

Original research

Preventable deaths from SARS-CoV-2 in England and Wales: a systematic case series of coroners' reports during the COVID-19 pandemic

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Abstract

Objectives To examine coroners' Prevention of Future Deaths (PFDs) reports to identify deaths involving SARS-CoV-2 that coroners deemed preventable.

Design Consecutive case series.

Setting England and Wales.

Participants Patients reported in 510 PFDs dated between 01 January 2020 and 28 June 2021, collected from the UK's Courts and Tribunals Judiciary website using web scraping to create an openly available database: <https://preventabledeathstracker.net/>.

Main outcome measures Concerns reported by coroners.

Results SARS-CoV-2 was involved in 23 deaths reported by coroners in PFDs. Twelve deaths were indirectly related to the COVID-19 pandemic, defined as those that were not medically caused by SARS-CoV-2, but were associated with mitigation measures. In 11 cases, the coroner explicitly reported that COVID-19 had directly caused death. There was geographical variation in the reporting of PFDs; most (39%) were written by coroners in the North West of England.

The coroners raised 56 concerns, problems in communication being the most common (30%), followed by failure to follow protocols (23%). Organisations in the National Health Service were sent the most PFDs (51%), followed by the government (26%), but responses to PFDs by these organisations were poor.

Conclusions PFDs contain a rich source of information on preventable deaths that has previously been difficult to examine systematically. Our openly available tool (<https://preventabledeathstracker.net/>) streamlines this process and has identified many concerns raised by coroners that should be addressed during the government's inquiry into the handling of the COVID-19 pandemic, so that mistakes made are less likely to be repeated.

Study protocol preregistration <https://osf.io/bfypc/>.

Introduction

Over 5 million deaths worldwide have been attributed to SARS-CoV-2¹; some deaths may have been preventable.

Summary box

What is already known about this subject?

- ⇒ The UK Government has stated that there will be a public inquiry into the handling of the COVID-19 pandemic, to learn lessons for future pandemics.
- ⇒ Coroners in England and Wales have a duty to report and communicate information about the deaths they investigate when the coroner believes that action should be taken to prevent future deaths.
- ⇒ These reports, called Prevention of Future Deaths (PFDs) reports, had not yet been systematically analysed to identify deaths that occurred during the COVID-19 pandemic.

What are the new findings?

- ⇒ We created the Preventable Deaths Database (<https://preventabledeathstracker.net/>) using web scraping to systematically assess PFDs published on the Courts and Tribunals Judiciary website.
- ⇒ Between 01 January 2020 and 28 June 2021, 1 in 20 (4.5%, n=23) PFDs that were published by coroners involved SARS-CoV-2.
- ⇒ Coroners raised many concerns about the care of patients in hospitals, care homes and people in the community during the COVID-19 pandemic, which require action to prevent future deaths.

In England and Wales, causes of deaths are investigated by coroners during an inquest, unless the death is natural or referred to the criminal court. Under UK regulations, coroners have a duty to report and communicate information about the deaths that they investigate when they believe that actions should be taken to prevent similar deaths.^{2–4} Such reports, previously called Rule 43 reports, are named Prevention of Future Deaths reports or PFDs. Despite these regulations,

Summary box

How might it impact clinical practice in the foreseeable future?

- ⇒ Preventable deaths that occurred during the COVID-19 pandemic should be referred to the coroner so that an inquest can be performed and a PFD issued, highlighting actions that could be avoided in improving the handling of future pandemics in both the UK and elsewhere.
- ⇒ Our tool, <https://preventabledeathstracker.net/>, can be used by others to examine preventable deaths in England and Wales, and to identify signals for quality improvement to reduce avoidable harms in clinical practice.

there is no formal system in place for auditing or systematically analysing PFDs, so concerns raised by coroners in such reports may go unrecognised and unreported, reducing the impact of the PFD system.

The PFD system has three processes: (1) coroners write PFDs after the inquest and send reports to those with the power to act; (2) addressees respond to coroners regarding the concerns raised in PFDs within 56 days; and (3) actions to prevent such deaths are proposed and ideally implemented. In December 2020, a series was launched in *BMJ Evidence-Based Medicine* to disseminate PFDs that highlight lessons for clinical practice and policy.⁵ Case reports in the series have identified deaths from ingesting alcohol-based hand sanitiser, misdiagnosed adverse drug reactions, problems with repeat opioid prescriptions and fire hazards from emollient products.^{6–9} Case series of PFDs have also been conducted to investigate preventable deaths from medicines and misused drugs, suicides, cardiovascular disease and cycling.^{10–13}

During the COVID-19 pandemic, healthcare professionals in England and Wales called for the deaths of their colleagues to be reported to coroners and for PFDs to be issued.^{14 15} However, PFDs issued during the COVID-19 pandemic have not been analysed. We therefore aimed to systematically analyse PFDs in which SARS-CoV-2 was directly or indirectly implicated in a death.

Methods

We extracted a series of cases from the Courts and Tribunals Judiciary website and analysed them according to a study protocol that was preregistered on an open repository.¹⁶

Data collection

PFDs are published on the Courts and Tribunals Judiciary website.¹⁷ We used web scraping to systematically collect all published PFDs and created a searchable database, the Preventable Deaths Database,¹⁸ which can be efficiently updated. The code for the web scraper is openly available on GitHub and the methods have been previously described.^{19 20} The Preventable Deaths Database contains the case reference number; the date of the report; the name of the deceased; the coroner's name; the coroner's jurisdiction; the category of death (as assigned by the Chief Coroner's Office); to whom the report was sent and the URL to the Judiciary website.

Eligibility of cases

We screened all 510 PFDs in the Preventable Deaths Database, dated from 01 January 2020 to 28 June 2021, for cases that mentioned COVID-19 as a direct or indirect cause of death. Direct deaths were defined as those that the coroner explicitly attributed to COVID-19 as a cause of death or were associated with a positive test for COVID-19 within 28 days of death. Indirect deaths were defined as those that were not medically caused by COVID-19, but where coroners mentioned that the associated mitigation measures during the COVID-19 pandemic (for example, missed appointments due to lockdown) had contributed to the death. Cases that did not mention SARS-CoV-2 or an effect of the COVID-19 pandemic were excluded.

Data extraction

For included cases, one study author (BS) manually extracted the following variables into a predesigned Google Sheet, which was cross-examined by another study author (GCR): the individuals or organisations to whom reports were sent and who responded; date of death; age; sex; setting or location of death; medical cause(s) of death; the coroner's conclusion(s) of the inquest; relevant medical, mental health and social history; substance(s) implicated in the death and the type of substance(s); and the coroner's concerns. The data available for extraction were limited by the information reported by coroners in the PFDs.

Data analysis

We used descriptive statistics to describe the numbers and types of cases that met the eligibility criteria for inclusion. The numbers and types of individuals and organisations who received PFDs were synthesised and response rates to coroners were calculated. A response rate of 100% meant that the individual or organisation responded to all published PFDs issued by coroners. Once all concerns were extracted, one study author (BS) read through all the concerns and used content analysis to count and classify each concern inductively.²¹

Software

We used Tableau to present the coroners' concerns visually and Data Wrapper to geographically map the number of PFDs reported in each region of England and Wales.

Patient and public involvement

Patients and the public were not involved in this study.

Results

Figure 1 shows the results of the extraction process. Of 510 PFDs reported on the Judiciary website between 01 January 2020 and 28 June 2021, 23 (4.5%) were attributed to COVID-19 and deemed preventable by coroners (table 1).

Most of the deaths (78%; n=18) occurred in men, and the median age at death was 76 years (IQR: 50–87 years; range: 18–90 years; n=11). The deaths occurred between 13 April 2020 and 03 April 2021, but the date of death was unreported in six cases.

Causes of death

Eleven deaths (48%) were directly related to COVID-19, defined as those for which the coroner explicitly reported COVID-19 as a cause of death or that were associated with a positive test for COVID-19 within 28 days of death. Risk factors for death from COVID-19 included type 2 diabetes mellitus, kidney disease, hypertension, heart failure and epilepsy (table 1). Pneumonitis

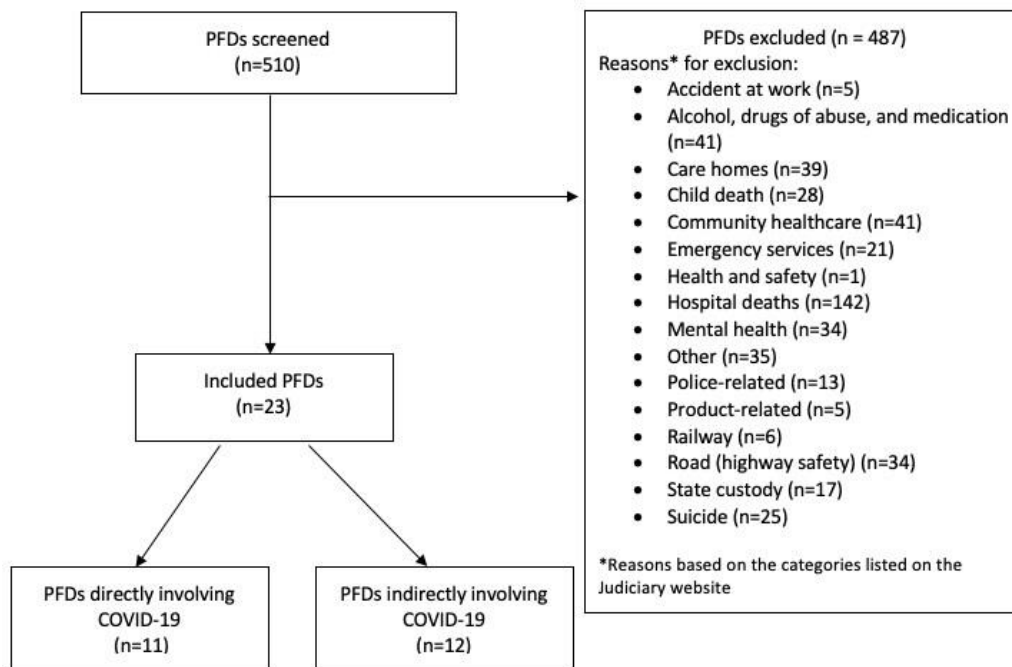


Figure 1 Flow diagram depicting the number of Prevention of Future Deaths (PFDs) reports screened and included or excluded using the predefined eligibility criteria. Created by the authors.

co-occurred in 64% of deaths (n=7). One death was attributed to drowning, to which COVID-19 and asthma contributed. In one-third (36%; n=4) of the direct deaths, patients contracted COVID-19 as inpatients for other reasons, and another contracted COVID-19 while a care home resident. One man's symptoms of COVID-19 were undiagnosed during a telephone appointment and untreated, resulting in death. In four cases (36%), it was unclear how the deceased had contracted COVID-19.

Twelve deaths (52%) were indirectly related to COVID-19, defined as those that were attributed to mitigation measures during the pandemic. There were three suicides and two cases of inappropriate prescription of medications during lockdown. Two deaths occurred because the deceased refused to go to hospital or a care home, against medical advice, owing to fears of COVID-19. A further two deaths occurred from complications with medical devices when medical appointments were cancelled owing to lockdown and inadequate follow-up; a catheter was not changed in one case, causing urosepsis, and a salivary bypass tube was accidentally left inside the patient, where it perforated the small bowel. In two cases, deaths were attributed to undiagnosed medical problems after incorrect diagnoses of COVID-19 via remote telehealth appointments. One death was due to natural causes, contributed to by several falls and a fractured neck of femur in a patient with advanced dementia.

The 23 deaths were classified into nine groups by the Chief Coroner's Office; hospital related (28%; n=11), community healthcare (18%; n=7), care homes (13%; n=5), other (13%; n=5), emergency services (10%; n=4), alcohol, drugs of abuse and medications (8%; n=3), mental health related (5%; n=2), suicide (3%; n=1) and service personnel related (3%; n=1).

Geographical variation

Twelve coroners across 12 jurisdictions wrote PFDs relating to COVID-19. Most were written by coroners in the North West of England (39%; n=9), followed by the South East (22%; n=5) and London (17%; n=4) (figure 2; online supplemental table 1).

Coroners in the South West, North East, West Midlands and Wales did not report any deaths deemed preventable from COVID-19.

Coroners' concerns

The coroners raised 56 individual concerns in the 23 PFDs. We categorised them into 28 groups and 5 higher order categories (figure 3; online supplemental table 2). Poor communication was reported in one-third of PFDs, followed by failure to follow protocols (23%), lack of education and training (19%), lack of resources (16%) and safety concerns (12%).

Communication

Most (42%, n=8) concerns involved poor communication, followed by failure to keep accurate medical records/care plans (n=5) and failure to consider how the COVID-19 pandemic would affect appointments (n=3).

Example 1

An elderly woman residing in a care home, at high risk of falls, became unwell. Her general practitioner (GP) remotely diagnosed suspected COVID-19, and she was isolated in her room, with staff observation and sensor mats to ensure her well-being. She fell while unobserved and was admitted to hospital with a fractured neck of femur, bronchopneumonia and possible COVID-19. A test for SARS-CoV-2 was negative. She was unfit for surgery, deteriorated and later died in hospital from bronchopneumonia. The care home had a risk plan that stipulated that she was to be observed during the day in communal areas. However, the home was not staffed to provide one-to-one observation for residents in self-isolation.

The coroner believed that it was unclear how care homes were being advised to safely manage residents at risk of falls when isolation was required, and the home knew of no guidance they could follow to manage the risk. Furthermore, restrictions on family visitors when in hospital presented significant communication

Table 1 Summary of 23 deaths involving SARS-CoV-2 as reported in Prevention of Future Deaths (PFDs) reports in England and Wales between 1 January 2020 and 28 June 2021, ordered by causes and date of death (created by the authors)

Age	Sex	Dates			Causes of death	Responses to PFDs	
		Death	Inquest	Report		Addressee(s)	Date of reply*
Directly related to COVID-19							
–	M	13 Apr 2020	14 Apr 2020	01 Dec 2020	1. Community-acquired pneumonia 2. COVID-19 3. Dementia, chronic obstructive pulmonary disease, asbestos-related pulmonary fibrosis, pleural plaques, type 2 diabetes	1. CQC 2. Vicarage Residential Care Home 3. Public Health England 4. NHS England 5. Greater Manchester Health and Social Care Partnership	1. 04 Feb 2021 2. Undated 3. 26 Jan 2021 4. 02 Mar 2021 5. 19 Feb 2021
86	F	17 Apr 2020	03 Jul 2020	11 Dec 2020	Natural causes and COVID-19	Whipps Cross Hospital	Received but not dated
74	M	21 Apr 2020	22 Apr 2020	01 Dec 2020	1. Hypovolemic shock 2. End-stage kidney disease 3. Polyneuropathy, frailty and COVID-19	1. Department of Health and Social Care 2. Royal London Hospital	Not yet received†
–	M	21 May 2020	26 May 2020	09 Dec 2020	1. COVID-19 pneumonia 2. Right-sided neck of femur fracture, hypertension, atrial fibrillation	1. Public Health England 2. NHS England	1. 11 Feb 2021 2. 09 Feb 2021
18	M	31 Jul 2020	03 Aug 2020	30 Mar 2021	Drowning to which COVID-19 and asthma were contributory	1. Craven District Council 2. Yorkshire Dales National Park 3. Yorkshire Water	Not yet received†
–	M	07 Sep 2020	07 Sep 2020	24 Apr 2021	1. Bronchopneumonia in combination with COVID-19 2. Falls with vertebral fractures, type 2 diabetes mellitus, pulmonary fibrosis, heart failure and epilepsy	1. Greater Manchester Health and Social Care Partnership 2. NHS England	1. 07 Sep 2021 2. 02 Jul 2021
–	M	15 Nov 2020	16 Nov 2020	11 Jun 2021	1. COVID-19 pneumonitis 2. Chronic obstructive pulmonary disease, ischaemic heart disease, previous right upper lobe resection for lung adenocarcinoma, type 2 diabetes mellitus	Tameside CCG	24 Jun 2021
90	M	28 Jan 2021	08 Feb 2021	23 Apr 2021	1. COVID-19 pneumonia 2. Dementia, heart failure, acute on chronic subdural haematoma, fall	Medway Maritime Hospital	07 Jun 2021
–	M	05 Feb 2021	08 Feb 2021	10 Jun 2021	1. COVID-19 on background of immunomodulatory treatment 2. Seborrheic eczema 3. Peripheral vascular disease	1. NHS England 2. Secretary of State of Health	Not yet received†
–	M	14 November 2020	17 Nov 2020	14 Jun 2021	1. Aspiration pneumonia on a background of a choking incident, COVID-19 pneumonitis 2. Alzheimer's dementia	1. MHRA 2. NHS Stockport CCG	1. 27 Jul 2021 2. 06 Aug 2021
–	M	–	30 Oct 2020	19 Feb 2021	COVID-19 pneumonitis	1. Brighton Sussex University NHS Hospital Trust 2. West Sussex NHS Hospital Trust 3. Medicolegal	1. 19 Mar 2021 2. Not yet received† 3. Not yet received†
Indirectly related to COVID-19							
32	F	19 Mar 2020	30 Mar 2020	23 Nov 2020	1. Hanging 2. Bipolar affective disorder	1. Sussex Partnership Foundation NHS Trust 2. Brighton and Hove City Council	1. 10 Feb 2021 2. 10 Feb 2021
–	M	17 Apr 2020	24 Apr 2020	07 Dec 2020	Metadone toxicity	1. Public Health England 2. Haverhill Pharmacy	1. 13 Jan 2021 2. Undated
–	M	24 Apr 2020	05 May 2020	19 Nov 2020	Suicide	1. Woolwich Station Medical Centre 2. Ministry of Defence	1. Not received† 2. 16 Feb 2021
–	F	20 Jun 2020	23 Jun 2020	11 Feb 2021	1. Bronchopneumonia 2. Frailty 3. Dementia 4. Hypertension 5. Fractured neck of femur	1. CQC 2. Department of Health and Social Care	1. 04 Jun 2021 2. 03 Jun 2021

Continued

Table 1 Continued

Age	Sex	Dates			Causes of death	Responses to PFDs	
		Death	Inquest	Report		Addressee(s)	Date of reply*
28	M	10 Aug 2020	14 Aug 2020	15 Mar 2021	Suicide	Sussex Partnership NHS Foundation Trust	Not yet received†
76	F	28 Sep 2020	03 Dec 2020	16 Dec 2020	Atherosclerosis and complete blockage of one artery	1. NHS Pathways‡ 2. COVID-19 Pandemic Response Service	10 Feb 2021
–	M	25 Oct 2020	26 Oct 2020	02 Jun 2021	Combined drug toxicology	Stockport CCG	07 Jul 2021
77	M	–	08 Oct 2020	02 Feb 2021	1. Advanced dementia 2. Fractured neck of femur 3. Ischaemic heart disease	1. Adult Social Services, Norfolk County Council 2. Norfolk and Norwich University Hospital	1. 11 Mar 2021 2. 09 Apr 2021
88	M	–	20 Aug 2020	05 Feb 2021	1. Bronchopneumonia 2. Heat stroke 3. Dehydration	Care Outlook	18 Apr 2021
–	M	–	11 Aug 2020	07 May 2021	1. Small bowel obstruction and perforation 2. Ingestion of foreign body	Norfolk and Norwich University Hospital NHS Foundation Trust	23 Jul 2021
68	F	–	20 Sep 2020	14 Dec 2020	1. Pneumothorax 2. Rib fractures 3. Fall 4. Chronic obstructive pulmonary disease and ischaemic heart disease	West Midlands Ambulance Service	08 Jan 2021
87	M	–	08 Oct 2020	07 May 2021	1. Urosepsis 2. Long-term indwelling catheter not changed since October 2019 3. Alzheimer's dementia, cerebrovascular accident, chronic kidney disease, bladder cancer, prostate cancer	Lower Clapton Group Practice	24 Jun 2021

Deaths directly related were defined as those that the coroner explicitly reported COVID-19 as a cause of death or a positive test for COVID-19 within 28 days of death. Indirectly related deaths were defined as those that were attributed to mitigation measures during the COVID-19 pandemic.

*Recipients of PFDs have 56 days from the date of report to respond to the coroner under Regulation 29 of the Coroners (Investigations) Regulations 2013.

†Replies were still overdue on 18 Oct 2021; however not all replies are posted on the Judiciary website.

‡NHS Digital responded on behalf of NHS Pathways and the COVID-19 Pandemic Response Service.

CCG, Clinical Commissioning Group; CQC, Care Quality Commission; MHRA, Medicines and Healthcare products Regulatory Agency; NHS, National Health Service.

problems, which reduced appropriate support and timely clinical decision-making.

Failure to follow protocols

The failure to regularly monitor/observe the patient was the most common form of failure (36%; n=4), followed by a general failure to follow protocols, omission of necessary treatment and delayed discharge (figure 3).

Example 2

A 28-year-old man with a lifelong history of low mood and depression with suicidal ideation was socially isolated, which was exacerbated when he was furloughed from his job. He had made five or six attempts to kill himself in 2020 alone and came to the attention of a National Health Service (NHS) Trust in May 2020. He registered with a GP at around the same time and was assessed by a mental health practitioner, who referred him for treatment. The man was aware of the referral and waited for treatment, but unfortunately the referral was lost. He died by suicide at home 2 months later.

The coroner concluded that the Care Programme Approach (CPA), as set out in national guidance 'Refocusing the CPA—Policy and Positive Practical Guidance', had not been followed. It was clear at the inquest that staff members were not aware of how matters should be dealt with and that this depended heavily on geographical location.

Education and training

The most common concern was poor clinical decision-making (30%, n=3), followed by inappropriate dosage of medication (20%, n=2).

Example 3

A man with drug dependency had been receiving support from a Recovery Network and was generally fit, well and in good spirits. He received a regular prescription for methadone in daily dosage bottles three times per week. During the COVID-19 pandemic, this regimen was changed to once every 14 days, giving him access to a much larger quantity of methadone. The deceased was found at home with a very high blood concentration of methadone. There was no evidence that he intended to take his own life. At the start of the pandemic, Public Health England (PHE) guidance was issued that patients taking short-term methadone should be moved to long-term treatment. The doctor who changed the prescription stipulated that the drug must be supplied in single daily dosage bottles, and explanatory letters had been sent to all the pharmacies that supplied opiate replacement therapies to his patients.

The coroner saw evidence that the prescription was not in daily dose bottles and that there was no measuring jug to enable accurate measurement of doses. The coroner believed that it was probable that the man had guessed his first dose from the large methadone bottle. If he had been given his daily dosage bottles, as



Figure 2 Map of the number of Prevention of Future Deaths reports involving COVID-19 issued by coroners in England and Wales between 1 January 2020 and 28 June 2021. Created by the authors.

prescribed, a measuring jug and instructions on how to use it, his death might have been prevented.

Resources

Lack of awareness of appropriate protocols and national guidelines was the most common failure (40%, n=4), followed by

understaffing (30%, n=3), a shortage or lack of availability of medical equipment (20%, n=2), and unclear protocols (10%, n=1).

Example 4

A man was admitted to hospital after an accidental fall at home. After surgery for a fractured hip, he developed a chest infection. When fit for discharge, he was moved to several different wards and eventually put in a bay where patients had been exposed to COVID-19. He subsequently tested positive for COVID-19, deteriorated rapidly and died.

The coroner heard that the decision to move the deceased had been made on interpretation of guidance from PHE. The Trust changed its policy, and such movements are reportedly no longer taking place. However, when the PFD was written, the guidance from PHE had not been amended, and it was not known how other Trusts were choosing to interpret the guidance, potentially putting other vulnerable inpatients at risk of COVID-19. Rapid and national dissemination of coroner’s concerns might have prevented similar errors in other hospitals.

Safety

Half of the concerns about safety related to facilities (50%, n=3), followed by poor systems (33%, n=2) and inadequate discharge processes (17%, n=1).

Example 5

A resident in a care home, who had pulmonary fibrosis, had an unwitnessed fall. He lay on the floor for over 4 hours awaiting an ambulance. Sepsis was diagnosed and it was thought that he had symptoms consistent with COVID-19. He remained at the home until 11 April, became unresponsive, deteriorated rapidly, was moved to palliative care and died on 13 April 2020.

The coroner reported that the care had been of limited quality, notwithstanding the diagnosis of COVID-19 and his vulnerability. The care home was unclear if staff had brought COVID-19 into the home or if admission of residents from the community who had not been

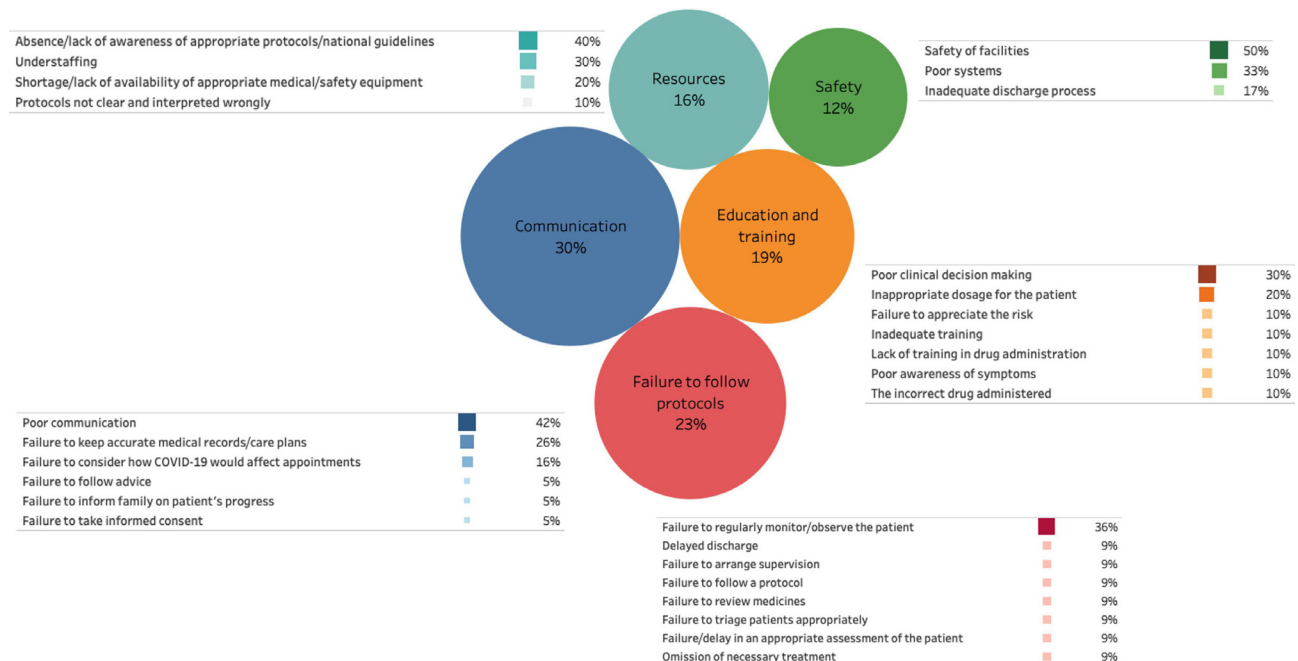


Figure 3 Concerns raised by coroners in Prevention of Future Deaths reports involving COVID-19 in England and Wales between 1 January 2020 and 28 June 2021. Created by the authors.

Table 2 Recipients of Prevention of Future Deaths (PFDs) reports involving COVID-19 in England and Wales between 1 January 2020 and 28 June 2021 and their response rates (created by the authors)

Addressee	Number of PFDs sent	Number of responses*	Response rate (%)
NHS organisations	22	10	45
Trusts	5	2	40
NHS England	4	2	50
NHS Hospitals	4	3	75
CCGs	3	0	0
Health and Social Care Partnerships	2	1	50
NHS Pathwayst	1	1	100
Ambulance services	1	1	100
GPs	2	0	0
Government	11	7	64
Public Health England	3	3	100
Department of Health and Social Care	2	1	50
Local authorities	3	2	67
COVID-19 Pandemic Response Servicet	1	1	100
Secretary of State of Health	1	0	0
Ministry of Defence	1	0	0
Professional bodies	4	2	50
CQC	2	2	100
General Pharmaceutical Council	1	0	0
MHRA	1	0	0
Other	6	3	50
Care homes/providers	2	2	100
Water board	1	0	0
National Park	1	0	0
Legal	1	0	0
Pharmacy	1	1	100

*Recipients of PFDs have 56 days from the date of the report to respond to the coroner under Regulation 29 of the Coroners (Investigations) Regulations 2013.

tNHS Digital responded on behalf of NHS Pathways and the COVID-19 Pandemic Response Service.

CCG, Clinical Commissioning Group; CQC, Care Quality Commission; GPs, general practitioners; MHRA, Medicines and Healthcare products Regulatory Agency; NHS, National Health Service.

tested before admission had caused COVID-19 to enter the home. There was no risk assessment in place relating to the admission of new residents, creating an unsafe environment for vulnerable people.

Responses to PFDs

Forty-three unique individuals and organisations received PFDs from coroners (table 2). Most reports were sent to the NHS (51%; n=22), followed by the government and related bodies, other organisations and professional bodies. Government organisations had the highest response rates (64%; n=7), followed by professional bodies (50%; n=2), other organisations (50%; n=3) and NHS organisations (45%; n=10). Of the 23 PFDs, 9 had a 100% response rate and 10 had no responses on the Judiciary website.

Discussion

One in 20 PFDs published online involved COVID-19. Most of the deaths occurred in men and older adults. There was wide

geographical variation: no PFDs were reported by coroners in Wales or in the North East, East Midlands or South West of England. Coroners raised several concerns, particularly regarding problems with communication and following protocols. The largest numbers of PFDs were sent to NHS Trusts and the government.

Eleven deaths were directly caused by SARS-CoV-2. In one-third of these cases, patients acquired COVID-19 after admission to hospital for an unrelated reason, and another acquired COVID-19 while in a care home. This suggests that measures to reduce the transmission of SARS-CoV-2 in healthcare settings were not adequate. Healthcare settings should focus on evidence-based provisions, such as ventilation, personal protective equipment and regular testing to mitigate the risk to vulnerable patients.²²

Twelve deaths were indirectly attributed to the COVID-19 pandemic. This finding highlights the importance of considering the harms of measures and policies that were implemented to reduce the transmission of SARS-CoV-2 in the community. Reduced social interactions and changed working conditions or loss of work and income have negatively affected adult mental health in the UK.²³ Six million patients in the UK did not seek treatment in 2020 (so-called 'missing patients'), owing to re-prioritisation of healthcare services.²⁴ In some cases, reduced access to care because of lockdown, despite telemedicine, led to deaths.

Healthcare professionals in England and Wales have called for the deaths of their colleagues to be reported to coroners and for PFDs to be issued.^{14 15} However, we did not identify any PFDs that reported deaths of healthcare professionals.

The UK Government has stated that they will begin their public inquiry into the handling of the COVID-19 pandemic to learn lessons for future pandemics.²⁵ We have identified several areas that the government should address during this inquiry, including poor communication and gaps in education and training. PFDs should be examined by the government and healthcare providers to inform quality improvement and patient safety initiatives.

The Office of the Chief Coroner, who is responsible for uploading PFDs to the Courts and Tribunals Judiciary website, categorised the COVID-19-related PFDs into nine groups, including hospital related, community healthcare and care homes. A new category specifically for the effects of pandemics should be added to the Judiciary website to assist the government in examining these case reports so that policy measures can be implemented for future pandemics.

Our study has several limitations. The 23 deaths do not represent all deaths during the COVID-19 pandemic that could have been prevented in England and Wales. We are also limited by the information reported by coroners in PFDs. In 52% of PFDs, the age of the deceased was not reported and 26% did not report the date of death. There were also regions in England and Wales that did not report any PFDs.

Under-reporting of PFDs limits the capacity for actions to be taken to prevent future deaths. However, it is likely that more PFDs relating to COVID-19 will be published, owing to the backlog of inquests and the time it takes for inquests to conclude and PFDs to be written and published.

There are no clear guidelines in England and Wales for referring deaths to coroners nor for determining when a PFD should be issued and what information to include, hence the missing data. There is also no auditing or quality control of PFDs and their responses. Thus, whether action is taken to prevent such deaths, and the timeliness of such action, is unknown and unmonitored. In the meantime, we encourage coroners across England and

Wales to continue writing PFDs when they believe that deaths could have been prevented.

PFDs contain a rich source of information that can be systematically analysed to share information on preventing harms. The concerns identified in the 23 PFDs should be considered during the UK Government's inquiry, including how communication, protocols, education, training, resources and patient safety can be improved. Guidelines on how and when to report deaths to coroners, thresholds for issuing PFDs, and the necessary mandatory types of information to report in PFDs, including age and date of death, are needed. Coroners in England and Wales should be encouraged to continue writing PFDs during the COVID-19 pandemic, particularly when deaths involve frontline healthcare professionals.

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Contributors GCR developed the idea for this study, wrote the initial study protocol, ran the python code to collect the most recent PFDs for screening, contributed to the first draft of the manuscript and provided supervisory support. BS acts as the guarantor and contributed to the study protocol, screened the 510 PFDs for their eligibility, extracted the data from the 23 included cases, analysed the data and wrote the first draft of the manuscript. CH, JA and DH contributed to the study protocol and supervision of the project. All authors read, reviewed and approved the manuscript prior to submission.

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APPENDIX

Supplementary table 1: Jurisdictions of coroners who issued Prevention of Future Deaths reports involving SARS-COV-2 in England and Wales between 01 January 2020 and 28 June 2021. Created by the authors.

Region	No. of cases (%)
North West England	9 (39.1)
Greater Manchester	6 (26.1)
Manchester South	2 (8.7)
County of Cumbria	1 (4.3)
South East	5 (21.6)
Brighton and Hove	3 (13.0)
Mid Kent and Medway	1 (4.3)
North East Kent	1 (4.3)
London	4 (17.3)
Inner North London	3 (13.0)
East London	1 (4.3)
East of England	3 (13.0)
Norfolk	2 (8.7)
Suffolk	1 (4.3)
Yorkshire and the Humber	1 (4.3)
North Yorkshire	1 (4.3)
West Midlands	1 (4.3)
Black County	1 (4.3)
North East	0
East Midlands	0
South West	0
Wales	0

Supplementary table 2: Concerns raised by coroners in Prevention of Future Deaths reports involving COVID-19 in England and Wales between 01 January 2020 and 28 June 2021. Created by the authors.

Concerns	No. of cases (%)
Communication (30%)	
Poor communication	8 (42)
Failure to keep accurate medical records/care plans	5 (26)
Failure to consider how COVID-19 would affect appointments	3 (16)
Failure to take informed consent	1 (5)
Failure to follow advice	1 (5)
Failure to inform family on patient's progress	1 (5)
Failure to follow protocols (23%)	
Failure to regularly monitor/observe the patient	4 (36)
Failure to follow a protocol	1 (9)
Omission of necessary treatment	1 (9)
Delayed discharge	1 (9)
Failure/delay in an appropriate assessment of the patient	1 (9)
Failure to triage patients appropriately	1 (9)
Failure to arrange supervision	1 (9)
Failure to review medicines	1 (9)
Resources (16%)	
Absence/lack of awareness of appropriate protocols/national guidelines	4 (40)
Understaffing	3 (30)
Shortage/lack of availability of appropriate medical/safety equipment	2 (20)
Protocols not clear and interpreted wrongly	1 (1)
Education and training (19%)	
Poor clinical decision making	3 (30)
Inappropriate dosage for the patient	2 (20)
Inadequate training	1 (10)

Poor awareness of symptoms	1 (10)
Failure to appreciate the risk	1 (10)
Lack of training in drug administration	1 (10)
The incorrect drug administered	1 (10)
Safety (12%)	
Safety of facilities	3 (50)
Poor systems	2 (33)
Inadequate discharge process	1 (17)