study countries, the UK, Austria, and Portugal had the highest testing rates (see Annex 1, Table A2), but these reflect testing at a particular point in time and do not represent testing rates over the period in question (see ECDC, 2020c). Testing strategies have changed as testing capacity has improved and countries have moved towards more widespread testing in the community, including, in some cases, the testing of asymptomatic individuals. Contact tracing is also in place across the EU/EEA and the UK, although implementation has varied over time, and between regions within countries (ECDC, 2020a).

Comparing national legislative provision and guidance

In this section we compare countries in terms of legislative provision and guidance related to COVID-19. We draw on the individual country reports (see Annexes 2 to 7) to illustrate the similarities and differences that exist.

In five of the six countries COVID-19 is listed in legislation as a notifiable disease, clearly indicating the importance attached to the disease and the need for action on the part of government. The disease was added to the list of notifiable diseases in Germany on 1st February, in Scotland on 22nd February, and in England on 5th March. In Austria, new coronaviruses have been included in the list since 2016 and in Portugal since 2017. In France, COVID-19 is not on the list of formally 'notifiable' diseases as is the case for other infectious diseases: under the COVID-19 legislation it is an illness that should be declared (as agreed with the *Conseil National de l'Ordre des Médecins*), but the regulations may not be adhered to by all categories of doctor.²

Reporting obligations vary between countries but in all cases they involve notifying the relevant local health authority (or equivalent) regarding suspected or proven cases of COVID-19. Data are then transmitted to a central government body, institute or agency. A key difference between countries is in the use of electronic databases for doctors to submit data to the local health authority: these are used systematically in Austria, Germany and Portugal, allowing for speedy transmission of data to local (health) authorities (but not in Italy, the UK or systematically in France).

There are legal obligations for doctors to notify the authorities of cases in which an infection is suspected or confirmed. In Germany all doctors, including those in ambulatory care, are obliged to report suspected cases. And in Austria, there is a legal obligation on everyone to report a suspected case, with a reporting hierarchy (i.e., if a physician reports a suspected case, a school does not have to do so). In Portugal all COVID-19 deaths have to be reported by law by a physician irrespective of the place where they occur (hospital or community).

There is variation as regards the information that must be provided by medical practitioners. Thus, in England, personal details, date of onset of symptoms, date of diagnosis, date of death (if patient died), name, gender, date of birth, ethnicity, NHS number, address, contact number, occupation,

² See Steffen, Annex 3.

overseas travel, if relevant (destinations and dates) are required. The local authority (or equivalent) must then pass the notification to Public Health England within 3 days of a case being notified. The notification is separate from testing. Until 18th July local authorities did not have full information about positive COVID-19 tests in their local area, but on 6th August, councils in England were offered near real-time data from Public Health England on COVID-19 cases in their local area.

In Austria, the specific requirements are more extensive. For COVID-19, as with all infectious diseases, personal details must be provided, along with data on close contacts. However, in addition information on the patient's travel history, country of infection, suspected sources of infection, and visits to community facilities must be reported (except when reporting a death). The authorities have to be notified if the existence of the virus SARS-CoV-2 was confirmed by a laboratory test (currently polymerase chain reaction (PCR) tests). In the case of a death, the person's name, age and place of residence must be reported to the county council of the area where the death has occurred within 24 hours. After the information has been validated by a physician, the county council has to register the death case in the epidemiologic reporting system (EMS), a database that is jointly managed by the county councils, state health offices and the Ministry of Social Affairs and Health.

In France, the approach is different: each person presenting with symptoms suggestive of a COVID-19 infection receives a prescription for a PCR test from the medical practitioner. However, since August 2020 – linked to people returning from summer vacations – the patient now has to complete a form with personal details and details of any recent overseas travel, prior to the test being carried out. In contrast to Austria, no details of contacts are sought at this stage.

Comparing the recording of deaths and death certificates

In this section, we focus on recording deaths and completion of the death certificate in the context of the COVID-19 pandemic. We focus on policies in place and provide illustrative examples to highlight the variation amongst the countries (for more details see country reports in Annexes 2 to 7). Our aim is to ascertain how recording deaths affects the reported deaths and in particular the potential for under-reporting (if there is little testing and a restrictive set of requirements for filling in the death certificate such as having a confirmatory test result) or over-reporting (if the cause of death is not confirmed or investigated when completing a death certificate).

In each country, there are different procedures in place regarding the completion of the death certificate – for example, whether an external examination is needed or not and who completes the certificate. Thus in Austria and Germany, any death must be subjected to an external examination by a physician, but this is not the case in the emergency COVID-19 period in England, where a death can be confirmed in the absence of an external examination.

The death certificate itself can be completed by any licensed medical practitioner in France and in England (but only in the latter under the emergency regulations). In hospital settings, the authorised pathologist completes the certificate in Austria, whilst in England the consultant in charge of the patient has responsibility for ensuring that the death is properly certified.

Turning to causes of death there are differences between countries in how these are documented on the death certificate. In most cases considerable discretion can be exerted by the medical practitioner completing the form.

In Germany, if a person dies in their own home or a care or nursing home, the doctor (who may not be the normal attending doctor) may not know whether the person has been infected with the virus. In such cases, it is at the doctor's discretion to determine the cause of death and complete the death certificate. Doctors can request a posthumous test for COVID-19, however the cost is not covered by social health insurance, so there is an incentive not to ask for a test. In Scotland, the doctor may have little information on state of health of the person who has died and in such circumstances should consider symptoms from friends and relatives and whether there is evidence of medication suitable for treating the symptoms of a COVID-19 to help inform the cause of death.

In Austria, where testing has been widely available, it is up to the medical examiner/physician to decide and record whether the death of a person with a laboratory confirmed SARS-CoV-2 infection has been caused by COVID-19 or by other causes. Regardless, of what is stated on the death certificate, since the beginning of August, all persons dying from or with Covid-19 are counted as a COVID-19 fatality in the official COVID-19 statistics. In Italy on the other hand, from 16th April 2020, the death certificate must include COVID-19 as a cause of death when the SARS-CoV-2 is suspected (on the basis of symptoms) even if there is no positive test result.

As regards whether COVID-19 is the direct or indirect cause of death there are clear differences between countries. In France, COVID-19 is not a direct cause of death (this would be for example, heart failure), rather it is the illness that might explain the cause of death. In Italy, the different possible causes of death must be ordered such that COVID-19 should be considered as the first cause of death when it is thought that without the virus the patient would not have died at that point in time, independent from the severity of her or his concurrent conditions. In England COVID-19 is an acceptable direct or underlying cause of death for the purposes of completing the death certificate. Doctors are required to certify the causes of death to the best of their knowledge, even without a positive test result.

As regards certification, in Germany doctors notify the local health authority via uploading data or fax. In France, there is an electronic certification system but this is only used by a very small percentage of doctors. In England, certificates should be sent electronically to the registrar. In both Germany and France, there is a reluctance by medical practitioners to recording data electronically and fax is frequently used. There are also differences as regards when the certificate must be completed: in Italy, the practitioner should submit the form within 24 hours; in Germany, the doctor has to notify the local health authority within 24 hours and the local health authority then notifies the Robert Koch Institute (RKI) within a further 24 hours. However, this may not always be possible. In England, deaths are required by law to be registered within 5 days of their occurrence unless there is to be a coroner's post-mortem or an inquest.

Comparing the reporting of deaths at a national level

In all six countries, the progress of the pandemic has been monitored and data collected for the purposes of real-time monitoring. Data are presented on a daily basis via country level web-sites (see COVID-19 Country dashboards/overviews below). In addition, data from death certificates are analysed by national statistical offices, which also publish reports, but generally with longer time delays. These data are also reported to supranational bodies such as the ECDC and WHO.

As regards real-time monitoring, a range of different sources of data are used, depending on the country. In Austria, data on COVID-19-related deaths are derived from an electronic database jointly managed by county councils, state officials and the Ministry of Social Affairs and Health. In Germany and Portugal there is also an electronic database for reporting cases.

In the case of Austria and Germany, the numbers reported in real-time may not have been verified by the medical examiner/district physician and/or entered into the epidemiological reporting system. Any death of a person with a laboratory confirmed infection of SARS-CoV-2 is treated as a death due to COVID-19. In Austria, the Ministry of Social Affairs and Health also reports data on suspected cases, confirmed cases and fatalities provided via the EMS. Similarly, in Portugal, every death of a person with a confirmed infection of SARS-CoV-2 is a 'COVID-19 death'.

In Germany all COVID-19 related deaths (confirmed by a PCR test) that have been reported to local health authorities are collected on a daily basis and presented on the RKI Dashboard (see COVID-19 Country dashboards/overviews below). Data can take 2 to 3 days to reach the RKI, and, as with other countries (such as the UK), fewer deaths are reported on Saturdays and Sundays, and sometimes deaths are reported later.

As there is no mandatory national electronic reporting system in France and no national electronic database in England, both countries use a range of different sources to collect data on COVID-19 deaths. Initially, the focus was on deaths in hospitals and only later was it extended to care homes, and also in England to deaths at home.

In France, the bodies assisting with the collection of data in France include SurSaUD® (*Surveillance sanitaire des urgences et des décès*), SI-VIC (*Système d'information pour le suivi des victimes*); and the 'Sentinel' information system of the 'Resuscitation Services'. The national health authorities have asked hospitals to report each day, directly to them, their number of COVID-related deaths. More recently care homes for older people, and for people with disabilities, private and public, have also been asked to provide their 'COVID-suspected' figures, especially deaths, via a specific national platform set up for them by Public Health France.

Turning to the UK, prior to 29th April, deaths in care homes were not included in the daily reports of COVID-19 deaths in England (in contrast to the rest of the UK). From this date, Public Health England combined the following data: (a) deaths that occur in hospitals, collected manually from NHS trusts; (b) deaths notified to local PHE Health Protection Teams; and (c) laboratory reports

where a confirmed COVID-19 test has been linked to a death report from electronic hospital records.

In all countries there have been concerns about the number of deaths in care homes. In England and Germany, around a third of all deaths associated with COVID-19 have been in care homes and the proportion is even greater in France and Portugal. Moreover, deaths at home associated with COVID-19 are not included in the reporting systems of all countries (e.g. France).

In France, Italy and the UK concerns about under-reporting of COVID-19 deaths have been expressed, whilst in Germany concerns relate to over-reporting. In the former, the numbers reported are likely to be an under-estimate due to the limited availability of testing facilities³ especially, but not only, early on in the pandemic.

Limitations of comparability

On the surface, there are similarities between the case study countries in terms of at least some of the legislative provision relating to COVID-19, death certification and national reporting of deaths. In each country, death certificates need to be completed by a medical practitioner, and the causes of death noted. In addition, national statistical offices analyse the data and report relevant data to the European Centre for Disease Control. In all countries, there is also 'real-time' reporting of COVID-19 cases and deaths, with data being relayed, with varying degrees of efficiency, to central government or to a government agency.

However, beneath the surface there are differences between countries. As regards **legislative provision**, in five of the six countries, COVID-19 is a statutory 'notifiable disease' and as such there is a legal requirement for a medical practitioner to report suspected cases of COVID-19 to the relevant public authorities. In France however the legislative framework for reporting suspected cases of COVID-19 differs from that for other infectious diseases.

In all countries medical practitioners are required to provide information on suspected or confirmed cases of COVID-19 to the relevant public authorities, but in the case of France, this regulation may not be adhered to by all categories of doctor. In some countries, medical practitioners request information on contacts of the person with suspected COVID-19.⁴

The window for reporting cases varies between countries which leads to differences in the real-time reporting. There are differences also as regards the linkages between the notification of COVID-19 to the local (health) authority and test results. This is very weak in England, where the local authority is not informed of positive test results until data are shared with them by Public Health England. By way of contrast, the linkages are strong in the case of Austria and Germany,

³ More recently, testing in France and the UK has been expanded. In both countries there were also severe problems with the availability of personal protective equipment; there were also problems in Germany.

⁴ Providing the names of contacts is likely to result in the number of people identified as having COVID-19 subsequently being higher, and the reporting of suspected and actual cases, and deaths more accurate, particularly if there is widespread testing available.

where test results are available to the relevant local health authority prior to being submitted to central government.

Information provided on the **causes of death** and reported on death certificates varies considerably between countries, with different conventions/rules regarding whether or not COVID-19 is included as a direct or indirect cause of death. There are differences between countries as regards the use of posthumous tests. In all six countries, COVID-19 can be given as a cause of death on the death certificate on the basis of other evidence (e.g. clinical or circumstantial evidence).

In terms of the **reporting of deaths**, the real-time systems function differently in the six countries and indeed within countries over time. Thus, in most countries real-time data on COVID-19 deaths are produced on the basis of positive PCR test results. However, early on in the pandemic some countries did not systematically record deaths in other settings; this was the case in both France and the UK, where testing capacity was low. In those countries where all settings are included, data will be more accurate.

Statistical offices report differently too. In the UK 'mentions' of COVID-19 on death certificates are used for national reporting, but this is not the case in France or in Italy. In France, COVID-19 is not deemed a direct cause of death, whilst in Italy it can be.

In summary, notwithstanding some similarities at a surface level, there are differences regarding how cases of suspected COVID-19 are recorded, how deaths associated with COVID-19 are certified, and how data are reported nationally for real-time monitoring.

Discussion and implications for policy

This paper set out to answer two pertinent policy questions: How do countries vary in terms of legislative provision, recording of deaths and reporting deaths associated with COVID-19? And what limits the comparability of data across countries?

Having examined the legislative provision, recording deaths, and reporting deaths, it is clear that at many different levels there are differences between countries; these have an impact on the comparability of data associated with COVID-19 across countries. Some of these differences can be traced to low levels of preparedness and testing in some countries – for example, France, Italy and the UK (see also Lau et al., 2020). Other differences appear to be related to the fact that some countries have greater co-ordination between different levels of government and also have a more streamlined system in place for recording and reporting COVID-19 and deaths. This is particularly the case in Austria and Germany. In terms of recording deaths on death certificates there are different norms and legislative provision in place relating to recording causes of death, militating against comparability between countries. Significantly the differences can lead to over-reporting, and more significantly from a policy perspective, under-reporting, with governments having missed the opportunity to intervene earlier, so in all likelihood increasing the number of deaths associated with COVID-19.

It is noteworthy that over time, policies have evolved. Indeed, we would argue that there has been convergence between those countries that were less well prepared at the outset – in particular, France, Italy and the UK – towards those that were better prepared, namely Austria and Germany. In particular, testing, fundamental to accurate recording was not readily available initially in France, Italy and the UK at the outset, but this increased over the course of the pandemic (see Annex 1, Table A2). Reporting of deaths has become more complete and more reliable over time in those countries that were less well prepared; this is most apparent as regards deaths in the community and particularly in social care institutions in France and the UK.

Further work could usefully seek to elucidate how the public health systems function in different countries, whether different types of public health system can be identified, and what characteristics are likely to lead to more accurate reporting of deaths. Tentatively, on the basis of the analysis reported here it is possible to observe similarities between Austria and Germany on the one hand and France and the UK on the other, with preparedness and co-ordination (between institutions, local (public) authorities and central government), being key parameters differentiating the countries.

Given the public interest in international comparisons there is a case for data collection and statistics to be harmonised. However, this needs a political will, resources and collaborative work by professionals (Steffen, 2012). As in the case of HIV/AIDS, multi-level working is likely to be the most promising way forward with COVID-19. Governments need to be well informed about the strengths and weaknesses of their own systems and those of other countries. As Steffen notes: 'The translation of ideas into effective policy and implementation requires a powerful input from politics. Crisis appears to be a necessary factor. By obliging politicians to solve an acute problem, crises create windows of opportunity... (p. 1085).

More consistency regarding what is reported would facilitate accurate comparison between countries. However, reporting is also related to testing capacity, so this is not simply a question of comparable data being available. This is particularly important in the case of deaths in the community, but also relates to the analysis of death certificates. Typically, individual deaths are allocated to a single underlying cause, but there is scope for further use of additional causes mentioned on death certificates (Murphy et al., 2019).

Finally, it is clear that there is – and probably always will be – a significant grey area between deaths *with* and deaths *from* the virus, given that the infection is likely to aggravate pre-existing conditions. Whilst the full extent of excess deaths from COVID-19 can only be estimated through retrospective analysis of excess deaths compared to previous years, this will in all likelihood take several years. As Spiegelhalter (2020) notes 'we will need years to properly assess the effect of the epidemic and the measures taken against it' (p. 5).

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Annex 1: EEA/EU and UK COVID-19 cases, deaths. Incidence, testing

Table A1: Distribution of COVID-19 cumulative cases, deaths and 14-day incidence of reported cases, EU/EEA, UK and EU candidate and potential candidate countries, as of 30th June 2020.

Country	Cases	Deaths	14-day incidence of reported cases per 100 000 population
Austria	17 666	703	6.8
Belgium	61 427	9 747	9.9
Bulgaria	4 831	223	21.3
Croatia	2 725	107	11.6
Cyprus	996	19	1.3
Czechia	11 805	348	16.3
Denmark	12 751	605	9.2
Estonia	1 987	69	1.0
Finland	7 209	328	1.8
France	164 260	29 813	10.3
Germany	194 259	8 973	8.9
Greece	3 390	191	2.4
Hungary	4 145	585	0.7
Iceland	1 840	10	8.4
Ireland	2 5462	1 735	2.9
Italy	240 436	34 744	5.2
Latvia	1 117	30	1.0
Liechtenstein	83	1	0.0
Lithuania	1 816	78	1.5
Luxembourg	4 256	110	30.0
Malta	670	9	4.1
Netherlands	50 223	6 107	8.3
Norway	8 855	249	4.2
Poland	34 154	1 444	11.5
Portugal	41 912	1 568	47.4
Romania	26 582	1 634	22.8
Slovakia	1 665	28	2.1
Slovenia	1 585	111	4.3
Spain	248 970	28 346	9.9
Sweden	67 667	5 310	149.4
United Kingdom	311 965	43 575	22.7

Source: ECDC. 2020c

Table A2. COVID-19 reported 14-day case and death incidence rates, testing rates and test positivity during week 30, 2020 (week beginning 26th July 2020) EU/EEA and the UK

Country	Testing rate (per 100 000 population)
Austria	1120.1
Belgium	610.2
Bulgaria	463.2
Croatia	269.2
Cyprus	1221.9
Czechia	321.6
Denmark	1855.6
Estonia	190
Finland	523.1
France	683.4
Germany	678.8
Greece	234.9
Hungary	181.7
Iceland	95.5
Ireland	1012.6
Italy	534.3
Latvia	528.2
Liechtenstein	NA
Lithuania	749.4
Luxembourg	10659.2
Malta	1453.7
Netherlands	645.2
Norway	435.4
Poland	365.9
Portugal	923.3
Romania	580.2
Slovakia	247
Slovenia	272.2
Spain	582.4
Sweden	578.1
United Kingdom	1378.2
EU/EEA and the UK -	710.4
TOTAL	

Source: ECDC, 2020a

Annex 2: Austria Country Report: Thomas Czypionka, Isabel Pham

Legislation and guidance provided at a national level

In Austria, it is mandatory to disclose suspect cases, confirmed cases and fatalities related to COVID-19 based on §1 of the Law on Epidemics of 1950 (*Epidemiegesetz 1950*), which lists all communicable diseases with reporting obligations. Since 2016, coronaviruses have been included in §1 within the category *MERS-CoV (Middle East Respiratory Syndrome Coronavirus/neues Coronavirus)* as listed diseases. With regard to SARS-CoV-2, only laboratory confirmed suspect infections are defined as confirmed infections (currently polymerase chain reaction (PCR) tests). In case of a fatality, §2 of the Law on Epidemics further determines, that the person's name, age and place of residence has to be reported to the respective county council (*Bezirksverwaltungsbehörde*) of the area where the death has occurred within 24 hours.⁵ After the information has been validated by a physician, the county council has to register the death in the epidemiologic reporting system (EMS), a database that is jointly managed by the county councils, state health offices (*Landessanitätsdirektion*) and the Ministry of Social Affairs and Health (BMSGPK 2020a).

§4 of the Law on Epidemics of 1950 requires the county councils to report the following data about a suspect case, confirmed case and fatalities via the EMS system on national level: (1) personal data on identification, (2) date of death, reason of death, and status of post-mortem if available, (3) clinical data related to the notifiable disease and laboratory results if available, (4) data on the close contacts of the person and (5) any precautionary measures that have been taken due to the case.

In the case of COVID-19, this reporting obligations have recently been further specified and extended via governmental decree (*Erlass, Vollzug des Epidemiegesetzes 1950, Vorgaben zum Umgang mit SARS-CoV-2/COVID-19*). In contrast to other notifiable infectious diseases, county councils have to report COVID-19 suspect cases to the EMS with the following extended data: (1) data based on doctor's notification (demography, date of notification etc.), (2) data on travel history, country of infection, suspected source of infection, job and job location as well as any visits to community facilities. As this information is available for suspect cases, it is therefore also available for confirmed cases and fatalities. (BMSGPK 2020b)

Basically, all relevant personnel have a legal duty to report suspect cases, confirmed cases and fatalities based on §3 of the Law on Epidemics, especially medical personnel, but in their absence also owners/managers of community facilities (schools, kindergartens, care homes, hotels, restaurants, apartment buildings etc.) or residential buildings.

Recording of deaths and death certificate

Any death, irrespective of its cause, must be subjected to an external examination by a physician with the corresponding authorization (coroner, medical examiner). In small communities, this

⁵ Law on Epidemics of 1950 §2

obligation is carried out by the district physician, in hospital by the authorised pathologist within the facility. The external examination serves to declare death, as well as the nature and cause of death based on the available medical history. If cause of death can be derived, the attending medical professional will issue a death certificate (*Totenschein*). Irrespective of reporting to the county council and the EMS in case of notifiable infectious diseases, the hospital/care home/family of the deceased are additionally legally obliged to notify the registry office (*Standesamt*) in any cases of death.

If a clinically relevant question arises from the medical history, the examining physician is authorised to carry out or commission a post-mortem, even against the wishes of the relatives/next of kin (Medical University of Vienna 2020a, 2020b). In the case of COVID-19, §5 of the Law on Epidemics allows executive bodies to enforce mandatory post-mortems on COVID-19 related death cases if deemed necessary, however this has not yet been adopted.

In short, it is up to the medical examiner/physician to decide and record whether the death of a person with a laboratory confirmed SARS-CoV-2 infection has been caused by COVID-19 or by other causes. However, regardless of the cause stated on the death certificate, since August 2020 all cases with confirmed COVID-19 in the last 28 days are counted as a COVID-19 fatality in the pandemic-related statistics.

Reporting of deaths at a national level

Generally, the death certificates and registrations at the registry offices feed into the official statistics on deaths and causes of death by the National Office of Statistics (*Statistik Austria*). These numbers are usually published annually for the previous year following careful checks for plausibility and completeness (Statistik Austria 2020a). Due to the current extraordinary public interest, the Office of Statistics has started publishing weekly death statistics for the first quarter of the year 2020 (Statistik Austria 2020b).

In case of COVID-19, the Ministry of the Interior and the Ministry of Social Affairs and Health are responsible for collecting and presenting the data. Due to the urgency of the situation, the ministry of the interior has started holding daily morning conferences with the state health offices that report on the current number of suspect cases, confirmed cases and fatalities in their respective state (BMI 2020). When it comes to fatalities, the numbers reported on this occasion may not have been verified yet by the medical examiner/district physician and/or entered into the EMS. Any death of a person with a previous laboratory confirmed infection of SARS-CoV-2 is treated as a 'death due to COVID-19'. This number is also reported to the ECDC and displayed by the Johns Hopkins University global dataset (ECDC 2020, ORF 2020). Both the Ministry of the Interior and the Ministry of Social Affairs and Health publish and update these numbers daily on their respective websites (BMI 2020, BMSGPK 2020c).

The Ministry of Social Affairs and Health has started to provide an additional visualisation tool (*Amtliches Dashboard*), which pulls the data on suspect cases, confirmed cases and fatalities directly from the EMS (BMSGPK 2020d). As outlined above, these are the cases where a medical

examiner/doctor has already confirmed whether COVID-19 was the cause of death or not after carefully inspecting the medical history of the deceased person. Therefore, differences between these figures occur.

Deaths in the community (care homes/home) and COVID-19

As in many other countries, care homes were especially prone to transmissions of COVID-19 and subsequent severe cases and deaths. At the beginning of the pandemic, the policy focus lay on hospital capacity and only when several clusters emerged in care homes, were measures taken to limit contact with visitors. By the end of June, more than half of female and quarter of male fatalities were residents of care homes (BMSGPK 2020e p.24).

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Annex 3: France Country Report: Monika Steffen

Legislation and guidance provided at a national level

In France, the obligation to notify certain diseases to the local health administration dates from 1892 (Faure, 2008). The national list of notifiable diseases has been updated periodically. Today, it includes 32 infectious illnesses. Despite a longstanding legal obligation to notify infectious disease, under-declaration is still frequent, reaching between 66 % and 90 % according to the practitioners' clinical interest for the illnesses (Antoniotti et al, 2002). A decree was passed on 23rd March 2020 prescribing the general measures necessary to address the COVID-19 epidemic in light of the state of emergency (Decree 2020-293). Despite being defined as infectious disease, and as a pandemic, at the date of writing COVID-19 has not yet been added to the official list of notifiable diseases. The COVID-19 legislation however includes provisions, agreed with the *Conseil National de l'Ordre des Médecins*, according to which the illness is to be notified. This is done systematically in hospitals, but probably less respected by the doctors working in the community. The latter have been involved in the notification of COVID cases since the end of the shutdown (11th May 2020), as part of the official « exit strategy » based on « testing – tracing – isolating », which however was lengthy to develop fully as testing capacities remained insufficient. Within this framework, since May, each person presenting symptoms suggesting COVID-19 infection, or having been warned of risky contact, receives a prescription for a PCR test. All doctors, especially the GPs are 'invited' by the health authorities to ask positive patients for their contacts: names, and if possible telephone numbers or email addresses that are then immediately transmitted to the local office of the health insurance (instead of the local section of the Regional Health Authority that normally receives compulsory disease notifications, and would take eventually necessary local or regional actions, and also transmit the risk information to the national authorities).

Doctors in community care have been given a financial incentive for participating: the tariff for a consultation with COVID-19 has been doubled compared to a normal consultation, and extra money is added for each valid telephone number or email address provided. The local health insurance office immediately contacts the various 'contact persons', and ask them to take a test (free of charge). Positively-tested contacts are expected (not legally forced) to stay isolated for two weeks (this period has been lowered, since mid-September, to seven days only if the person has no symptoms), which is fully compensated as sickness leave. If they live with family or cohabitants, they can choose to spend the isolation time in a collaborating hotel, fully paid for by the health insurance (however, very few people are opting for this). The Health Insurance has trained nearly 6000 members of staff for these so-called 'COVID brigades', all under strict professional confidentiality (Ameli, 2020). A dedicated platform processes the collected information for epidemiological monitoring. Clear procedures concerning delays have been issued for doctors, patients and contact persons. However, the system is not based on legal constraint, but on good will and persuasion. The patient has no legal obligation to provide names of people with whom he or she has been in contact (Claich, 2020). It seems efficient, having successfully identified and circumscribed 109 new local clusters in the first three weeks of operation, 11th to

30th May; at the time of writing (15th September 2020) 866 active clusters are under monitoring of which 121 (15 %) in nursing homes, according to the daily dashboard of Public Health France.

This COVID-brigade system is a compromise between privacy and medical confidentiality on the one hand, and the imperatives of public health management on the other hand. With massive testing – without medical prescription – developing since August/September, the laboratories participate in this double notification system, communicating their daily numbers of tests and the results for both the individual tracing system, by the health insurance, and the national statistical monitoring of the epidemic.

Recording of deaths and death certificate

Legislation and administrative procedures for death recording are the same for the entire French territory, including the overseas regions. Each record of death travels from the local to the central authorities. Death recording comprises two separated channels, one serving civil registration and vital statistics, the other morbidity statistics and guidance for public health policy. The separation is strict in France, in order to protect the clinical discretion of the certifying doctor, the personal data, and the medical confidentiality.

Each death must be certified by a medical doctor enrolled at the licensing authority (*Orde de Médecins*). In most cases it will be the attending GP or a hospital doctor, but any registered doctor can do it. The doctor issues the Certificate of Death (*Certificat de décès*), directly at the place of death. The form comprises two distinct parts: an administrative section which consists only of the name, date of birth, sex and address of the deceased, place, day and hour of death, and a checklist of standardised legal information that allows the local registry officer to issue the burial authorisation, or legal investigations to be carried out.

The other part is the ‘medical certificate of causes of death’, which is strictly anonymous and confidential. It states only the administrative district of residence of the deceased, or of the place of death if different, without any identification of the deceased person. The answers for the cause(s) are entirely open, and left to the discretion of the doctor. This is carried out in the absence of patients or others, by the doctor. The doctor then seals the medical part of the death certificate. This medical part comprises two open paragraphs: (a) for the immediate direct cause of death, which the doctor *must* fill in (e.g., cardiac arrest, kidney failure), and (b) where the doctor may add the initial or responsible pathology, or comorbidities that the doctor may consider as having contributed to death, if he or she knows. The doctor is free to add any causes and related comments. Although it is not compulsory, doctors generally fill in section (b) based on their ‘best knowledge’ (expert interview). They have a large discretion to state the cause(s) of death.

There are no official guidelines concerning COVID-19 death confirmation. In hospital, patients are tested and normally have a lung CT scan, which confirms COVID-19 as direct cause of death. In community care, tests were not available initially (tests were reserved for hospital use only). Doctors had to rely on their clinical experience. There is a professional consensus among GPs to add the ‘objective elements suggesting COVID-19’ on the b-part of the Certificate of Death. By

contrast, GPs have received precise guidelines from the national health authorities of how to follow-up patients with COVID-19 symptoms, and how to orient them, e.g. to send them to a hospital or not, according to the severity of symptoms (INSEE, MSS and SPF, 2020). As to the international classification of medical causes of death, it is rarely used by French practitioners. As explained below, the international coding is done later by INSERM/CépiDc (expert interview).

The doctor hands the Certificate of Death in its entirety to the family or its substitute, who must bring it, in person and within 24 hours to the local Registry Office (*État Civil*) at the town hall. The registry officer issues the official Record of Death (*Acte de décès*). The town hall forwards the part of the document containing the name of the deceased and the civil status information to INSEE, the National Institute of Statistics (*Institut national de la statistique et des études économiques*). The latter updates the National Directory of Natural Persons (RNIPP), and feeds the information into its demographic statistics. The town hall forwards the medical part, still sealed, to the regional health agency, via its local district office where its medical officer (a doctor) opens it. He or she consults the causes of death noted in the paragraphs (a) and (b), checks if local action against infectious disease or for suspicious deaths is necessary, and then forwards it to INSERM, the French National Institute of Health and Medical Research (*Institut National de la Santé et de la Recherche Médicale*).

At INSERM, the medical certificate is passed to a specialised unit: the Centre for Epidemiology of Medical Causes of Death (CépiDc: *Centre d'épidémiologie sur les causes médicales de décès*), which produces detailed statistics on the causes of death. For COVID-19, CépiDc analyses medical certificates transmitted electronically, e.g. mainly those originating from hospitals. The algorithm used analyses the responses doctors provide on both, the a-part and the b-part of the medical certificate, and classifies causes into three categories: "confirmed" COVID death, "suspected" COVID death, and other causes of death (CépiDc, consulted 5th October 2020). The CépiDc also codes the causes of death as it receives them according to the WHO international classification, and transmits the data to the respective international organisations. In addition, CépiDc scans the medical certificates for electronic transition to Public Health France, which prepares the presentations for the government and for the public.

This complex circuit guarantees confidentiality: INSEE knows who died but not the medical causes of death, while INSERM knows the causes of death but not the deceased person. Doctors in the community still resist electronic death certification: in 2019, 80 % of their certificates were still delivered on paper. Despite repeated insistence from authorities to use the 'CertDc' platform, there has only been a slight increase recently, of 5 to 8 % depending on the regions (expert interview).

Reporting of deaths at a national level

For monitoring the epidemic *in real time*, other sources and tools, new or pre-existing, have been mobilised. They share the following common standards: exclusive IT operating, reporting directly to Public Health France, daily reporting, and reporting all syndromes (instead of by-disease-reporting). The underlying theory is that of 'syndromic surveillance', which aims at early detection of emerging diseases, and exceptional situations (Henning, 2004). The approach started after the

heat crisis in 2003 and has been consolidated since then. The approach has been systematised under the leadership of Public Health France, created in April 2016. On 24 February 2020, the code 'suspicion of COVID-19' was introduced into all the real-time monitoring systems, which are coordinated by Public Health France.

The main partner system is SurSaUD®, the Health Surveillance of Emergencies and Deaths (*Surveillance sanitaire des urgences et des décès*). It covers 86% of the activity of hospital emergency services, e.g. SAMU France; 90% of the activity of « SOS Doctors », which is the emergency and round-the-clock service of the independent doctors; and 80% of daily deaths according to Santé Publique France).

The other important partners are, on the one hand, SI-VIC, the specific information system on victims of terrorism and other catastrophes (*Système d'information pour le suivi des victimes*); and on the other hand, the « Sentinel » information system of the « Resuscitation Services ». These two provide information concerning ongoing hospitalisations for COVID-19.

Furthermore, the health authorities have asked all hospitals likely to receive patients diagnosed with COVID-19 to report each day their number of covid-related deaths, via the application for the 'intra-hospital monitoring of exceptional health situations', which has been activated again for this epidemic. Recently, all care homes for older people, and for people with disabilities, private and public, have also been asked to provide their 'COVID-suspected' figures, especially deaths, via a specific national platform set up for them by Public Health France. Compliance was lengthy as tests were lacking during the first months of the epidemic, but has been progressing since June, and is nearly achieved now (September 2020).

Together these information systems allow publishing the following figures, daily:

- Cumulative, and the daily deaths for COVID-19 in hospital, since 1st March.
- Cumulative, and the daily deaths for COVID-19 in care homes since mid-April.
- Patients with COVID-19 in hospital on that day.
- Patients with COVID-19 in resuscitation care on that day.
- Cumulative number of COVID-19 patients released from hospitals.
- As testing progressed, since July the number of confirmed positive cases, and the percentage of positivity among tests are also published daily.

The need for monitoring in real time did not start with the COVID-19 epidemic, but did provide a new impetus for active epidemiology. Such new recording methods had to develop outside the traditional legal-administrative system for declaring death and infectious disease. But the focus was initially on hospitals only, reaching out further later and slowly.

Deaths in the community (care homes/home) and COVID-19

Among the numerous reasons for late recording in care homes, three stand out. First, France lacked tests (and masks). Infection was imported by staff and family visits, and spread rapidly inside care homes via collective space and life. As a rule, only the first suspected case of COVID-19 was tested in a care home. It was progressively enlarged to the first 3 - 4 cases for staff and residents. Controversy concerning containment and isolation in care homes added to uncertainty and delays. Alarm finally came from families and media. On 23rd March, national news reported 20 suspected COVID-19 deaths, e.g. a quarter of the residents, in a nursing home located in a much affected district in Eastern France. On 20 April, news reported 22 suspected covid deaths, out of 51 residents in a private nursing home. Several cases of litigation are under way at the time of writing.

On 7th April, for the first time, national albeit incomplete figures for covid were released on covid-suspected death in nursing homes (for older people and those with disabilities): 2,417 deaths, representing 27% of all then counted covid deaths. This percentage increased to 36% by 19th April, and stabilised at 37%. On 21st May, officially communicated numbers of covid deaths amounted to a total of 28,215, of which 10,345 'suspected' cases in care homes, and 17,870 confirmed cases in hospitals (Gouvernement, 2020). In view of the progressive exit from containment, the health minister announced that 'all residents and all staff in all nursing homes *will* be tested', and all positive cases followed according to the general rules of contact tracing and isolation via COVID-brigades.

On 15th September 2020, the official number of COVID-19 deaths was 31,999, of which 20,471 were in hospitals and 11,500 in nursing homes, according to the daily figures published by Santé Publique France. COVID-19 deaths in the home are still not included. Excess mortality at home increased by 32 % between the 1st March and 30th April 2020, compared to the same period in 2019 and 2018 (INSEE, 2020). Second, care homes do not have permanent medical staff, only a part-time 'coordinating doctor'. Care is delivered by the independent doctors and paramedical professionals from outside, often by the treating general practitioner and paramedics who cared for the patient before entering a nursing home. The epidemic has added to coordination problems. During containment, tele-consultation was promoted as a rule, resulting a sharp drop of activity for independent doctors, a decrease of 40 to 60% for GPs. It is likely that care home residents with respiratory difficulty would not always have seen a doctor, and not been sent to hospitals, because the latter suffered overload, because of lack of geriatric beds (drastically reduced for cost containment) or fear from infection, and because the disease and its severity had not been recognised in the particular setting of nursing homes.

Third, nursing homes do not have the status of 'health care' institutions. In administrative terms, they are providers medico-social services, e.g. merely a social service, and as such under the direct responsibility of local administrations (municipalities, *Départements*), whereas hospitals are under the direct competency of centralised 'health' authorities (Ministry, and its regional agencies). Borders of administrative and professional competency can thus impact on epidemiology and death recording.

The recording of COVID-19 deaths at home has been largely invisible. The knowledge of the independent practitioners, who witness most, if not all of the home deaths, does not reach the recording systems in real time, since GPs rarely issue electronic Certificates of Death. However, some home deaths are included in the real time monitoring via the electronic reporting of the 'SOS-Doctors', who attend emergency cases at home when the treating doctor is not available. Furthermore, information is lacking on the question as to whether GPs always record whether the death occurred at home or in a nursing home, given that, in general, the same GP, and the same paramedical professionals continue caring for the same patient, initially in his or her personal home and later in a nursing home.

The reporting and recording of COVID cases and deaths in France is not yet accurate, but it is progressing. Like during the AIDS epidemic, exact statistics demand learning time.

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Annex 4: Germany Country Report: Stefanie Ettelt

Legislation and guidance provided at a national level

The Infection Control Act (*Infektionsschutzgesetz*) sets out the framework for the reporting of deaths associated with COVID-19. The Act lists all communicable diseases that have to be reported nationally. On 1st February 2020, COVID-19 was added to the list by decree of the Federal Ministry of Health. The decree also extended the requirement to notify the authorities to cases, in which an infection was only suspected and not yet confirmed. Therefore, in contrast to other notifiable infectious diseases, which have to be reported by laboratories and facilities (such as kindergartens, hospitals or nursing homes) only, the duty to report has been extended to doctors (Deutsches Ärzteblatt, 2020a).

The decree requires all doctors to notify the local health authority of a patient suspected of being infected with SARS-CoV-2 (which includes giving the name and address of the patient). The authorities have to be notified if the existence of the virus a) was confirmed by a laboratory test (currently a PCR (polymerase chain reaction) test, b) is likely and the diagnosis is supported by clinical presentation i.e. specific symptoms (e.g. pneumonia plus acute respiratory problems), or c) is likely because of a combination of symptoms and a setting in which the presence of the virus is confirmed or suspected (i.e. at least two cases of pneumonia in a care home) (RKI, 2020a). Doctors are advised to prescribe a diagnostic test if they suspect a Coronavirus infection.

Recording of deaths and death certificate

Any death, irrespective of its cause, has to be testified by a medical doctor, who completes a certificate of death (*Totenschein*). Certificates of death differ between the 16 states, but include the same basic information. The RKI notes that all doctors have to indicate on the death certificate if the person who has died was infected with SARS-CoV-2, among other things, to alert other professionals dealing with the body (e.g. in preparation of the funeral) of the risk of infection (Der Spiegel, 2020b, RKI, 2020b).

Doctors and facilities are expected to report any death suspected to be associated with the virus. This requirement applies to all deaths associated with the virus irrespective of setting. In hospitals, this will be the responsibility of the department in which the person has died. In the community, the responsibility is with the treating physician. This includes deaths in people's own homes and in care homes. The doctor has to notify the local health authority in which the patient is registered as a resident and they typically do so via data upload or fax (as sending emails with patient data would violate privacy laws).

The law sets out that any case or death has to be reported by a doctor within 24 hours. However, in practice this can be difficult, for example, if a laboratory confirms a positive test result and reports this to the local health authority in its area, it is not always possible to directly inform the local health authority in the area in which the person lived, as the laboratory will not necessarily have the address details of the person (only the details of the doctor or hospital requesting the test). Local health authorities have another 24 hours to report to state authorities (typically but not always state ministries for health) which pass the data to the Robert Koch Institute (RKI), the Federal Government's institute for infectious disease control, or they report to the RKI directly through SurvNet@RKI. For Sars-COV-19, the RKI publishes the data on its newly created 'COVID-19 Dashboard', an online data reporting tool that provides daily updated information about numbers of infection and deaths per district and state (RKI, 2020c).

In practice, if the person dies in their own home or a nursing home, the doctor (who may be an emergency doctor of the ambulance service) may not know whether the person has been infected with the virus. In such cases, it is at the doctor's discretion to determine the cause of death and complete the death certificate. In principle, doctors can request a posthumous test. However, as posthumous testing for coronavirus is not covered by social health insurance, there is an incentive not to ask for a test. A post-mortem is not typically conducted, unless the death is seen as suspicious (i.e. potential suicide or act of violence). Until recently, the RKI advised against post-mortems in the case of a suspected Coronavirus infection, to reduce the risk of infection for health personnel.

The family of the deceased is legally obliged to notify the local registry office (*Standesamt*) of the death of their relative. If a person dies in hospital, care home or other facility, the hospital, care home or other facility are required to register the death at the local office. By law, the office has to be notified on the first working day after the day on which the death occurred. A number of documents need to be provided to register a death, including the person's birth certificate and death certificate. This requires a member of the family to attend in person or to commission the funeral company to organise the registration. The registry office provides the family with a record of the death (*Sterbeurkunde*), which is necessary for various administrative purposes (e.g. to demonstrate to a bank that an account holder has died).

Reporting of deaths at a national level

The RKI currently treats every death of a person with a confirmed infection of SARS-CoV-2 as a 'Corona death'. This requires a laboratory test. In Germany, the number of tests conducted is relatively high in comparison with other countries (OWID, 2020); however, it can be assumed that not everyone dying of COVID-19 has been tested, especially people who have died at home and not seen a physician because they have been afraid of contracting the virus in a health facility.

All COVID-19-related deaths reported to local health authorities are collected on a daily basis and presented in the RKI's COVID-19 Dashboard. The RKI acknowledges on its website that it can take 2-3 days for the data to arrive. The Dashboard indicates that reporting of COVID-19 death varies by week day, with significantly fewer deaths reported on Saturdays and Sundays than on other weekdays. The Dashboard also shows that some deaths are reported later than 2-3 days (sometimes weeks and months later) suggesting that the daily reporting captures the majority of the data but is not a complete account.

The Office for Statistics usually publishes detailed analyses of death statistics for the previous year following checks of the data for plausibility and completeness. For COVID-19 deaths, the Office for Statistics publishes preliminary data within four weeks (DESTATIS, 2020).

In Germany, there is concern about COVID-19 deaths being over-reported. This may be driven by a desire to downplay the impact of the epidemic and to strengthen the rationale for an end of restrictions to public life, although this is speculative. However, this issue is widely discussed in the media. Specifically, a distinction is being made between the deaths of people who have died 'from' the coronavirus, for whom the virus was the cause of death, and people who died 'with' the virus, i.e. who had a positive result for SARS-CoV-2 but died from another cause (e.g. a car accident or a chronic illness).

It is clear that there will be a significant grey area between deaths with and deaths from the virus, given that the infection is likely to aggravate pre-existing conditions. The RKI acknowledges that it

will not be possible to entirely distinguish between the two classifications of deaths. It is accepted that the full extent of excess deaths from COVID-19 can only be estimated through retrospective analysis of excess deaths compared to previous years (e.g. similar to calculating the excess death caused by seasonal flu).

Deaths in the community (care homes/home) and COVID-19

Over a third of all Covid-19 deaths have occurred in institutional facilities (RKI, 2020d). These include nursing and residential care homes, accommodation for rough sleepers, facilities for asylum seekers, and prisons, but the vast majority of these deaths will have occurred in care homes for older people. The RKI provides an overview of Covid-19 related deaths in facilities as part of its monthly situation report; however, it is not mandatory to provide information about the place of residence (i.e. whether in a facility or one's own home) and occupation (e.g. relating to care home personnel) and therefore underreporting is likely to occur. Given the age profile of Covid-19 fatalities and the reported outbreaks in residential and nursing homes, the RKI estimates that a high percentage of these deaths occurred in facilities for older people with care needs.

There has also been concern about the number of deaths of care personnel, but the number of cases reported in these facilities is relatively low (39 as of August 2020), although again there is likely to be underreporting. Still, the number of staff who have died in these types of facilities is slightly higher than the number of those who worked in ambulatory health care or hospitals.

There have been many reports of outbreaks in nursing and residential care homes and a survey undertaken by a regional television channel, MDR, in early April found that there were Covid infections in at least 520 care facilities (MDR, 2020). Shortages of protective equipment have been reported in both ambulatory care and care homes (Deutsches Ärzteblatt, 2020), and federal and state governments have stepped in to help purchase and distribute equipment to care providers.

The RKI has issued guidance on prevention and management of Covid-19 infections in care homes, which have been updated in May and July (RKI, 2020e). The federal government has decided a raft of measures to support care homes, including an increase in funding to allow care homes to adjust to the challenges faced during the pandemic. Measures also included the provision of additional financial benefits for care staff in appreciation of their efforts during the crisis. However, other measures vary between states, such as support for domiciliary care workers and support for unpaid (family) carers (Lorenz-Dant, 2020). There is also variation with regard to the testing regime at discharge from hospital and within care homes (including for staff) and with regard to the easing of measures over time, including changes to recommendations with regard to managing visits from relatives and friends, which have gradually been eased since May.

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Annex 5: Italy Country Report: Simone Ghislandi

Legislation and guidance provided at a national level

Italy was the first European country to face an infection wave. When the first non imported case was found, on the 21st February 2020, the epidemic wave was already developing. As documented by the excess mortality data (Ghislandi et al, 2020), mortality had already started increasing at the beginning of March. The fast evolution of the events justified the use of a series of emergency decrees (i.e. not voted or discussed by the Parliament) by the Italian Government.

These decrees were issued with a high frequency, especially in the early stages of the epidemic wave, and reflected the state of emergency the country was going through. In particular, since the 27th of February 2020 (Ministry of Health, 27th February 2020) and until the beginning of the Phase II of the epidemic (4th May 2020), the testing focussed on the symptomatic cases only. While in the initial stage of the epidemic the Istituto Superiore della Sanità (ISS, the Italian National Institute of Health) was requiring that all the positive tests should be sent to Rome for further confirmation (double checking, Ministry of Health, 22nd February 2020) before being officialised as COVID-19 positive, due to the high number of cases the rule was relaxed in early March and the test could be run by accredited regional laboratories, which would then report to the ISS in Rome about the results. According to the February decrees, a symptomatic COVID-19 patient would have fever and would show respiratory symptoms. GPs would have to quarantine these cases and report the case to the emergency number and to the local Operative Unit for Infection Diseases. Direct access to hospitals or Emergency Rooms was explicitly forbidden. Given the high number of cases in certain areas of the countries, most patients in quarantine never accessed the hospitals and were never tested. Also, during the peak of the epidemic in Lombardy, many potential COVID-19 patients died at home without being tested.

Regarding the death certificate, no new legislative arrangements were needed for considering COVID-19 as a possible notifiable causative agents.

Recording of deaths and death certificate

In Italy the certification and counting of deaths is regulated by a series of national and regional laws, some of which date back to 1934 (Regio Decreto 1265, 1934). In its current form, the (ISTAT) death certificate includes one health related part (part A) and one demographic part (part B). When the death happens in a healthcare facility part A is filled out by the healthcare personnel. If the deceased is at home, the GP, the doctor on call (*Guardia Medica*) or any other medical doctor must first certify the death. Within 24 hours, the GP is required to fill in the ISTAT certificate of death, part A. The causes of death can be more than one, but need to follow a logical sequence. The first cause is then the pathology/event that started the sequence of the conditions that brought to death. If the cause of death can not be determined, the certificate can include a 'not determined' option. Once the health part is filled in, the part B is compiled by the municipality (Comune) which then transmits the information to ISTAT.

Following a first period of uncertainty, on the 16th April 2020, ISTAT issued precise guidelines (ISTAT, 2020) regarding what should be included on the death certificate. According to these, the death certificate should include COVID-19 as a cause of death even when the positivity to the virus is just suspected (i.e. with symptoms, but not confirmed by a test). In addition, ISTAT specifies that the different possible causes of death must be ordered following a logical sequence, so that COVID-19 should be considered as the first cause of death when it is thought that without the virus the patient would have not died in that moment, independently from the severity of her or his concurrent conditions. This specification also avoids confusion regarding the medical conditions caused by COVID-19 (typically, pneumonia), which must be included among the secondary causes of death when COVID-19 is diagnosed or suspected.

Reporting of deaths at a national level

The total number of deaths at national level was collected on a daily basis by the ISS and reported in a daily conference (*Bollettino*) together with the number of new infections.

The approach taken by the ISS and Protezione Civile when counting the death toll for the purposes of the official statistics remained consistent throughout the infection wave: in order to be classified as a COVID-19 death, it is necessary and sufficient that the deceased is tested positive for COVID-19. This implies that people dying without being tested would not be classified as COVID-19 deaths. This issue, mainly due to service overcrowding and lack of equipment in the peak of the wave, represented a relevant source of under-reporting, especially for nursing homes and people dying at home. Research on excess mortality indeed confirmed that COVID-19 mortality was significantly underestimated by the official figures (Ghislandi et al, 2020). At the same time, concurrent conditions are not relevant for the classification of a death as COVID-19 related. Hence, the general approach of Italy was to avoid any distinction between mortality *with* and mortality *from* COVID-19.

Deaths in the community (care homes/home) and COVID-19

In a recent report on mortality in long term care facilities in Italy, the ISS found that more than 9000 people died in long term care facilities during the epidemic period in Italy (ISS, 2020). Furthermore, during the epidemic wave the majority of the residents in nursing homes died without a COVID-19 diagnosis. For example, in the nursing homes of Lombardy only 7.4% of the deceased during the epidemic period tested positive to COVID-19 (ISS, 2020). Among the reasons indicated for the peak in mortality in these facilities, health operators included the difficulty in both hospitalising the critical cases (hospitals were operating at full capacity) and isolating the suspected positives from the other residents. On the other hand, the limited availability of testing equipment within the facilities is the main reason for the peak in under-reporting of COVID-19 related deaths within long term care facilities. Testing availability is a necessary requirement for classifying COVID-19 as a cause of death. While in the initial stage of the epidemic the ISS required all positive tests to be sent to Rome for further checking (Ministry of Health, 22nd February 2020) before being confirmed as COVID-19

positive, the rule was relaxed in early March and the test could be run by accredited regional laboratories. Since the 27th of February 2020 (Ministry of Health, 27th February 2020) the testing focusses on the symptomatic cases only.

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Annex 6: Portugal Country Report: Céu Mateus

Legislation and guidance provided at a national level

Since 2017, coronaviruses have been included as MERS-CoV (new coronavirus - Middle East Respiratory Syndrome Coronavirus) as one of the listed diseases requiring mandatory notification. With regard to SARS-CoV-2, only laboratory confirmed suspect infections are defined as confirmed infections (currently PCR tests).

Recording of deaths and death certificate

In Portugal, since 2014, all institutions involved in the death certification process enter information directly into an electronic system without relying at all on paper records (e-death certification). This e-death certification allows for the synchronisation of the data from various institutions and ensures completeness and accuracy in mortality records. All deaths are recorded electronically by a physician through SICO (Sistema de Informação dos Certificados de Óbito – Information System of Death Certificates www.sico.pt). When someone dies of an infectious disease this has to be reported by the physician filling in the death certificate (Portaria n.º 162-A/2015; Despacho n.º 7214/2015).

SINAVE (National Epidemiological Surveillance System) is a public health surveillance system that identifies risk situations, collects, updates, analyses and disseminates data on communicable diseases and other public health risks, as well as preparing contingency plans emergency situations or as serious as public calamity. The SINAVElab data model for SARS-CoV-2 is designed and updated according to the epidemiological evolution and available scientific knowledge. Laboratory notifications are monitored daily to ensure data quality.

Physicians are required to fill in some information for all the infectious diseases that have to be notified and that is called the 'epidemiological survey'. As soon as possible, the physician in charge of the admission, notifies the case on the SINAVEmed platform, in line with the Law 81/2009 of 21st August, selecting the option 'coronavirus infection'. The SINAVE notification is printed to label all laboratory samples. (DGS, 2020a). Laboratory tests for infectious diseases have to be recorded on the electronic platform of the performing laboratory. The results should be recorded in SINAVE.

The Public Health Teams/Health Authorities are responsible for: i) Conducting the epidemiological survey, tracking contacts, and implementing appropriate Public Health measures, using SINAVE and 'TraceCOVID-19' (another web-based tool); ii) Completing the epidemiological survey at SINAVE (public health area). (DGS, 2020b).

All deaths of those with COVID-19 have to be reported by law by a physician irrespective of the place where they occur (hospital or community). The physician has to complete the death certificate and indicate if the person who has died was infected with COVID-19 to alert other health professionals and caretakers of the risk of infection.

Reporting of deaths at a national level

Every death of a person with a confirmed infection of SARS-CoV-2 is a 'COVID-19 death'. People with confirmed infections will have been tested and the number of tests conducted in Portugal is relatively high in comparison with many other countries. Nevertheless, one cannot assume that all those who have died of COVID-19 have been tested (for example, those who have died undiagnosed at home or in care homes).

All COVID-19 deaths are reported to local health authorities and collected on a daily basis. Data is presented daily by the General Directorate of Health (*Direção Geral da Saúde – DGS*). However, DGS recognises that sometimes data can take 2-3 days to update. Data collection systems have proved fallible during the pandemic and it is acknowledged that the daily reporting is reliable for capturing the main trend but is not fully accurate, and updates can take several days or weeks.

INE (*Instituto Nacional de Estatística* – Office for National Statistics) and DGS publish detailed analyses of death statistics for the previous year, or for longer periods, following checks of the data for accuracy and completeness.

Deaths in the community (care homes/home) and COVID-19

Deaths in the community/care homes are reported in the same way as deaths occurring in hospitals and the SICO system comprehends all the deaths taking place. If those dying have not been tested and given a confirmed diagnosis it might prove difficult to assign that death to COVID-19. However, unfortunately, in Portugal, as in many other countries, care homes have been particularly affected by COVID-19 and fatality rates have been high, at around 40% of all deaths (Público, 2020).

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Annex 7: United Kingdom Country Report: Anne West

The focus in this document is on England, however, reference is also made to the constituent countries of the UK, in particular Scotland, given its separate, longstanding legal system.

Legislation and guidance provided at a national level

New legislative arrangements relating to COVID-19 were introduced across the UK in 2020 (for earlier legislation, see Griffith, 2020). In England, on 5th March 2020, a statutory instrument was made into law;⁶ this added COVID-19 to the list of notifiable diseases and SARS-CoV-2 to the list of notifiable causative agents. Doctors have a statutory duty to notify their local council or local health protection team of suspected cases of certain infectious diseases; the notification form should be completed immediately on diagnosis of a suspected notifiable disease. This should be sent within 3 days unless urgent, in which case the notification should be within 24 hours by phone, letter, encrypted email or secure fax machine.

The form submitted by the doctor asks for information including the disease, infection or contamination, date of onset of symptoms, date of diagnosis, date of death (if patient died), name, gender, date of birth, ethnicity, NHS number, address, contact number, occupation, overseas travel, if relevant (destinations and dates).

The local authority (or equivalent) must then pass the notification to PHE within 3 days of a case being notified, or within 24 hours for urgent cases. The notification is separate from testing. (Until 18th July local authorities did not have full information about positive COVID-19 tests in their local area (Helm and Tapper, 2020). On 6th August, councils in England were offered near real-time data on COVID-19 cases in their local area (Halliday et al., 2020).)

Turning to other legislative provision, on 25th March 2020, The Coronavirus Act 2020 was enacted (across the whole of the UK). This was 'to enable the Government to respond to an emergency situation and manage the effects of the COVID-19 pandemic' (UK Government, 2020, p. 7). The Act contains temporary measures that amend existing legislative provisions or introduce new statutory powers. The Act makes changes to the requirements for death certification; there is a statutory obligation to report and COVID-19 can be given as a cause of death. If test results are not available, the practitioner can draw on clinical judgement. COVID-19 is an acceptable direct or underlying cause of death for the purposes of completing the death certificate (officially known as the Medical Certificate of Cause of Death (MCCD)).

Certain legislative provision differs across the countries of the UK. In Scotland for example, the Scottish Government made new regulations to make COVID-19 a Notifiable Disease; these came into force on 22nd February 2020 (Calderwood, 2020).

⁶ Medical practitioners have a statutory duty to notify suspected and confirmed cases of notifiable diseases to PHE under the Health Protection (Notification) Regulations 2010 and the Health Protection (Notification) Regulations 2020.

Recording of deaths and death certificate

During the COVID-19 pandemic there has been a relaxation of legislation concerning completion of the death certificate by doctors. Outside the emergency period, the doctor who attended the deceased during his or her last illness has a legal responsibility to complete a death certificate. In the emergency period, however, any doctor registered and licensed to practice by the General Medical Council can certify the death (Ministry of Justice, 2020).

If no doctor has attended the deceased within 28 days of death (including video/visual consultation) or he or she was not seen after death by a doctor, the death certificate can still be completed. However, the registrar of births and deaths is obliged to refer the death to the coroner before it can be registered (ONS and HMPO, 2020). The referral process is defined at a local level by each coroner, but the doctor is required to explain the medical history and circumstances of the death to assist the coroner with reaching a determination. The coroner can authorise the completion of the process of registration, or order a post-mortem examination (British Medical Association (BMA), 2020).

In a hospital setting, there may be several doctors in a team caring for the patient. In the final analysis, it is the consultant in charge of the patient who has responsibility for ensuring that the death is properly certified. The doctor must send the death certificate electronically to the local registrar of births, marriages and deaths. (Ministry of Justice, 2020). By law, deaths are required to be registered within 5 days of their occurrence unless there is to be a coroner's post-mortem or an inquest (ONS and HMPO, 2020).

Turning to the causes of death, government guidance notes that 'COVID-19 is an acceptable direct or underlying cause of death for the purposes of completing the Medical Certificate of Cause of Death'. Doctors are required 'to certify causes of death 'to the best of their knowledge and belief'. Thus, 'if before death the patient had symptoms typical of COVID19 infection, but the test result has not been received, it would be satisfactory to give 'COVID-19' as the cause of death...In the circumstances of there being no swab, it is satisfactory to apply clinical judgement'. The guidance also states that doctors 'are not expected to be infallible' (ONS and HMPO, 2020, pp. 4-5). If the doctor completing the form is aware that a test for COVID-19 has been carried out, the result should be stated if it is known (e.g. 'COVID-19 (positive test)').

The guidance published by the British Medical Association likewise notes that the cause entered on the death certificate is a matter of clinical judgement; this is determined on the basis of patient's recent and past medical history and the circumstances of his or her death:

In those cases where the doctor is confident on medical grounds that a particular cause of death is likely then that should be entered on the MCCD [death certificate]. COVID-19 is an acceptable direct or underlying cause of death for the purposes of completing the MCCD even without the results of a positive test, and it is important that likely COVID-19 deaths are reported as such via the registrar (BMA, 2020, p.2).

Turning to care homes, the provider is obliged to return a form to the Care Quality Commission (the independent regulator of health and social care in England) in the event of the death of a resident. The form that has to be submitted was updated on 23rd April to include COVID-19 as a cause of death. The form also asks where the death occurred. The provider is asked if the death was as a result of confirmed or suspected coronavirus (Care Quality Commission, 2020).

The guidance in the case of Scotland is broadly similar to that in England and Wales. On 24th March guidance was issued regarding the providing death certificates during the COVID-19 Pandemic (Calderwood and Harvie, 2020). This states that doctors should bear in mind that their 'clinical responsibility for appropriate certification of death requires that they be satisfied, on the balance of probabilities, as to the likely cause of death This complies with the concept of certification, to the best of one's knowledge and belief...' (p. 6).

The guidance further states that there may be some categories where identification of the cause of death is not straightforward. First, there may have been medical intervention but the doctor may have some doubt as to the cause of death; in this case he or she should consider the symptoms to see whether, 'on the balance of probabilities and to the best of their knowledge and belief, 'COVID-19 Disease' is the likely cause of death. These symptoms should include a persistent cough, high temperature and shortness of breathing in adults, and in children (who may have milder symptoms)' (p. 6).

Second, there may have been limited – or no – recent medical intervention and the doctor may have little information on the recent state of health of the person who has died. In these circumstances, he or she should:

consider the symptoms outlined above from relatives or friends, if available, as well as looking at the wider facts and circumstances. These wider facts and circumstances can include the fact that there is a COVID-19 Pandemic, that the COVID-19 Pandemic has struck in the locality, whether there was any evidence of medication suitable for treating the symptoms of a COVID-19 Pandemic found in or near the deceased's possessions e.g. analgesics, cough medicine, medicines to reduce the fever, etc. (p. 6).

Third, there may also be cases where the doctor finds some:

evidence of symptoms and/or surrounding circumstances that are compatible with, but perhaps not exclusive to, COVID-19 disease as being the cause of death. In such a case...it would be considered to be clinically responsible to certify the death as 'presumed COVID-19 disease (p. 7).

The guidance in England and Wales and Scotland is broadly similar although the basis on which the decision is made to list COVID-19 as a cause of death is specified, varies. Across the UK, it is clear that there is considerable discretion regarding whether or not COVID-19 is listed as a cause of death. One likely reason for this is that testing capacity in the UK was initially very limited.

Reporting of deaths at a national level

Until 17th July 2020, the UK Department of Health and Social Care (DHSC) released daily updates regarding the number of people who tested positive for COVID-19 whose deaths were reported on that day. This included any patient who had tested positive for COVID-19 but who might in fact have died from another condition (e.g. terminal cancer). Initially, hospital deaths only were reported. However, for the first time on 29th April 2020, the government's daily figure included deaths that had occurred in all settings in England where there had been a positive COVID-19 test, including hospitals, care homes and the wider community. Scotland, Wales and Northern Ireland and Wales were already reporting out-of-hospital deaths. In short, each day Public Health England combined the following data: (a) deaths that occur in hospitals, collected manually from NHS trusts; (b) deaths notified to local PHE Health Protection Teams; and (c) laboratory reports where a confirmed COVID-19 test has been linked to a death report from electronic hospital records (Public Health England, 2020a).

On 17th July, however, the Secretary of State (the most senior Minister) asked Public Health England (PHE) to review as a matter of urgency the way daily death statistics were reported (DHSC and PHE, 2020):⁷ this is because reported deaths may have included those who tested positive months before they died. On 12th August PHE decided that their data series would be revised to include two measures: deaths in laboratory-confirmed positive individuals where the death occurred within 28 days, and deaths within 60 days, or if the death occurred after 60 days, COVID-19 is listed on the death registration (PHE, 2020b).

In addition to the daily updates, the Office for National Statistics (ONS) reports deaths in different settings (hospital/care homes/community) in England and Wales on a weekly basis. The ONS counts all deaths as COVID-19 where COVID-19 was mentioned on the death certificate, regardless of whether the deceased was tested or if it was merely a suspected case of COVID-19. As the ONS relies on a death certificate having been issued, the data take longer to be published. The ONS also publishes age-standardised mortality rates (ASMRs) for deaths 'due to' and 'involving' COVID-19. ASMRs, unlike the number of deaths account for the population size and age structure (ONS, 2020a). (More information on the different sources of data used is provided in Table A3.)

⁷ PHE's definition of the daily death figures means that everyone who has ever had COVID-19 at any time must die with COVID too (Loke and Heneghan, 2020). In Scotland there is a 28-day cut-off after which a patient who has tested positive is not automatically considered to have died from the virus. Northern Ireland also uses the 28-day cut-off model (Busby and Stewart, 2020). (See Public Health Agency (2020) for policy in Northern Ireland.)

Deaths in the community (care homes/home) and COVID-19

There have been major concerns about deaths in care homes. In England as of 7th August, there had been 31,173 COVID-19 related deaths in hospital (63%), 14,668 in care homes (29%), 2,312 in private homes (5%) (the remaining 3% died in other communal settings) (ONS, 2020b).

As regards reporting, there were major concerns expressed during the pandemic about deaths in care homes not being reported (see Comas-Herrera et al., 2020), and it was not until 29th April that they were published. By law, care homes must report deaths to the relevant regulator (CQC), but until early April 2020 they were not asked whether the death was related to the SARS-CoV-2.

Although data are now reported there was comparatively little testing available across the UK initially (compared with Germany for example (see Rough, 2020), so daily figures are in all likelihood an underestimate of deaths. The limited testing capacity in the UK has been the subject of media debate (e.g. Booth, 2020) and an ongoing parliamentary inquiry by the Health and Social Care Committee (see BBC, 2020). In April 2020 it was announced that testing capacity would be expanded (DHSC, 2020a).⁸ In May 2020, the government announced an additional £600 million to support providers via a special fund for adult social care infection control (DHSC, 2020b).

⁸ There are now different pillars responsible for testing. Pillar 1: NHS swab testing for individuals who have a medical need and key workers deemed most critical; Pillar 2: Commercial-swab testing for critical key workers working in the NHS, social care and other sectors (this involves a partnership with universities, research institutes and companies, including Amazon and Boots, in order to build a network of new laboratories and testing sites across the UK); Pillar 3: Antibody testing to help determine if people have immunity to COVID-19; Pillar 4: Surveillance testing to understand more about COVID-19 and aid the development of new tests and treatments; Pillar 5: Diagnostics National Effort in order to build a mass-testing capacity (DHSC, 2020a).

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Table A3: United Kingdom Definitions of coronavirus (COVID-19) deaths between different sources						
	DHSC COVID-19 (as published on GOV.UK) before 29 April	DHSC COVID-19 (as published on GOV.UK) from 29 April	ONS COVID-19 deaths registered	ONS COVID-19 death occurrence (actual date of death)	NHS England	Public Health Wales
Coverage	UK (ONS only includes England and Wales breakdowns for comparable coverage with ONS data)	UK (ONS only includes England and Wales breakdowns for comparable coverage with ONS data)	Registrations in England and Wales	Registrations in England and Wales	England only	Wales only
			Selected UK figures are included in the weekly release	ONS in discussions with devolved nations to create UK estimates		
Inclusion	Deaths in hospitals	Includes any place of death, including care homes and community	Any place of death, including care homes and community	Any place of death, including care homes and community	Deaths in hospitals	Includes any place of death, including care homes and community
	Deaths where patient has been tested for COVID-19	Deaths where patient has been tested for COVID- 19	Deaths where COVID-19 has been mentioned on the death certificate	Deaths where COVID-19 has been mentioned on the death certificate	Deaths where patient has been tested for COVID-19	Deaths where patient has been tested for COVID-19
Timeliness	Provided daily but not officially registered	Provided daily but not officially registered	Weekly registrations are 11 days behind because of the time taken to register, process and publish	Weekly registrations are 11 days behind because of the time taken to register, process and publish	Updated daily for each date of death	Updated daily for each date of death

Source: Office for National Statistics, 2020a