# Expert Report for the UK Covid-19 Public Inquiry

## Module 3: The impact of the Covid-19 pandemic on healthcare systems in the UK

# Emergency Prehospital Care and Shielding

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Professor Snooks is the expert who was instructed for this report, will give evidence and who holds overall responsibility for the report. She gratefully acknowledges the contributions of Assistant Professor Porter developing content for this report, and Dr Mark Kingston for further contributions.

We would like to acknowledge the following people for their contributions through consultation to preparation of this report.

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## Contents

# Preamble

## Professor Helen Snooks

i. Relevant qualifications and experience: I am a Professor of Health Services Research with over thirty years' experience in the fields of emergency and unscheduled care, particularly emergency prehospital care; primary care and public health. I am primarily a methodologist, with considerable topic knowledge in these areas. I have been Editor for the National Institute for Health and Care Research for over ten years and have recently taken on the role of Senior Editor for the National Institute for Health and Care Research's (NIHR) Health and Social Care Delivery Research programme.

ii. I have led the drafting of this report. Dr Alison Porter has written the first draft of some questions, in particular those related to workforce or where evidence is qualitative in nature. Dr Porter has provided comments throughout. Dr Mark Kingston has sourced information and produced figures included in the emergency care section of the report.

iii. In drafting the report, I have drawn upon existing published evidence, including from my own work. In addition, I have used publicly available sources of data and policy documents. All sources are referenced in full.

iv. I have summarised published scientific evidence, publicly available policy documents and statistics to address each question the Inquiry posed. Where I have included my own opinion, this is clearly stated.

v. Throughout the report I am transparent about sources and facts and have included my interpretation of validity and implications.

vi. Where I am aware that views differ, I have summarised the range of opinions and given reasons for the opinion I have reached, where this is the case. Where I believe there remains uncertainty, I have stated this.

vii. I summarise my expert conclusions at the end of the report.

viii. Where I am not able to give an opinion without qualification, I state the qualification.

ix. I understand my duty to provide independent evidence and have complied with that duty.

Helen Snooks

09/08/24

# Section 1: Emergency pre-hospital care

## Introduction – access to emergency pre-hospital care

1. Emergency ambulance (999) care is provided by 14 ambulance services across the UK, each serving a geographically defined population. It is free to all callers and patients at the point of use. There are ten freestanding NHS Ambulance Service Trusts in England, covering populations ranging between 3.5 million to 8.6 million, while services on the Isle of Wight are delivered by an integrated NHS Trust. Scotland, Wales and Northern Ireland each have their own ambulance service. Emergency ambulance services each cover the footprint of multiple health organisations (Integrated Care Boards (ICBs)/Health Boards) and are commissioned by a lead organisation on behalf of all in the area. Face to face response may be provided by paramedics (a protected title, regulated by the Health and Care Professions Council) or emergency medical technicians, who have a shorter period of training and more limited scope of practice.

2. Emergency ambulance services respond to a wide range of healthcare needs. Calls are categorised by urgency, with categorisation systems varying slightly between the four nations of the UK. In England and Northern Ireland, calls for life-threatening conditions (classed as Category 1) such as cardiac or respiratory arrest make up a relatively small proportion of the total, around 15%. The largest proportion of calls falls into Category 2 which might include chest pains, breathing difficulties or symptoms of stroke. Category 3 consists of the substantial number of calls classed as urgent, for example abdominal pain, while a relatively small number of less urgent calls – for example, diarrhoea and vomiting, fall into Category 4.

3. The Scottish Ambulance Service also has a four-category system, which uses colour coding rather than numbers, and with slightly different ways of categorising calls:
    - "Purple" refers to incidents where a patient is identified as having a 10% or higher than 10% chance of having a cardiac arrest
    - "Red" refers to incidents where a patient is identified as having a likelihood of cardiac arrest between 1% and 9.9%, or having a need for resuscitation interventions such as airway management above 2%
    - "Amber" refers to incidents where a patient is likely to need diagnosis and transport to hospital or specialist care
    - "Yellow" refers to incidents where a patient has a need for care but has a very low likelihood of requiring life-saving interventions — for example, this could include patients who have tripped or fallen but not sustained any serious injury

4. In Wales, the response model has three categories:
    - "Red" refers to immediately life-threatening incidents
    - "Amber" refers to incidents that are serious, but not immediately life-threatening
    - "Green" refers to neither serious, nor life-threatening incidents

5. Emergency ambulance services have evolved considerably from their roots in simply employing "ambulance drivers" to take people to hospital (McCann 2022). While conveyance to hospital, following appropriate assessment and immediate treatment, is still a substantial part of services' activity, they are also expanding their role in offering clinical treatment and advice (either over the phone or in person without conveyance).

6. The NHS defines emergency care as life-threatening and their website instructs people to call 999 or go to A&E for the following conditions:

- **signs of a heart attack**
  chest pain, pressure, heaviness, tightness or squeezing across the chest
- **signs of a stroke**
  face dropping on one side, cannot hold both arms up, difficulty speaking
- **sudden confusion (delirium)**
  cannot be sure of own name or age
- **suicide attempt**
  by taking something or self-harming
- **severe difficulty breathing**
  not being able to get words out, choking or gasping
- **choking**
  on liquids or solids right now
- **heavy bleeding**
  spraying, pouring or enough to make a puddle
- **severe injuries**
  after a serious accident or assault
- **seizure (fit)**
  shaking or jerking because of a fit, or unconscious (cannot be woken up)
- **sudden, rapid swelling**
  of the lips, mouth, throat or tongue

7. All UK ambulance services use Clinical Decision Support Software (CDSS) to support their response to 999 calls. Two systems are in use: Advanced Medical Priority Dispatch System (AMPDS) and NHS Pathways. Both are a series of interlinked algorithms designed to be used by non-clinical call handlers through a computer interface. The systems are not diagnostic but are used to assess symptoms and direct patients to appropriate care, known as "disposition". NHS Pathways (NHS England 2023) is owned by the Department for Health and Social Care and delivered by the Transformation Directorate of NHS England and has been in use since 2005 within the Urgent and Emergency care setting. Triage software varies in its cost, accuracy and nature. Each ambulance service has made its own commissioning decisions, with AMPDS being more costly to purchase and maintain but seen by some as having advantages – with more structured clinical advice given, for example by call-taker (Bohm and Kurland 2018). NHS Pathways is used in all NHS 111 in England and just over half of English ambulance services. AMPDS (also known as Medical Priority

Dispatch System (MPDS) (IAED 2024) is used in the remainder of UK ambulance services, as well as being widely used internationally. It is a proprietary system developed and licensed by the US organisation International Academies of Emergency Dispatch, and has been in use since the 1970s, with regular revisions and updates. Both systems are used under licence.

8. It is worth noting that a systematic review conducted before the pandemic by Bohm and Kurland (Bohm and Kurland 2018) found that there was limited evidence on the accuracy of medical prioritisation and dispatch in ambulance services.

9. The process of accessing emergency pre-hospital care can be summarised as follows:

    - Almost all contact with emergency ambulance services is through a telephone call to the 999 emergency number by the patient, friend or family member, or a bystander. In England in December 2019, around 27,275 calls to 999 were answered by emergency ambulance services each day. A small proportion of contacts come directly from another health care professional (e.g. a GP) or are transferred from NHS 111.

    - Calls for an ambulance are put through to an Emergency Operations Centre (EOC). Two decisions get made at the EOC: whether to send an ambulance (or other face-to-face response e.g. rapid response vehicle (car) or motorbike), and how urgently to send it (which category).

    - A call handler (trained but non-clinical) takes the details, using computer software (AMPDS or NHS Pathways) to help decide what to do. Based on the answers given, a decision about the priority of clinical response with an appropriate level of care and time frame is reached. Questions are asked in a clinical hierarchy, so questions to identify life-threatening conditions ("is the patient breathing?") are asked early in the call, progressing through to questions about less urgent symptoms.

    - The call then gets passed to a dispatcher, who arranges for an ambulance to get sent, if it is needed. At times of high demand, calls triaged to less urgent categories might wait in a "stack".

    - An EOC clinical advisor (a paramedic, nurse or doctor) might advise on certain calls, or review ones on the stack, to suggest what to do, or give advice directly to the patient. In some cases, the clinical advisor may close the call and no ambulance is sent ("Hear and Treat" – accounting for 7.4% of calls in England in Dec 2019) (NHS England 2020b). In these cases, the patient may be given advice on self-care and also "safety netting" advice by the clinical advisor – advised what to do if symptoms get worse or if there is not expected improvement.

    - If an emergency ambulance attends the patient, it will have two crew members, usually including one paramedic (generally educated to degree level or higher, with a range of clinical skills) and one emergency medical technician (a shorter period of training and a narrower scope of practice). Most ambulance services have other responses that can be sent to allow face

to face assessment by a paramedic, including Rapid Response Cars and motorbikes. They may also be able to call on air ambulances, which – with the exception of the Scottish Ambulance Service's air operations – are run by independent charitable organisations.

- Once an ambulance crew attends a patient, a decision is made (with the patient) about whether to convey the patient to hospital, where to take them, whether to pre-alert the hospital, and what pre-hospital care to give. In December 2019, approximately 30% of all 999 calls in England were resolved by the attending clinicians, then closed without the patient being conveyed to hospital ("See and Treat") (NHS England 2020b).

- The ambulance crew retain clinical responsibility for a patient conveyed to hospital until they are formally handed over to clinical staff in the hospital. Crews may be providing care for a patient in an ambulance parked outside a hospital while they wait for this to happen.

10. The four nations do not all use the same performance management metrics, and the Office for National Statistics cautions against making direct comparison of performance between them (Government Analysis Function 2024). Emergency ambulance service performance in England is monitored by NHS England through a range of metrics related to response times for different categories of call. Since 2018, the performance targets have been set at:

    - Category 1 – Life-threatening conditions such as cardiac or respiratory arrest – target response is 7 minutes on average, and 90% of calls responded to within 15 minutes

    - Category 2 – Emergency – target response is 18 minutes on average, and 90% of calls responded to within 40 minutes

    - Category 3 – Urgent – 90% of calls responded to within 120 minutes

    - Category 4 – Less urgent – 90% of calls responded to within 180 minutes

11. In addition to these response time measures, ambulance systems indicators (AmbSYS) used in England include process measures such as time to answer a 999 call and proportion of calls resolved without sending an ambulance. Also collected by NHS England are Clinical Outcomes measures (AmbCO) relating to stroke, cardiac arrest and sepsis.

12. In Northern Ireland, the ambulance response standards are the same as for England, with the exception of the mean response time for Category 1 calls, which is 8 minutes (Government Analysis Function 2024).

13. Ambulance response standards for Scotland are based on median rather than mean times:

- Purple category incidents have a median ambulance response standard of 6 minutes, with the 95th centile of all incidents within this category being responded to within 15 minutes

- Red category incidents have a median ambulance response standard of 7 minutes, with the 95th centile of all incidents within this category being responded to within 18 minutes

- Amber category incidents have a median ambulance response standard of 15 minutes, with the 95th centile of all incidents within this category being responded to within 30 minutes

- Yellow category incidents have a median ambulance response standard of 20 minutes, with the 95$^{th}$ centile of all incidents within this category being responded to within 60 minutes

14. In Wales, only Red calls have a set response standard. 65% of these types of calls are expected to have an emergency response at the scene within 8 minutes.

15. Since 2010, NHS 111 (in England) has provided initial protocol driven assessment and signposting for urgent, non-emergency healthcare needs. Its services are available through free telephone calls, responded to by non-clinical call handlers, or through the NHS 111 online service. Patients with physical or mental health concerns seeking urgent, but not emergency, treatment or advice can access it for free by phoning NHS 111 or by using the NHS 111 online service. In Scotland, NHS 24 (integrated into the area-based health boards) provides immediate advice, signposting and referral for urgent health care needs (also using the 111 number). Access to 111 was rapidly rolled out in Northern Ireland (as reported from 28$^{th}$ February 2020) specifically to allow people to access advice about Covid. Where appropriate, callers to 111/NHS24 in any of part of the UK are advised to call 999, or they may be directly transferred.

16. These services replaced NHS Direct with the intention of providing care that is more integrated with other unscheduled care providers (NHS Direct 2010). "Urgent" is defined by NHS England in its public facing information as "not a life-threatening emergency" (NHS 2024); in practice, the distinction between "emergency" and "urgent" may be not fully clear to members of the public who are asked to navigate the system (Pope, McKenna et al. 2019).

17. In Wales, call centre advice during the pandemic was provided in part by NHS Direct, and by NHS 111 – with the former being replaced gradually by a roll out of 111 by health board area between 2019 and 2022.

18. Although branded and marketed as a single service, NHS 111 is delivered by a range of provider organisations across England and Wales; in some areas (e.g. Wales, parts of London) this is the local NHS ambulance trust, in other areas, companies (usually originating as primary care providers) or NHS Trusts were commissioned to provide the service, often with overlapping provision of out-of-hours primary care. There is

variation between providers in terms of type of organisation and coverage, with some fairly local, others providing services regionally.

19. Callers are led through a structured algorithm and then advised to self-care or to contact a particular healthcare provider unless the call is deemed an emergency and is transferred directly to the 999 service. Calls are dealt with by a call handler without any clinical qualification; where necessary, they are referred to a nurse or paramedic for call-back – pre-pandemic, this was about 20% of calls (Dayan 2017). Pre-pandemic, the proportion of calls transferred from NHS 111 to ambulance services ranged by area from 8% to 17%; despite concerns that NHS 111 may be over cautious, it was estimated that on balance, NHS 111 diverted some calls away from ambulance services (Dayan 2017).

Summary of key points:

20. *Before* the *pandemic, both the 999 and 111 numbers were, and remain, free to all within the UK to access for emergency and urgent care and advice 24 hours a day. Non-clinical call takers usually answer calls and use triage tools to try to provide an appropriate level of care from within the service (e.g. 999 ambulance; self-care advice) or through signposting or referral (e.g. further clinical assessment/advice; call transfer). Routine statistics and performance measures are in place for both services in relation to call volume, response times, handover times, calls resolved etc.*

## Pandemic planning and preparedness guidance in the ambulance service and NHS 111

21. We have less direct expertise and knowledge in the area of emergency preparedness and were unable to find much published data or research on this topic. I have therefore provided my own impression and opinion from extensive contact with 999 providers over the past thirty years.

22. *NB* this section builds on the commentary provided by Professor Edwards in his report, paragraphs 57 to 76.

23. To our knowledge, planning and preparedness was inadequate at national level for 999 or 111 services to meet operational and clinical needs during the Covid-19 pandemic. Previous planning had taken place to prepare for major incidents involving mass casualties related to disaster, trauma or smoke / chemical contamination, or much milder influenza outbreaks (INQ000335968). The National Pandemic Flu Service (NFPS) was established in 2015, with the intention to provide an on-line and telephony self-assessment service for symptomatic callers, routed through a single 111 number. This provided the infrastructure which enabled NHS England to mobilise the Covid-19 Clinical Assessment Service (CCAS) and other related clinical assessment services during the Covid-19 outbreak.

24. My understanding is that there was inadequate planning, guidance, and advice to start with. That which did exist assumed a relatively mild influenza similar to 2009 pandemic flu would be the problem, with a lower mortality rate and also a lower rate of

transmission from people without symptoms. When Covid-19 began to spread in the UK, Ambulance Services were ill-prepared. Ambulance services deployed their Hazardous Area Response Teams (HART) initially, although these are suited to high-risk environments such as building collapses, gas explosions, chemical leaks, and carrying equipment which would have been effective against any respiratory threat, but they were very quickly overwhelmed by the level of demand. There are one or two HART teams in each of the English Ambulance Services areas (National Ambulance Resilience Unit 2024), with similar teams in Scotland, Northern Ireland, Wales.

25. In terms of infection control and guidance, usual practice was followed with regards to use of Personal Protective Equipment (PPE) and cleaning of vehicles, although this evolved over time as new knowledge was gained from March 2020 onwards. FFP masks were not routinely used by the ambulance service, they were not always available, and staff were not fit tested, so it was not known if they were appropriate for individual staff. There were reported shortages of equipment in some areas including PPE, especially in the early stages of the pandemic (Fitzpatrick et al. 2021).

26. The very high rates of staff absenteeism (due to Covid-19 symptoms, serious illness, or positive test) were unexpected and not adequately planned for, despite strategy documents forewarning such staff shortages in the case of a flu pandemic (Department of Health Pandemic Influenza Preparedness Team 2011).

27. In terms of ambulance triage and dispatch, a protocol, "Protocol 36", also referred to as "Card 36" originally developed in response to the H1N1 pandemic of 2019, was revised for coding a patient as "suspected Covid-19" and introduced by most services using AMPDS in early April 2020. The Emerging Infectious Diseases Surveillance tool within AMPDS was used before Protocol 36 by some services and later by others. Within NHS Pathways there was no specific protocol, although services reported that they largely adhered to advice issued from central sources including NHS England as the pandemic progressed (Snooks, Watkins et al. 2021).

28. To cope with the unusually high volume of calls, local plans were put into operation, for example, at the London Ambulance Service, the "Extreme overcapacity plan" (source: personal communication – Chris Hartley-Sharpe, former call centre and operations manager, LAS). Using this plan, callers were informed immediately or by call-back that they would not be receiving an ambulance response for a protracted period of time, if at all – so that they could find another way to get to the Emergency Department (ED) if they needed and were able to. This plan had previously been used at times of extreme demand e.g. New Year's Eve.

29. At an early stage, the Association of Ambulance Chief Executives (AACE) core team collaborated with members and various stakeholders to improve existing call-handling mutual aid arrangements (designed to cope with short-term outages), resulting in the development of technical solutions like the Interoperability Tool Kit (ITK) – the technical link between all UK ambulance services computer aided dispatch systems, in order to facilitate the transfer of emergency calls between ambulance services, ultimately saving lives. The process was "switched on and off" by BT when the need was identified. The process was in place by October 2020.

30. People were encouraged to call NHS 111 during the pandemic but services were unable to answer all calls and little appeared to be evident in terms of emergency preparedness in relation to the airborne and asymptomatic nature of SARS-CoV-2.

31. Although I have been asked to comment on the National Pandemic Flu Service in relation to preparedness of emergency ambulance services and urgent care providers, I do not have specific expertise on this topic.

*Summary of key points:*

32. *Although an area less within our direct expertise, based on the evidence we have received, it is our view that pre-pandemic planning was neither adequate nor relevant enough to cope with the repeated waves of Covid-19 that were experienced. Services were overwhelmed at times through excessive demand, operational requirements and high rates of staff absenteeism.*

## The resilience of the ambulance service

33. We have found very little research evidence on emergency ambulance service resilience within the UK or internationally.

34. Most services were at the highest Resource Escalation Action Plan (REAP) Level 4 for significant periods during and after the key pandemic period (BBC News 2022). The four REAP levels correspond to OPEL (Operational Pressures Escalation Levels) used by the wider NHS in England, providing a framework for effective and safe operational and clinical service response for patients. Normal service is at REAP level 1 or 2, but the REAP level may be designated as 3 or 4 by the strategic commander within the service. This is then communicated to the public and other services, with a range of actions possible, changes to service delivery; recruitment of additional clinical and non-clinical staff; and advice to patients that delays are long and it may be better to make their own way to hospital to seek care.

35. Haldane and colleagues (Haldane, De Foo et al. 2021) published a very useful analysis of the complex nature and needs of a resilient health system during the Covid-19 pandemic, centred on working together with strong community engagement (see Figure 1 below).

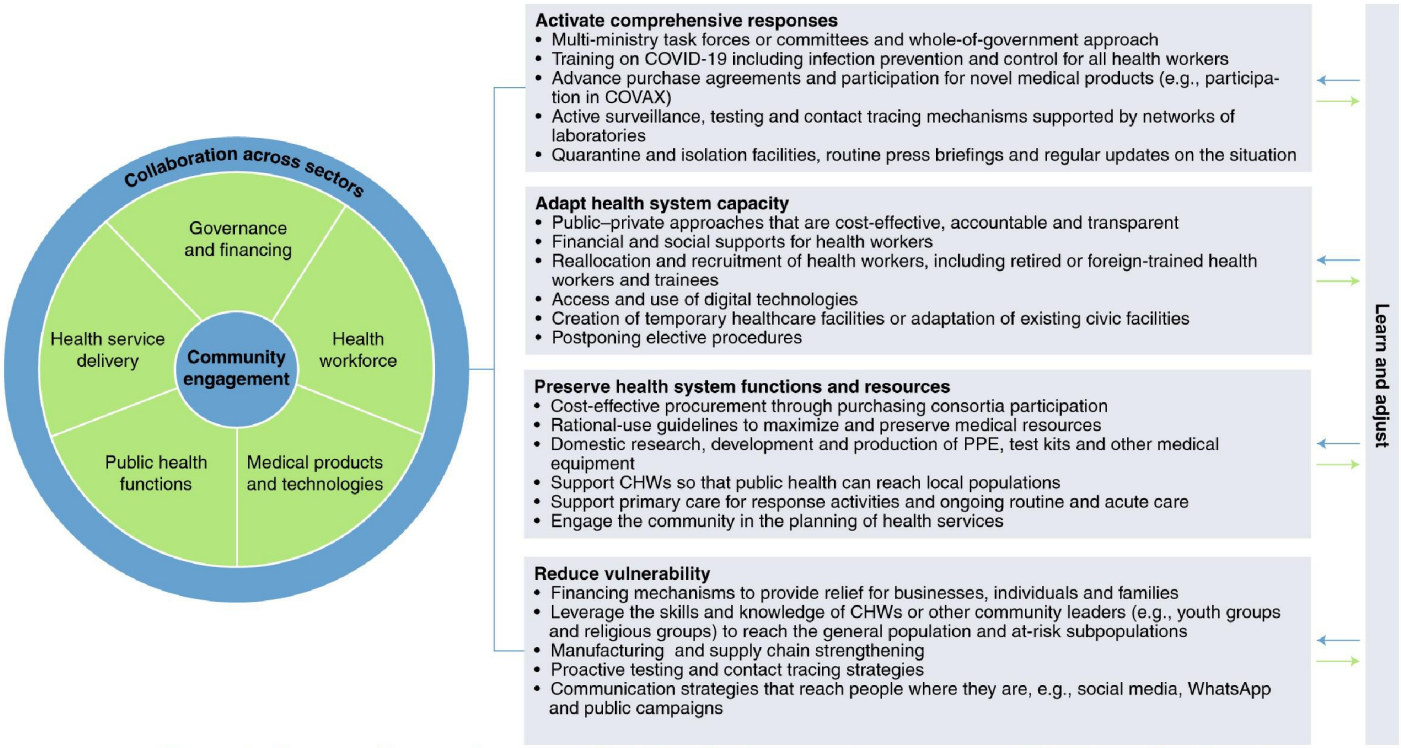



*Figure 1: Four resilience elements of highly effective country responses (Haldane, De Foo et al. 2021)*

*Summary of key points:*

*It can be argued that the UK emergency ambulance service has not recovered from the impact of the pandemic, either in terms of the morale and mental health of frontline staff or patient flows.*

## Trends in 111 and 999 use during the pandemic

36. During the first wave of the pandemic, we, together with colleagues (Snooks, Watkins et al. 2021) carried out a survey of all UK ambulance services. We obtained data (for February to June 2020) from 12 of the 13 UK freestanding ambulance services. We agreed not to share the names of the ambulance services in our reporting. The data related to volume and pattern of total calls and suspected Covid-19 related calls to emergency ambulance services; proportion of calls where an ambulance was dispatched; proportion conveyed to hospital, and features of triage used. We found that call volumes were highly variable across the pandemic period, with a UK peak in the week beginning 16 March 2020 at 13.1% above baseline (service range -0.5% to +31.4%). Anonymised data as published are shown in Figure 2. All services ended the study period (June 2020) with a lower call volume than at baseline (service range -3.7% to -25.5%). Suspected Covid-19 calls (as coded at point of call) across the UK

totalled 604,146 (13.5% of all calls), with wide variation between services (service range 3.7% to 25.7% of all calls). The highest proportions of suspected Covid-19 calls (Figure 3) within services were all recorded in the weeks commencing 23rd or 30th March, or 6th April 2020, and peaked at a low of 11.4% (Ambulance Service 4) and a high of 44.5% of all calls (Ambulance Service 12). Ambulances were dispatched to 478,638 (79.2%) of these calls (service range 59.0% to 100.0%), with 262,547 (43.5%) resulting in conveyance to hospital (service range 32.0% to 53.9%). Figures vary routinely according to local practice which is not standardised across ambulance services. Some services have a much higher usual rate of non-conveyance. Case mix and workload changed significantly as Covid-19 calls displaced other calls.

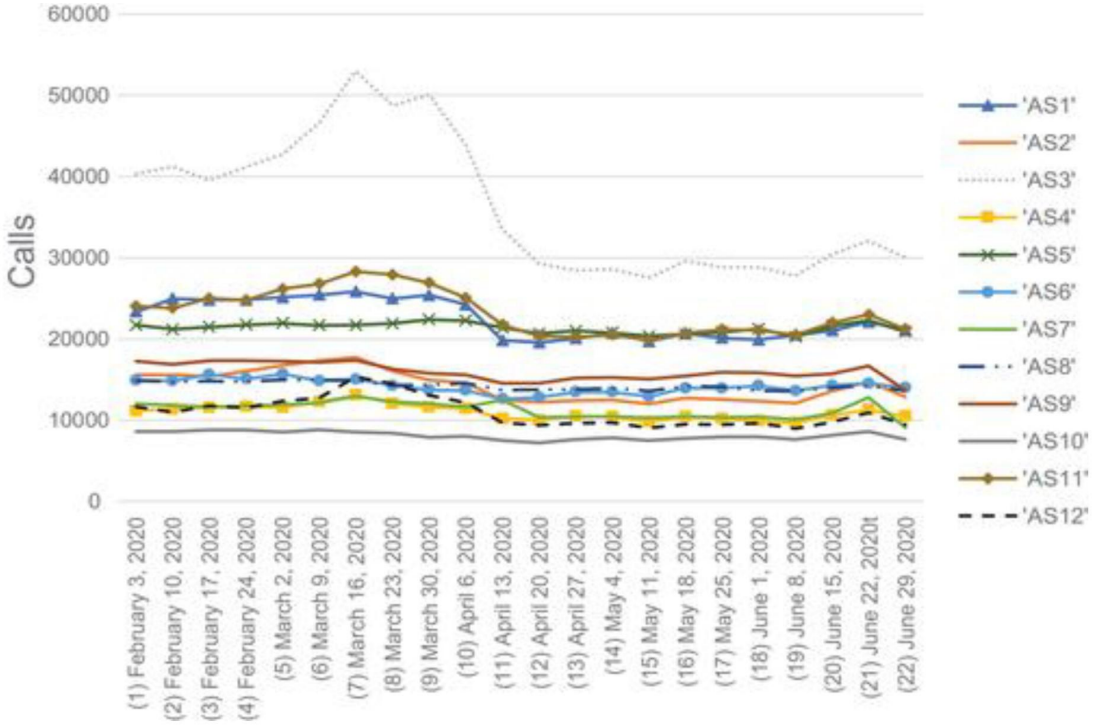



*Figure 2: Total emergency calls by ambulance service (AS) and week of study, February to June 2020 (Snooks, Watkins et al. 2021)*

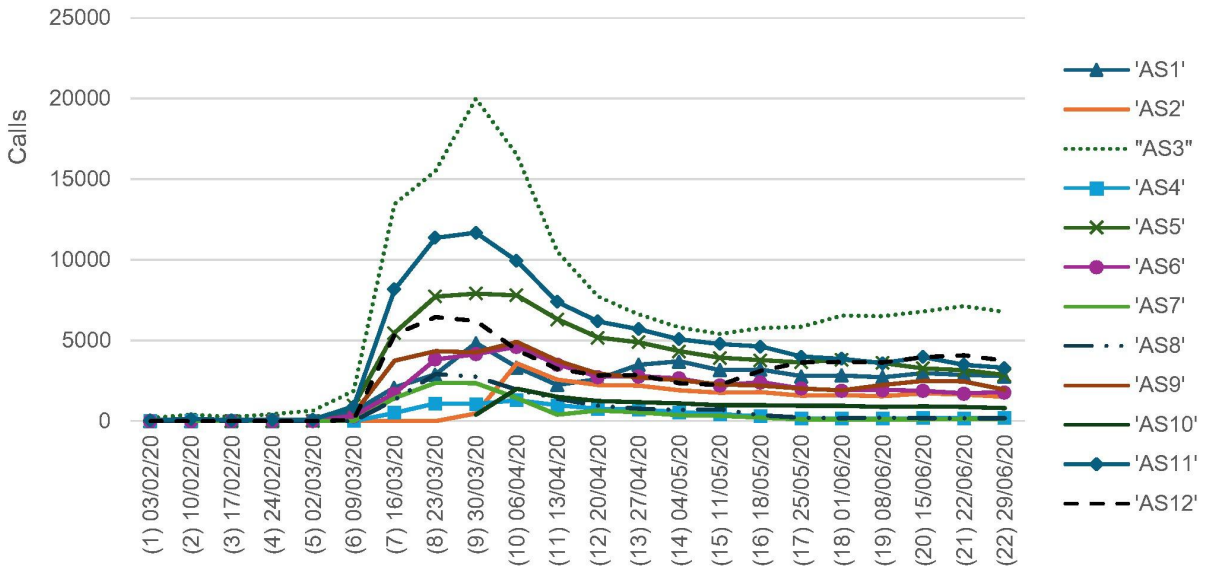



*Figure 3: Calls identified as suspected Covid-19 by ambulance service (AS) and week of study, February to June 2020 (Snooks, Watkins et al. 2021)*

37. We concluded that Emergency Ambulance Services in the United Kingdom bore the brunt of variable and, at times, unprecedented call volumes related to Covid-19 during the height of the first wave of the pandemic between March and July 2020. Some variation in call volume may be accounted for by varying patterns of caller behaviour, differences in coding between services or over time, and changes in the composition of patients. However, patterns overall appear to reflect higher call numbers in known hotspots of transmission and confirmed Covid-19 hospitalisations during this period.

38. The NHS generally saw dramatic drops in patients presenting for other causes ST segment elevation myocardial infarction (STEMI) (a type of severe heart attack) (Little, Kotecha et al. 2020) (Rattka, Dreyhaupt et al. 2021) and stroke (Douiri, Muruet et al. 2021) possibly because of fears about risk of infection and desire to avoid overburdening the NHS, although evidence related to effects on ambulance service demand has been equivocal. A small study in the West Midlands found no effect (Holmes, Brake et al. 2020), whereas Fothergill et al. found a large increase in out of hospital cardiac arrests in London during March and April 2020 compared with the previous year (an 81% increase) (Fothergill, Smith et al. 2021). Fothergill et al. also reported longer EMS response times for cardiac arrest (9.3 vs 7.2 min, $p < 0.001$) with survival at 30 days poorer during the pandemic (4.4% vs 10.6%, $p < 0.001$) and amongst patients where Covid-19 was considered likely (1.0% vs 6.3%, $p < 0.001$). This topic is covered in greater detail in Professor Chris Gale's expert report to the Inquiry on ischaemic heart disease (INQ000494739).

39. A further retrospective record linkage cohort study (Fitzpatrick, Duncan et al. 2022) was carried out by Fitzpatrick and colleagues using National Data collected from NHS Scotland only over a 5-month period (April–August 2020). The Scottish Ambulance Service responded to 214,082 potential Covid-19 calls during the study period (where

Protocol 36 was used). Of these, the ambulance call handlers categorised 3.4% (n = 7,305) as likely Covid-19 positive. Protocol 36 only identified 17% of Covid-19 positive patients. Approximately 60% of those identified by Protocol 36 as potentially Covid-19 positive were conveyed.

40. The low predictive value of Protocol 36 in identifying potential Covid-19 in patients emphasises the importance of ambulance clinicians approaching each call as if it may involve Covid-19, which reinforced the importance of adhering to policy and use of PPE for all calls. The non-conveyance rate of people categorised as Covid-19 negative was higher than non-conveyance rates in the preceding year across all calls in the same service. The authors reported that reasons for this are unknown.

41. Fitzpatrick described three changes introduced into the Scottish Ambulance Service early in 2020:

- Modified Protocol 36 for 999 call centres with Covid-19 symptom-focused questions (AEDR Editorial Team 2020)
- Covid hubs for communication between hospital and ambulance-based clinicians to support selection of appropriate care for Covid-19 patients
- A new guideline for ambulance clinicians to identify Covid-19 symptoms and severity and to support discussions concerning care of higher risk patients with senior physicians.

42. With regards to NHS 111 call volume and outcomes, NHS England data shows that calls made to NHS 111 in England have increased over time, from just over 1 million in January 2016 to 1.5 million in January 2020 and 1.8 million in Jan 23 1.9 million (NHS England 2023). At the start of the pandemic, people were encouraged to call NHS 111 with concerns about Covid-19 symptoms. The number of calls increased dramatically to just under 3 million in March 2020 (see Figure 4 below). At this peak over half of these were not answered: 1.1 million calls were abandoned during that month after waiting for more than half a minute, and only 30% of calls were answered within 60 seconds (Nuffield Trust 2024). Patterns in call volume (Figure 5) and calls answered were consistent across English regions. A specific Covid-19 NHS 111 online service was launched as well as new funding to increase the number of call handlers.

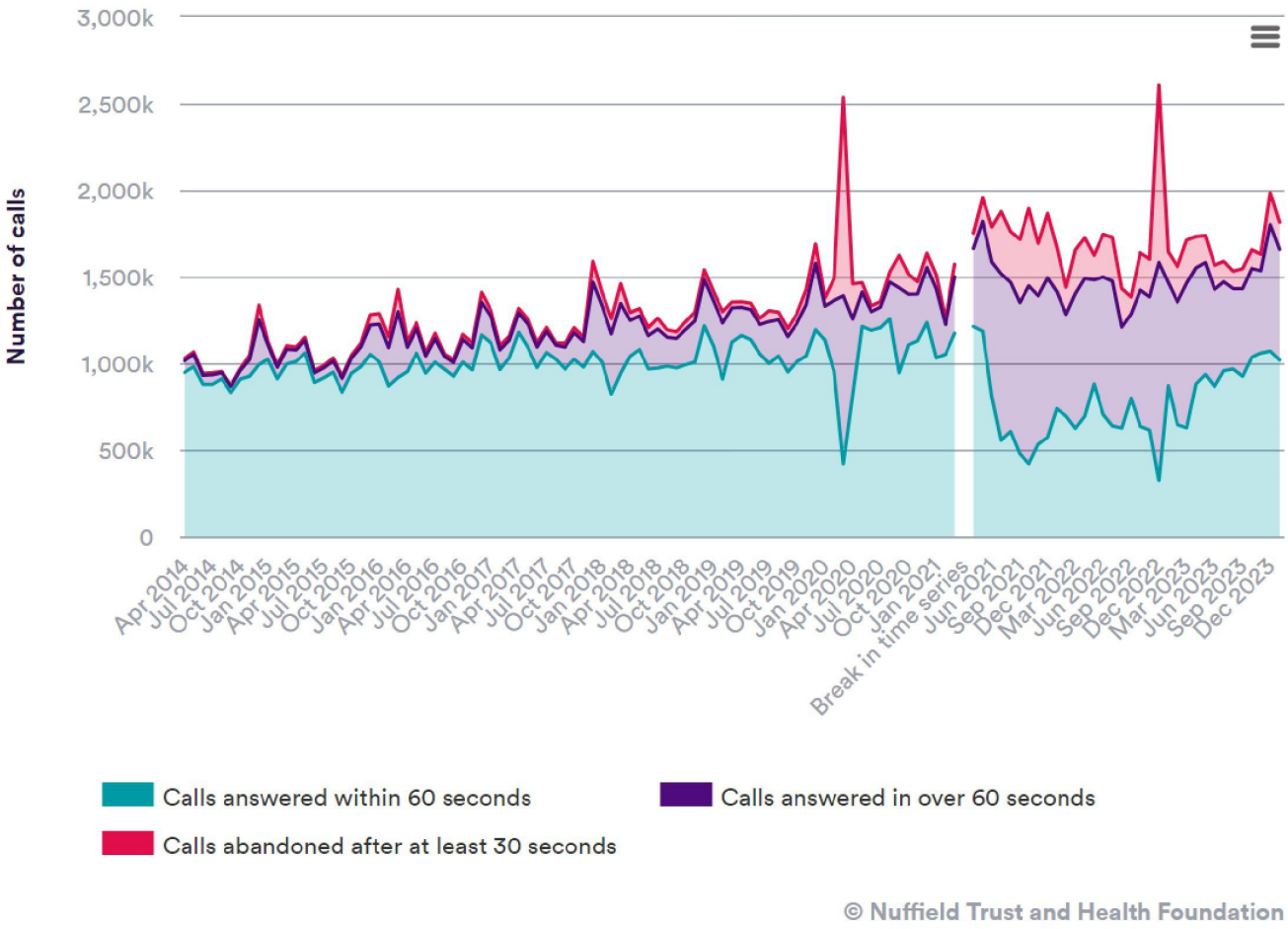



*Figure 4: Number of calls to NHS 111 abandoned, answered within 60 seconds, or answered in over 60 seconds. Source: (Nuffield Trust 2024)*

43. In Wales, Welsh Government data demonstrates a similar pattern of data to that of England, with calls to 111 and NHS Direct peaking in March 2020 at 106,413 compared to 50,163 the previous month (Welsh Government 2021). As in England, overall call volume has gradually increased over time. No Scotland or Northern Ireland specific data was identified.

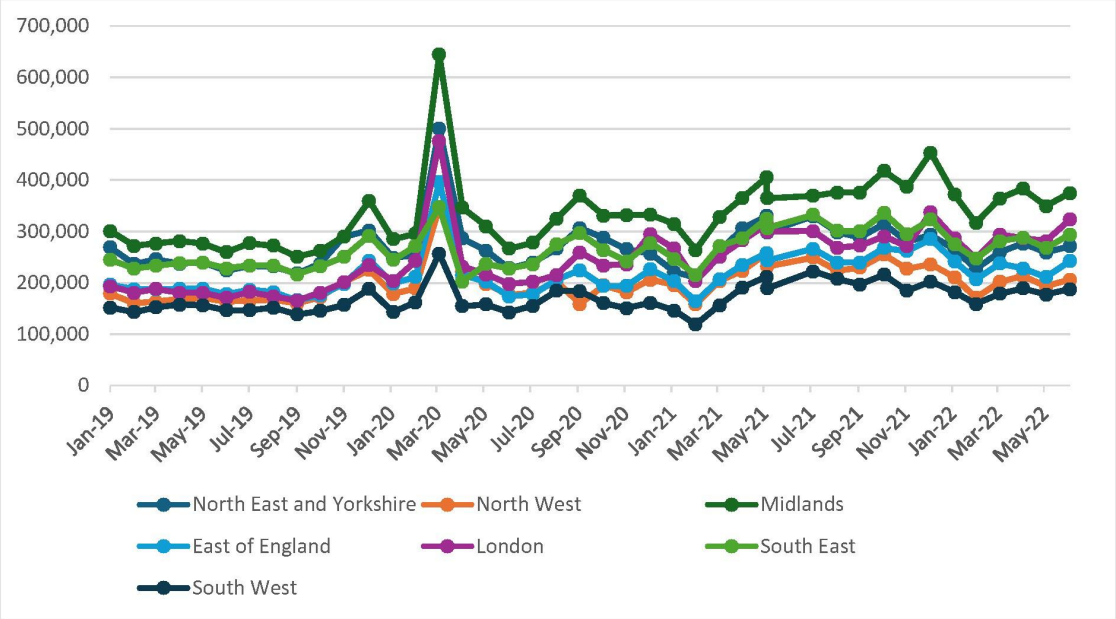



*Figure 5: NHS 111 Calls by English region Jan 2019 to June 2022 (source data: NHS England Integrated Urgent Care Aggregate Data Collection 2022/2023 (NHS England 2023))*

44. Initial rises in 999 demand affected response times. This was reported to be exacerbated by shortage of staff in the ambulance service and operational requirements to wear PPE and thoroughly decontaminate ambulances, lengthening handover times and therefore availability of ambulances to respond to calls (Avery and Bloom 2020).

45. The huge increases in 111 demand were related to public policy. The UK population was encouraged to call 111 from the start of the pandemic in order to protect other services, particularly face to face emergency care services:

> *"Anyone who is concerned they have signs and symptoms, should continue to use NHS 111 as their first point of contact – they will tell you exactly what you need to do and where necessary, the right place to be tested."* (22 Feb 2020) Professor Keith Willett, NHS strategic incident director for coronavirus. (NHS England 2020a).

46. There is also evidence that some people may have not presented to emergency care services for conditions which would normally require emergency assessment and care.

*Summary of key points:*

47. *Volume of calls to the 999 service was highly variable over the period of the pandemic, with extreme peaks at various times, but a fall off of calls for other reasons, resulting in lower 999 call volumes overall by the end of the review period. Identification of Covid-19 positive patients, and Covid-19 patients at risk of harm using triage tools in 999 call*

*centres was reported to be low. Crews who attended calls could therefore not rely on call centre categorisation related to Covid-19. Calls to 111 increased during this period and have continued to increase, with a large proportion of calls unanswered, particularly in the first wave of the pandemic. Trends in variation over time and regionally were related to spread of Covid-19, in waves affecting different areas at different times; guidance; and patients' own self-triage to try to protect services or to avoid infection.*

## Changes to the 111 and 999 telephone triage processes during the relevant period

48. Ambulance services made some changes to triage processes in response to the pandemic, though the basic response model remained the same (Tang et al. 2020). Services using AMPDS were able to put into practice Protocol 36 (IAED) Pandemic / Epidemic / Outbreak (Surveillance or Triage) which was promoted by its suppliers IAED as being able to safely support a reduction in the proportion of patients allocated to the highest priority response category (AEDR Editorial Team 2020).

> "*The purpose of Protocol 36 is to allow Emergency Medical Dispatchers to identify—at the point of call intake—those patients that are most likely Covid-19 symptomatic, and then triage them* ***within a single dispatch protocol*** *that allows the most efficient and effective use of pandemic-related limited EMS and public safety resources." (AEDR Editorial Team 2020).*

49. Protocol 36 had been developed prior to the Covid-19 pandemic, originally in response to the risk of flu pandemic, and was available to be "activated" as required. It allows for services to adjust the threshold for different response categories, in response to prevailing levels of infection and demand. Services using AMPDS would also have had access to the Emerging Infectious Diseases Surveillance (EIDS) tool produced by the International Academies of Emergency Dispatch (AEDR Editorial Team 2020), which combines clinical questions with screening questions around the patient's recent travels.

50. NHS Pathways did not have an exact equivalent to Protocol 36, but some changes were made to it – for example NHS Pathways version 19.3.8/9 incorporated changes such as loss of taste or smell as a feature of Covid-19 infection. In Scotland, NHS 24 developed a stand-alone COVID pathway (with versions tailored for babies and infants) in conjunction with the Respiratory Consultant who was clinical lead to the Scottish Government. The main pathway was revised based on emerging evidence, including that relating to Down syndrome, BAME and weight category. The clinical pathway was also shared with NHS Wales.

51. Ambulance services working with both models of CDSS would also have been informed by a series of guidelines applicable to all health service organisations. These included the guidelines on the management of symptoms of Covid-19, including at the end of life, in the community, from the National Institute for Health and Care Excellence (2020), published on 3rd April 2020, with updated guidelines published on 23rd March 2021 (NICE 2021). In addition, NHS Digital (part of NHS England at that

time) issued a *"Coronavirus (Covid-19) clinical triage support tool"* (NHS Digital 2020) to help assist clinicians in assessing breathlessness remotely and making an onward triage decision based on clinical presentation; the first version was made available on 6th April 2020, with a revised version made available on 13th May 2020. It was designed to be an adjunct to other elements of patient assessment that helped triage patients into three cohorts: those who needed immediate assessment and intervention in secondary care, those who could be assessed and managed in primary care and those who could self-isolate and self-care with safety netting advice.

52. On the 5th March 2020 a new telephone triage service was rapidly established in under a week for those with Covid-19 related symptoms (Health Services Safety Investigation Body 2022). The Covid-19 Response Service (CRS) was managed by South Central Ambulance Service (SCAS) and delivered by a range of providers. 6,000 health advisor call handlers were recruited. The service aimed to support Covid-19 related enquiries with the core NHS 111 service maintained for non-Covid 19 related symptoms (Health Services Safety Investigation Body 2022).

53. Within ambulance service Emergency Operations Centres, the immediate response to 999 calls continued - as before the pandemic - to be provided by staff who were trained but not clinically qualified, passing calls on to clinical colleagues for response as needed. However, ambulance services increased the number of clinical advisors available to support assessment and triage, generally by diverting clinically qualified staff from other roles. Some other changes were made to how clinical advice was delivered – in the Welsh Ambulance Service, for example, many clinical advisors switched to working from home, leading to reported increased levels of autonomy but some concerns about clinical supervision and support (Brady and Harry 2023).

54. In addition to the CRS, the Covid-19 Clinical Assessment Service (CCAS) was an emergency service staffed mainly by GPs (initially other staff groups such as nursing, paramedic and physiotherapy staff were involved) and accessed via NHS 111. It was intended for patients with Covid-19 requiring further assessment. The service was in operation from Wednesday 1 April 2020 to 23 May 2021 and then from 6 January 2022 to 31 March 2022 (NHS England 2023) and operated 24/7. Calls were placed in a queue awaiting clinician telephone call-back. The CCAS was rapidly mobilised by amending existing contracts and agreements between a variety of UK health authorities and providers that were originally created to support a national flu pandemic response. CCAS was created by the South Central and West Commissioning Support Unit and was hosted and managed by the South Central Ambulance Service NHS Foundation Trust. CCAS provided a remote, clinical review of patients with Covid-19 symptoms and directed them to the most appropriate care for their needs. The GPs staffing the service generally worked on a part time basis. In the first 12 months, the service had the Full-Time Equivalent of 161 GPs, but the work was delivered by a total of 1,479 distinct GPs working one or more sessions. Over a third (35%) of GPs working for CCAS were aged 60 or above, with many retired and returning to help in the crisis – supported by rapid Emergency Registered Practitioner status with the General Medical Council. Other GPs were locums or partner/salaried staff with capacity (NHS England Digital 2021).

55. Table 1 illustrates call volumes for CRS and CCAS.

| Month | CRS Offered | Answered | Abandoned | Abandoned % | Answered in 60 seconds | Answered in 60 seconds % | CCAS calls Calls handled |
|---|---|---|---|---|---|---|---|
| Mar-20 | 851,422 | 779,738 | 38,234 | 4.5% | - | - | 0 |
| Apr-20 | 356,460 | 351,558 | 757 | 0.2% | - | - | 26,349 |
| May-20 | 139,041 | 137,455 | 77 | 0.1% | - | - | 62,268 |
| Jun-20 | 15,702 | 15,582 | 0 | 0.0% | - | - | 39,453 |
| Jul-20 | 0 | 0 | 0 | - | - | - | 28,639 |
| Aug-20 | 0 | 0 | 0 | - | - | - | 24,153 |
| Sep-20 | 0 | 0 | 0 | - | - | - | 56,391 |
| Oct-20 | 30,721 | 30,138 | 439 | 1.4% | 29,677 | 98.5% | 52,660 |
| Nov-20 | 45,047 | 43,929 | 661 | 1.5% | 43,343 | 98.7% | 49,349 |
| Dec-20 | 48,073 | 46,970 | 737 | 1.5% | 42,171 | 89.8% | 50,853 |
| Jan-21 | 76,207 | 75,695 | 191 | 0.3% | 74,459 | 98.4% | 72,057 |
| Feb-21 | 27,824 | 27,703 | 11 | 0.04% | 27,581 | 99.6% | 31,396 |
| Mar-21 | 16,962 | 16,830 | 12 | 0.07% | 16,814 | 99.9% | 21,221 |
| Apr-21 | 0 | 0 | 0 | - | - | - | 18,375 |
| May-21 | 0 | 0 | 0 | - | - | - | 13,900 |
| Jan-22 | 2,565 | 2,415 | 10 | 0.41% | 2,368 | 98.1% | 3,209 |
| Feb-22 | | | | | | | 4,936 |
| Mar-22 | | | | | | | 4,638 |

*Table 1: CRS and CCAS calls overview (NHS England 2022)*

56. Calls taken by a Covid Response Centre (CRS) from 5 March to 10 June 2020 that required further triage by a clinician were sent to the SCAS Clinical Safety Net (NHS England and NHS Improvement 2022). NHS England data confirms that 209,957 calls were sent to this service, with the majority in March 2020 (107.016, 51%) (NHS England 2022). Of the March calls 35.6% were abandoned, but this fell to 9.5% (84,738 calls) in April 2020 and just 0.6% in May 2020 as demand dropped (17,397 calls).

57. In the Yorkshire Ambulance Service NHS Trust, video triage was introduced to supplement telephone triage in the early part of the Covid-19 pandemic, with the aim of safely increasing rates of “hear and treat”. In a service evaluation of the initiative, Bell and colleagues found that between 27 March and 25 August 2020, clinicians documented 1,073 triage calls (Bell, Pilbery et al. 2021). A successful video triage call was achieved in 641 (59.7%) cases, with others recorded as inappropriate, patient refused or technical failure. Clinical staff reported that video triage improved clinical assessment and decision making compared to telephone alone. Callers receiving video triage that ended with a disposition of “hear and treat” had a lower rate of re-

contacting the service within 24 hours compared to callers that received clinical hub telephone triage alone (16/212, 7.5% vs. 2,508/14,349, 17.5% respectively).The service evaluation also included postal surveys to patients who were recipients of a video triage, and though the response rate was low (40/201, 19.9%), those who did respond were satisfied with the technology and with the care they received.

*Summary of key points:*

58. *New or existing triage tools were used by 999 and 111 services, with changes continuing to be made to advice and dispatch as information became available during the pandemic. Changes were made on the basis of national or local advice and the pace of changes was at times reported as overwhelming to service providers. Additional clinical and non-clinical staff were recruited to answer calls, and to provide advice in both services and new links were made with partner services to try to manage workload.*

## Quality and safety of 999 and 111 calls during the pandemic

59. Safety concerns can be grouped into two categories: those relating to patients with suspected Covid-19, in particular whether services were able accurately to triage those patients and provide appropriate response; and those relating to patients with other conditions.

60. The prehospital PRIEST study (Pandemic Respiratory Infection Emergency System Triage) was originally designed after the 2009 influenza pandemic (and named at that time PAINTED) and funded by the NIHR so it could be "hibernated" ready for the next pandemic. In March 2020, when the Covid-19 pandemic first hit the UK, it was adapted for the new disease and put into practice. The PRIEST team analysed data from 40,261 adult contacts with the NHS 111 telephone triage service (Marincowitz et al, 2022a), 12,653 adult contacts with the emergency 999 service (Marincowitz et al, 2022b), and 7,549 adults attended by an emergency ambulance (Marincowitz et al, 2022c) during the first wave of the pandemic (between 2 April 2020 and 29 June 2020). The key findings relevant to the public inquiry are as follows.

61. The risk of adverse outcome (death or need for major organ support) was 3% in adults calling the NHS 111 telephone triage service, 11.1% in adults calling 999, and 17.6% in adults transported to hospital by emergency ambulance. Offering 999 and 111 as alternative routes for patients seeking help therefore allowed a useful degree of risk stratification before entering the urgent and emergency care system. Higher risk patients tended to use 999 while lower risk patients tended to use 111.

62. Most patients (60%) contacting the NHS 111 telephone triage service were recommended self-care or seek a non-urgent assessment. These patients had a 1.3% risk of an adverse outcome, compared to 5.6% among those that were recommended an ambulance or urgent response. The NHS 111 telephone triage service therefore diverted a substantial proportion of patients to self-care or non-urgent assessment, with a small risk of subsequent adverse outcome.

63. Most patients (84%) contacting 999 received an emergency response. Patients contacting 999 who did not receive an emergency response had a 3.5% risk of an adverse outcome. There was therefore little potential for safely diverting patients calling 999 to a non-urgent response.

64. Most patients (65%) attended by an emergency ambulance were transported to hospital. Patients who were not transported to hospital had a 7.9% risk of adverse outcome. Using a triage tool, such as the NEWS2 score (used throughout the NHS) or the PRIEST score (developed during the pandemic) could have increased the number of patients not transported to hospital without increasing (or potentially decreasing) the risk of adverse outcome among those not transported. However, this has not been tested in practice.

65. In all these analyses it should be noted that the decision not to provide an emergency response or transport the patient to hospital may reflect patient preference and/or recognition of limited treatment options in people with severe illness and underlying poor health, rather than an inappropriate decision.

66. Overall, the use of the NHS 111 service reduced the pressure on ambulance services and emergency departments, with a low but non-negligible risk of adverse outcome in those not receiving an urgent response.

67. Research undertaken during the pandemic identified that NHS 111 telephone triage may have overestimated the importance of chronic lung diseases as predictors of adverse outcome and under-estimated the importance of diabetes and repeated calls to the service as predictors of adverse outcome. The relatively slow process of NHS routine data acquisition, analysis, and dissemination precluded use of this information to improve telephone triage during subsequent waves of the pandemic.

68. NIHR infrastructure and funding during the pandemic successfully facilitated rapid research during the first wave. However, there were significant barriers to the research being rapidly undertaken and disseminated to policymakers.

69. Older age and pre-existing respiratory disease predicted false positive triage, indicating that the algorithm was more cautious with these groups. Results are not presented by ethnicity, which is seldom coded in the ambulance call centre and often missing on scene.

70. It is worth noting that the triage tool used was effectively a diagnostic predictor, and in common with other diagnostic tests, it was less than perfect. There will always be some false positives and false negatives, but ideally, these are reduced to an acceptably low level where the test is worth using despite occasional errors. The authors concluded that telephone triage can reduce unnecessary ambulance responses, but false negatives (i.e. categorised as not needing an emergency response due to serious Covid-19 wrongly) were also a problem - *"a small but significant proportion of patients who did not receive an initial emergency response deteriorated"*. They therefore recommended further study to improve these algorithms, with prospective data gathering. In other words, triage of 999 calls for a new infectious disease needs to be studied and updated based on new patient data. The accuracy of

triage tools used in ambulance call centres was fairly low in terms of identifying patients at high risk of serious consequences from Covid-19 and excluding those at low risk. This has to be set against the known limitations of telephone-based emergency care triage tools more generally (Bohm and Kurland 2018).

71. Related to this, the Health Services Safety Investigation Body (HSSIB) report covered below in paragraphs 73 to 77 states: "*NHS 111 call handlers do not usually have access to a patient's medical history. This increases the importance of appropriate 'safety netting' – that is, telling a patient or their carer what they should do if their condition does not improve or they have further concerns about their health*". (Health Services Safety Investigation Body 2022)

72. Video consultations by stroke physicians for suspected stroke at the scene of emergency calls were introduced by some ambulance services during the Covid-19 pandemic to try to improve the triage and transportation of appropriate patients to stroke units. Research has now been commissioned to evaluate the effectiveness of this intervention which has continued and expanded since the pandemic (NIHR 2023).

73. The Health Services Safety Investigation Body (England only) conducted an investigation into "NHS 111's response to callers with Covid-19-related symptoms during the pandemic" (Health Services Safety Investigation Body 2022). The report, published in September 2022, focuses on four "reference events" - deaths of four men early in the pandemic shortly after they or their families had been in contact with the NHS 111 service because of Covid-19 symptoms. The report identified that in the month of March 2020 the demand on NHS 111 so exceeded capacity that only about half of calls were answered – the rest being abandoned before being connected. The report stated, *"[e]vidence from families indicated that aspects of NHS 111 telephone triage, such as routing all Covid-19-related calls to the CRS, did not function as intended"*. The algorithm in use did not allow for an assessment of caller's comorbidities to establish whether a clinical assessment would be beneficial. There was a high threshold for transfer to a clinical advisor. It is not known whether those with communication or language difficulties would have been disadvantaged through this process.

74. The report also stated, *"[t]he healthcare system specified that patients with Covid-19 related symptoms and underlying conditions (including diabetes) who went through to core NHS 111 (instead of CRS) should be escalated to a clinician for assessment. However, some patients did not receive a clinical assessment."* (Health Services Safety Investigation Body 2022).

75. It also said that, *"[t]he intent was that Covid-19-related calls would be diverted to the CRS, which was operationally independent from NHS 111. Many Covid-19-related calls continued to go through the core NHS 111 service. Once callers had reached the core NHS 111 service, there was no way to route them to the CRS."* (Health Services Safety Investigation Body 2022).

76. The decision to redirect the public to call NHS 111 rather than access healthcare advice in other ways (for example, through their GP) shifted the immediate burden of managing patients with Covid-19 in the community. This increased capacity in the

wider healthcare system, but risked disrupting continuity of care for patients with complex health needs. (Health Services Safety Investigation Body 2022).

77. The report also acknowledged improvements in NHS 111 assessments throughout the pandemic – citing the example of recognising the importance of pulse oximetry in patients with Covid-19.

*Summary of key points:*

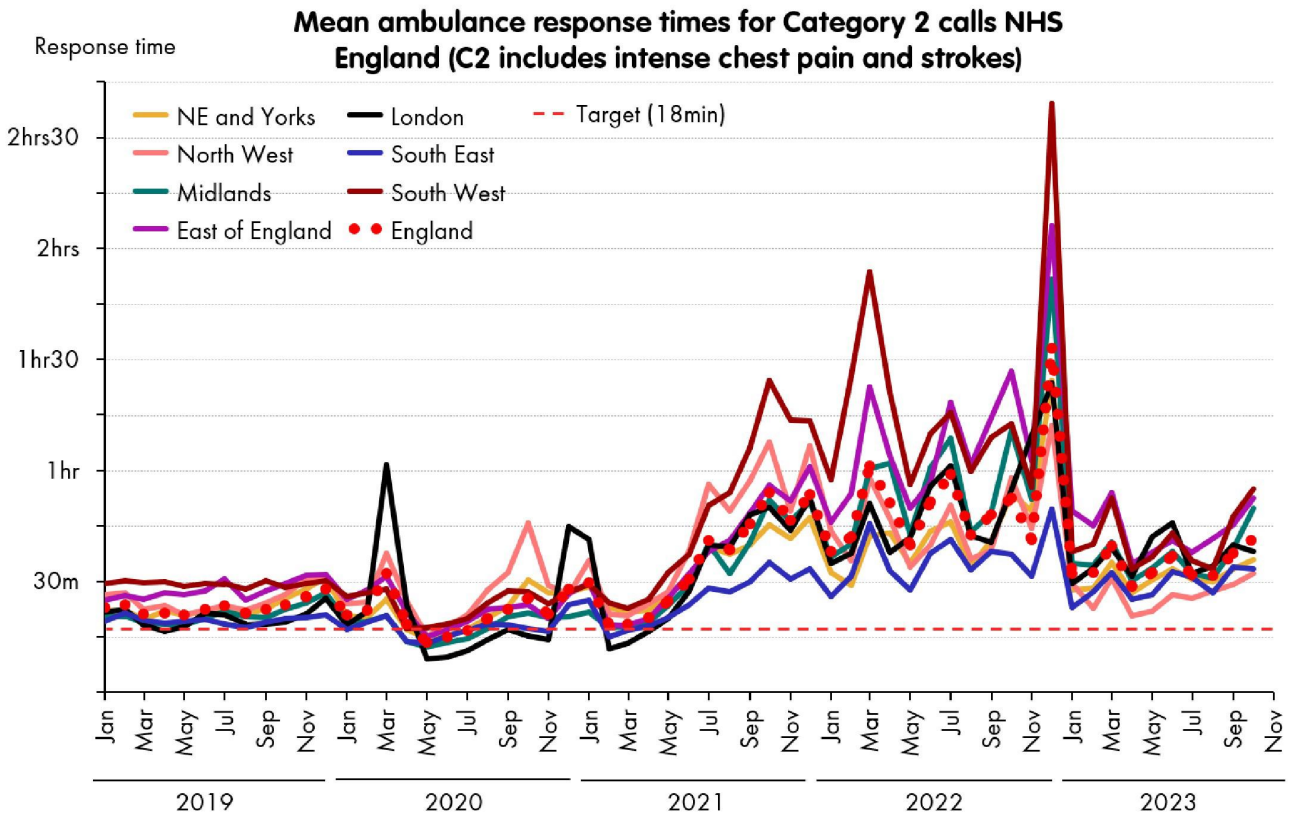
78. *999 and 111 services were overwhelmed at times with sudden increases in volume of calls, proportion of calls related to Covid-19 or calls received when staffing levels were very low. Processes of care were affected which detrimentally impacted on the safety and quality of care provided. Calls were not answered and/or response vehicles were not available for dispatch. Information on risk factors was poorly understood at the start of the pandemic e.g. diabetes and repeat calls. Although triage tools performed at reasonable levels, they were less accurate in identifying calls that did and did not need immediate care than hoped. Existing inequalities related to age, sex, ethnicity and disability may have been exacerbated, although data on ethnicity and disability are often missing in the emergency prehospital setting.*

## Trends in ambulance responses

79. Response times were variable across the early months of the pandemic and remained fairly stable for the most urgent categories, although there was a worsening picture for calls triaged into categories requiring a less urgent response in England and Wales (NHS England 2024, Welsh Government 2024). Generally, the picture was less challenging overall in Scotland (Scottish Ambulance Service 2024).

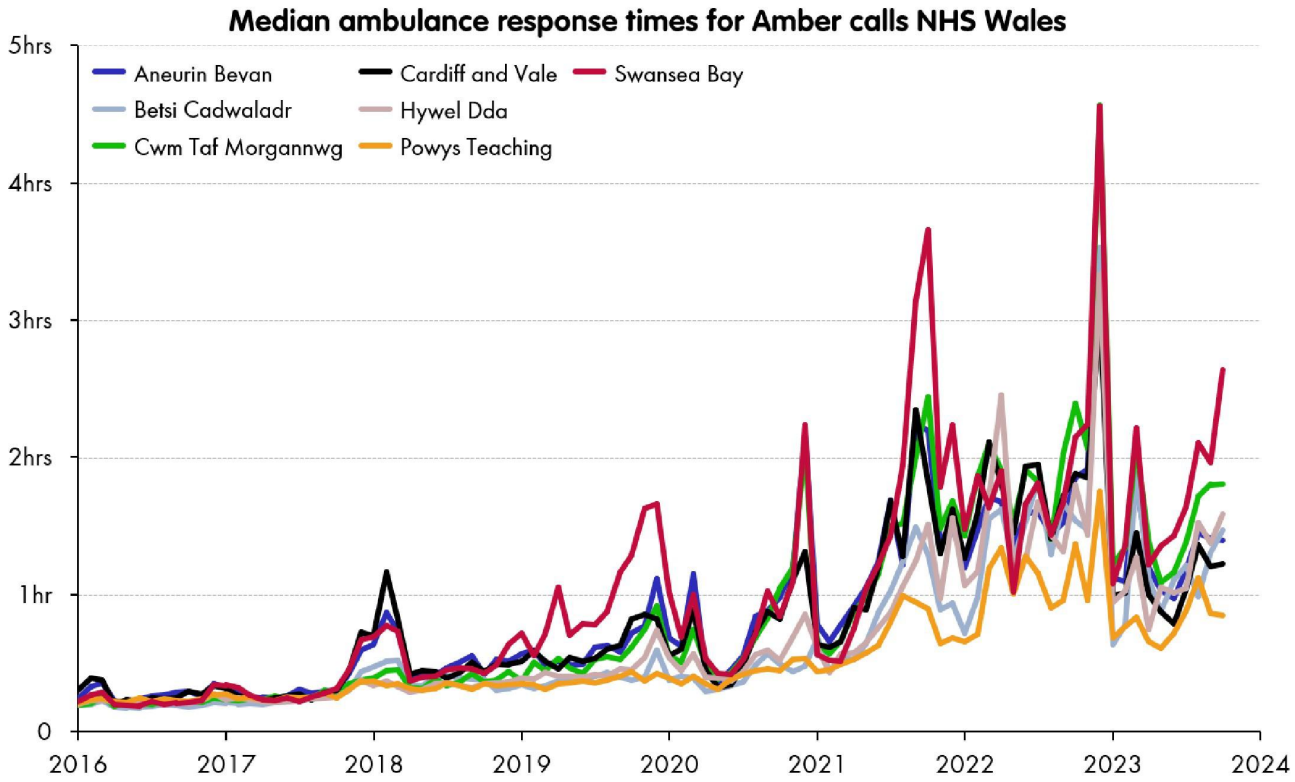
80. The Nuffield Trust highlighted long delays in responding to Category 2 emergency calls - a comparison between March 2019 and March 2020 showed an increase in mean response time of 43 minutes in London, but decreases elsewhere e.g. by 1 minute 50 seconds in the South West (Morris 2020). For the most urgent category again response times were variable and were most badly affected in London up to 9 minutes 52 seconds with a target of 7 minutes. In March 2020 the average wait in London exceeded 1 hour for Category 2 calls, against a target of 18 minutes (see Figure 6 below), with 10% of calls waiting longer than 2 hours 20 minutes. The Nuffield Trust author concluded that these delays may have occurred because of the *"additional time needed to disinfect ambulances, staff sickness due to Covid-19, or simply an increase in 999 calls".* Help was sought and provided by neighbouring ambulance trusts, with firefighters driving ambulances in some instances, which may have contributed improvements in response times in London in April.

81. At this time there were improvements across all regions, at the same time as reductions in call volumes. The Nuffield Trust author suggested these improvements may also have been a consequence of reduced road traffic and other urgent incidents because of the lockdown.




Source: NHS England; https://www.england.nhs.uk/statistics/statistical-work-areas/ambulance-quality-indicators/; October 2022 excludes London as data unavailable average is of regions except London

*Figure 6: Mean category 2 ambulance response times by region, Jan 2019 to Nov 2023 (Mainwood 2023) using data from NHS England.*




Source: https://statswales.gov.wales/Catalogue/Health-and-Social-Care/NHS-Performance/Ambulance-Services;

*Figure 7: Median ambulance response times for Amber calls NHS Wales (Mainwood 2023) using data from Statswales.gov.uk*

82. Information about handover delays is available publicly but we have not found any data split by Covid/Non-Covid calls.

83. Fifteen minutes is allowed for a standard handover, without delay. Performance data are collected in England about handovers that take more than fifteen minutes, more than 1 hour and more than 2 hours. It is clear, as shown in the Figures below, that handover delays increased during the pandemic and have generally continued to rise since then. Handover delays longer than 60 minutes have shown a particular increase across this period. Hours lost to the ambulance service (while ambulances are unavailable because they are queuing outside ED with patients) reflect these delays. Data are not available split by Covid-19/non-Covid-19 but do not appear to be directly related to call volume, or the main Covid-19 “waves”. It is important to note that national data can mask local peaks and troughs.

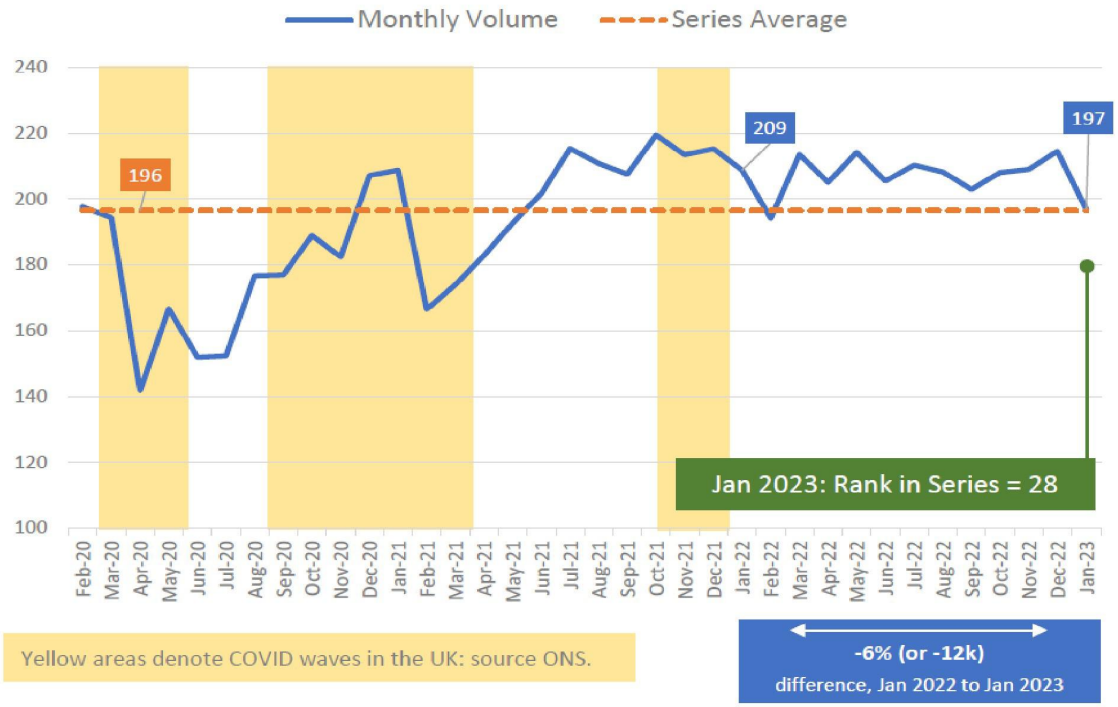



*Figure 8: Volume of handovers (thousands) over 15 minutes in England (source (AACE 2023) via NAIG)*

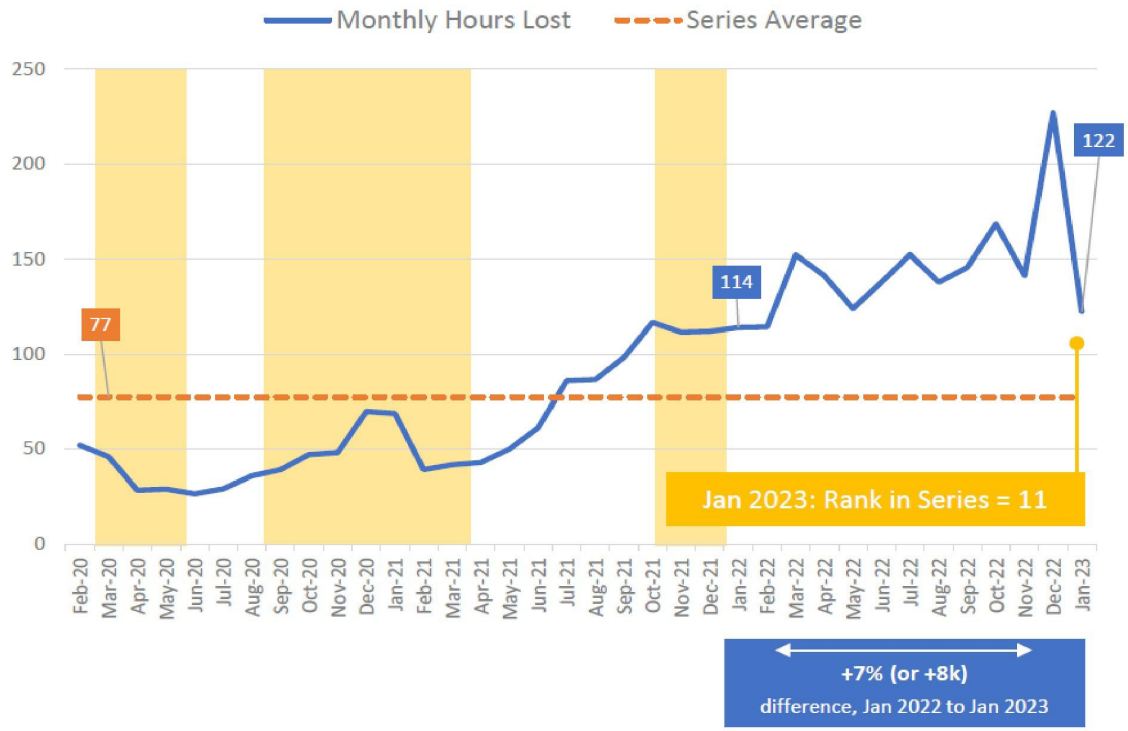



*Figure 9: Hours lost (thousands): handovers over 15 minutes in England ( source (AACE 2023) via NAIG)*

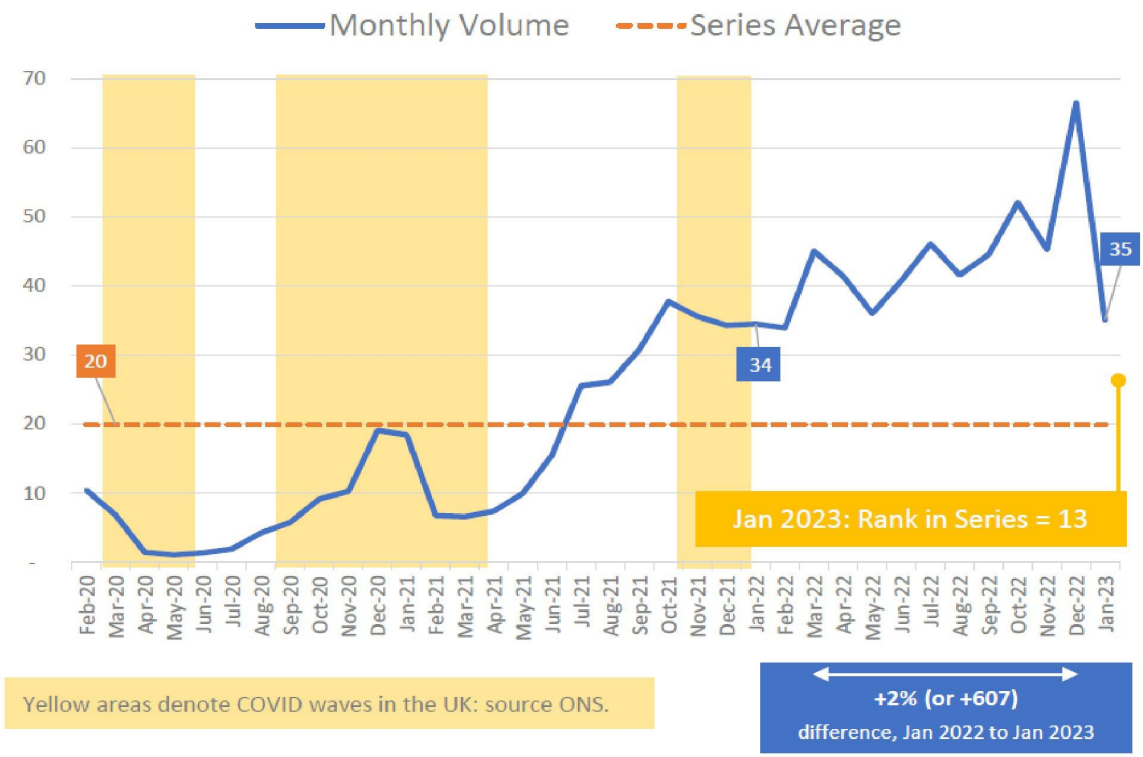



*Figure 10: Volume of handovers (thousands) over 60 minutes (Source (AACE 2023) via NAIG)*

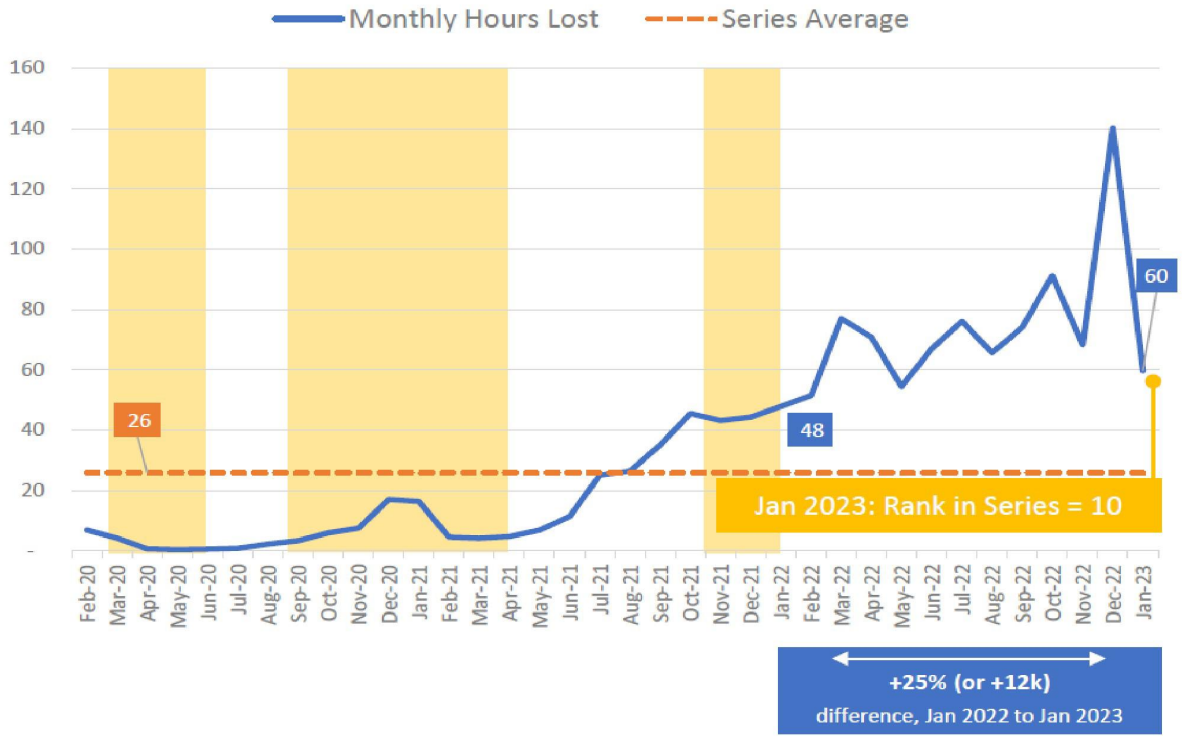



*Figure 11: Hours lost (thousands): handovers over 60 minutes (source (AACE 2023) via NAIG)*

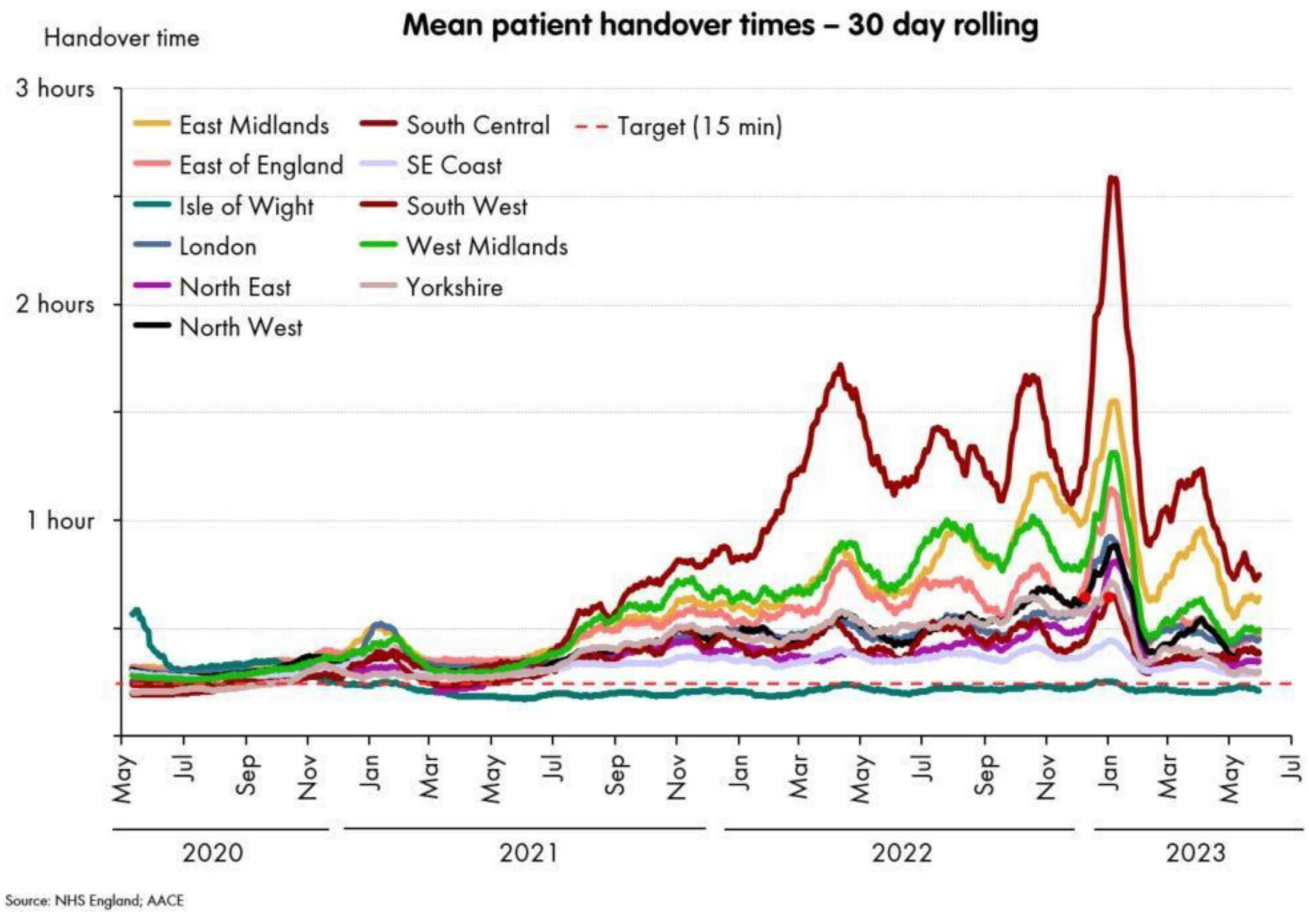



*Figure 12 Mean patient handover times – 30 day rolling (Mainwood 2023) Data sources: NHS England, AACE*

*Summary of key points:*

84. *Response times were variable and affected badly at times in some regions, although for the most urgent cases were reasonably maintained throughout the period of this review. For less urgent callers, response times increased significantly across the period, and were well outside performance targets. Handover delays between the 999 service and ED rose during the pandemic period, although with local variations and notably, since then. As ambulances queuing outside the ED are taken out of the 999 response capacity, hours lost reflect both these handover delays and further delays to callers.*

## The impact of the pandemic on the ambulance service workforce

### a. Calls per day, or any other relevant indicators of workload

85. Pre-pandemic, at times of high call volume or when patient flows were blocked within the hospital, patients were taken into the ED, handover completed, and the ambulance crew was able to report "green" or available to attend another 999 call. This practice –

informally known as “Corridor care”- was abruptly ended at the start of the pandemic. This meant that, until patients could formally be handed over to hospital staff, emergency ambulance crews had to retain clinical responsibility for them, generally in the ambulance parked outside the hospital. A doctor might come out to see the patient and assess whether their need for admission or hospital-based care justified the infection risk associated with them entering the building (TRIM Study team 2024). Delayed handovers are known to have affected the workload and morale of ambulance crews (HSIB 2023). There was a complex picture in terms of delayed handovers during the study period, and though there was an overall reduction nationally during the early phase of the pandemic, there was considerable variation by time and place.

### b. Absence rates due to illness and any impacts on mental health and wellbeing

86. Data collected by NHS England indicate that staff in ambulance services – both clinical and support staff – showed varying rates of sickness absence (from all causes), with a peak of 9.91% in January 2021 (NHS England 2023). As shown in Figure 13 below, rates followed broadly similar trends to sickness absence rates across the English NHS as a whole but were consistently higher. Even prior to the Covid-19 outbreak, ambulance service staff had notably higher sickness absence rates than average for the NHS workforce (Lipman, Gilkes and Hanson 2021). Self-isolating staff are not counted as off sick in the statistics. Sickness absence rates in the NHS in Wales and Northern Ireland followed a very similar pattern, including generally higher rates in the ambulance service than other NHS settings.

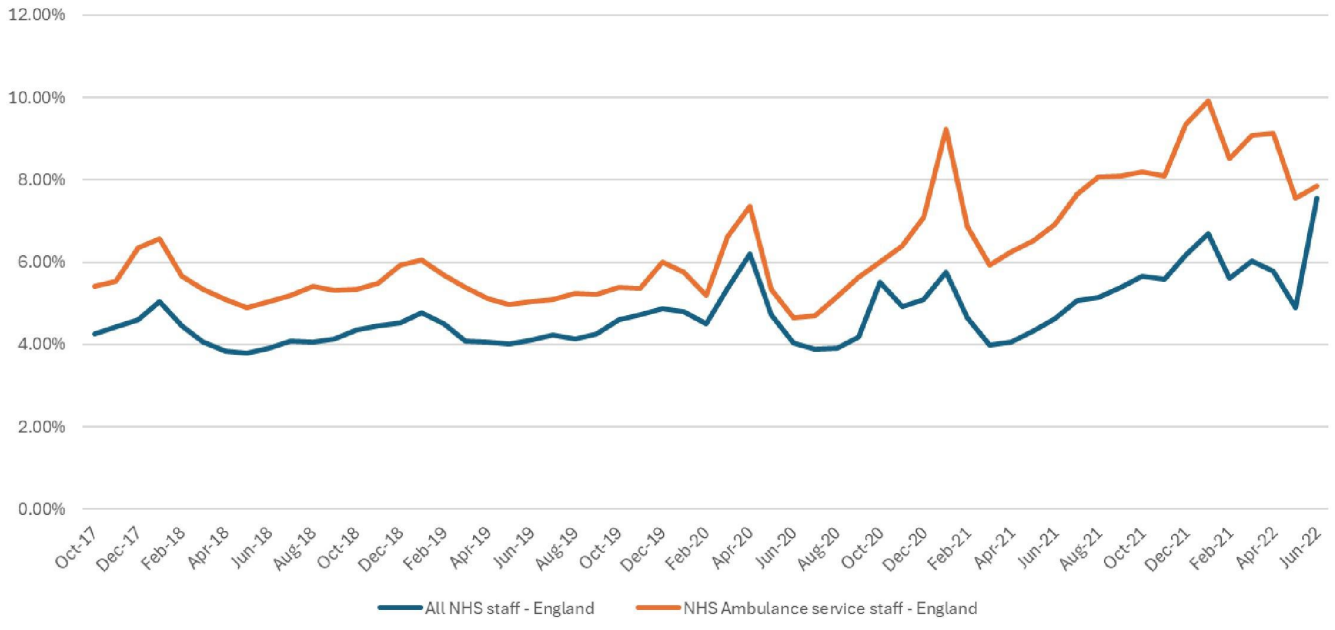



*Figure 13: Sickness absence rates in English NHS organisations October 2017 to June 2022 based on NHS England data*

87. In Northern Ireland, Northern Ireland Ambulance Service annual reports present overall absence rates as 10.49% in 2019/2020, 7.95% in 2020/2021 and 10.77% in 2021/22 (Northern Ireland Ambulance Service 2020, 2021, 2022). Separate data, additional to these absence rates, cover staff hours lost to Covid 19 (self-symptomatic/self-isolating). As may be expected, they confirm higher rates of lost capacity at times of higher Covid-19 levels. Hours lost peaked in the winter of 2021/2022 around Wave 4 – with a high of 8.7% monthly hours lost in February 2022 (compared to just 0.91% in May 2021). Other peaks corresponded to previous waves - 3.98% in November 2020 (Wave 2), and 2.10% in Wave 1 (April 2020).

88. Figures 14 and Figure 15 show sickness absence rates across the NHS workforce in England by different staff groups in the period April - June 2022, late in the period covered by the Inquiry. Absence rates were higher than in other groups at 7.4% in June 2024 for ambulance clinical staff (in patient facing roles), and 9.2% for ambulance service support staff. Between 2019 and 2022 the average increase in sickness absence rates was around 1% but was 2.3% for clinical ambulance staff and 3.2% for ambulance support staff (Palmer 2023). Again, it is important to note that averages across the country may hide peaks and troughs at local level or during defined periods.

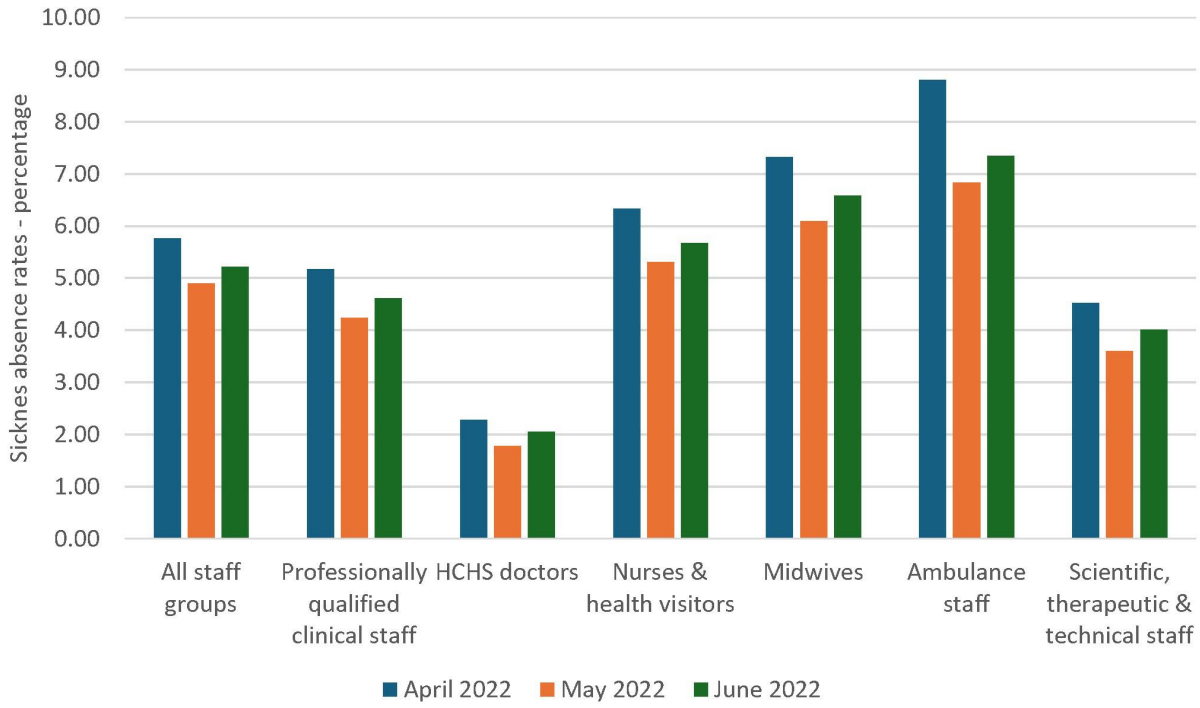



*Figure 14: Sickness absence rates of NHS all staff and clinical staff in England by staff group – April - June 2022*

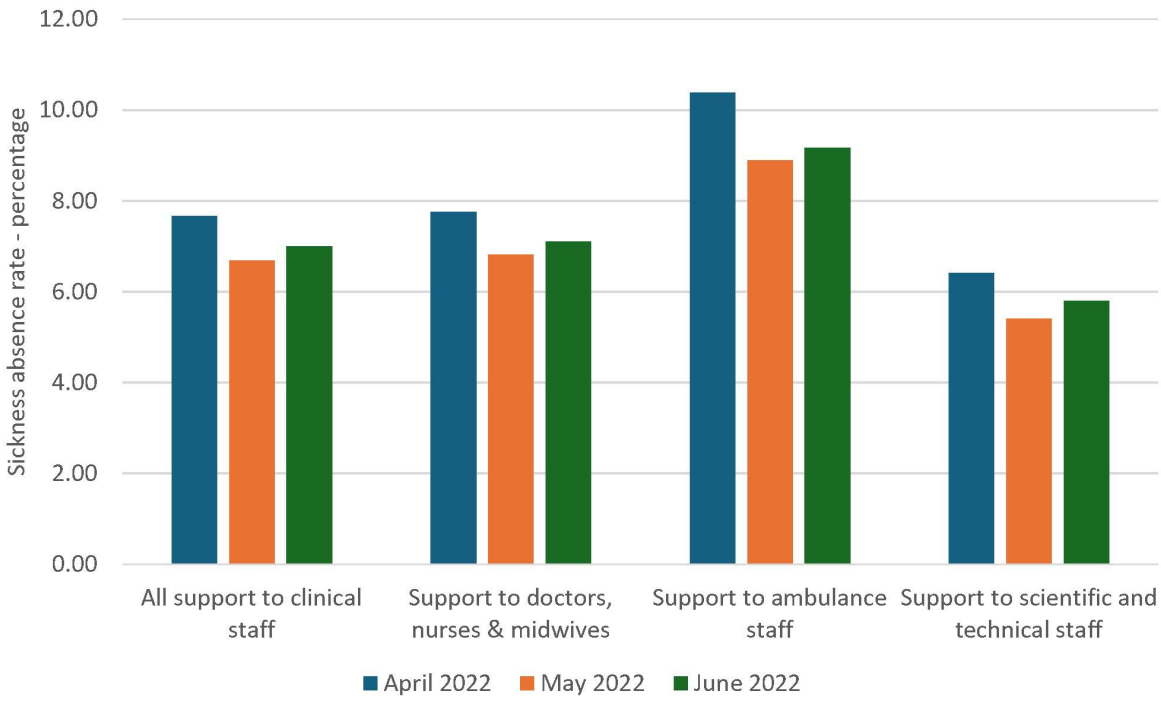



*Figure 15: Sickness absence rates of NHS non-clinical staff in England by staff group – April - June 2022*

89. Appleby (2021) analysed rates of sickness absence attributed specifically to Covid-19 infection among NHS staff in England during the period March to September 2020 (Appleby 2021). As shown in Figure 16 below, in the initial peak of infection in April 2020, ambulance clinical staff had the lowest proportion of sickness absence days attributed to Covid-19 infection of any clinical group. The peak impact of Covid-19 sickness absence came a little later for ambulance clinicians than for other staff groups and lasted longer.

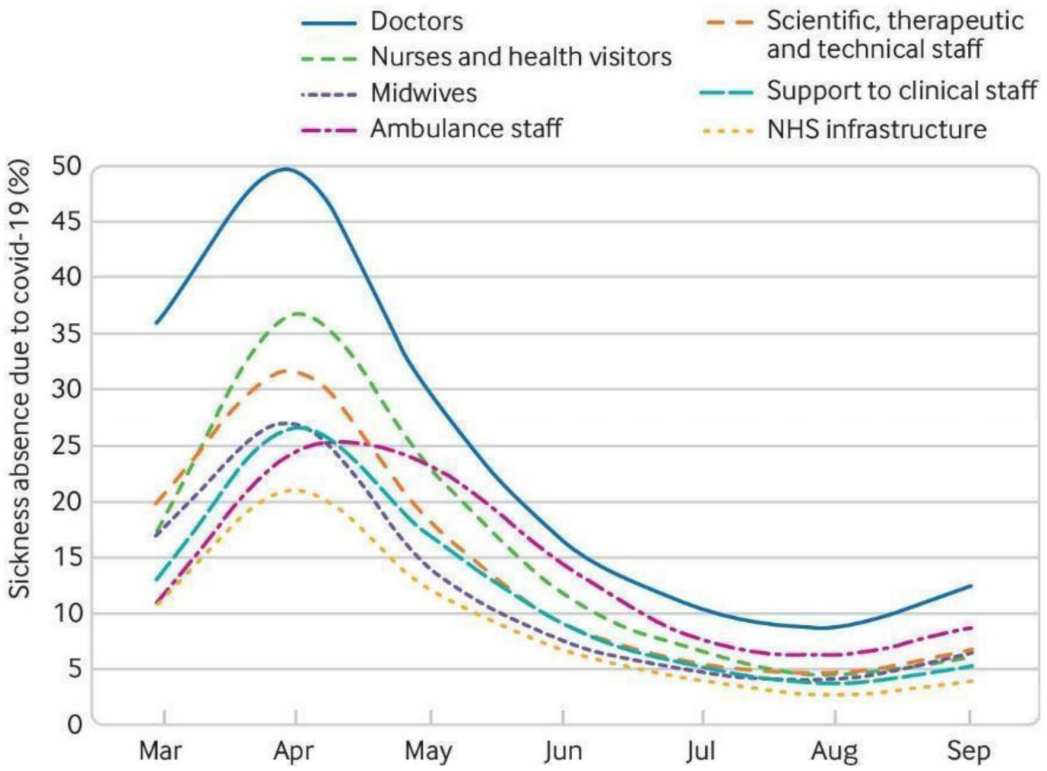



*Figure 16: Proportion of English NHS staff sickness absence due to Covid-19, March to September 2020 Source: Appleby 2021*

90. Anxiety/stress/depression/other psychiatric illnesses (Code S10) is the single biggest reason for sickness among ambulance service staff. As Figure 17 shows (based on data from NHS England (NHS England 2023)), the proportion of sickness absence in the ambulance workforce ascribed to Code S10 was consistently above 25% throughout the pandemic. However, it is worth noting that this is not markedly different from the situation pre-pandemic (25% for ambulance clinical staff in June 2019), nor from the situation across the NHS workforce as a whole – in June 2022, 23.2% of staff sickness absence was coded S10.

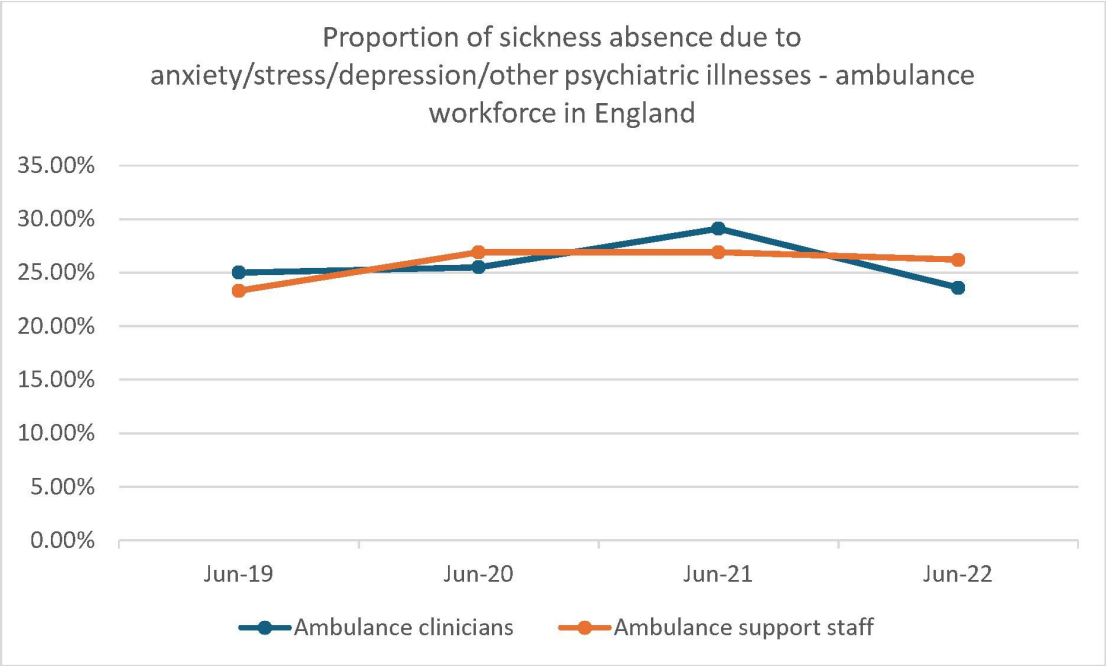



*Figure 17: Proportion of sickness absence due to anxiety/stress/depression/other psychiatric illnesses - ambulance workforce in England*

91. Data suggests that there is a similar position in Wales in terms of higher rates of sickness among ambulance service staff than among other NHS providers. In Wales, pre-pandemic sickness rates in the ambulance trust were between 6% and 8% but increased during the pandemic with rates peaking at over 12% during winter 2022, before falling again (Audit Wales 2023). Publicly reported data for the NHS workforce in Scotland groups ambulance clinicians alongside other allied health professionals when reporting sickness rates, which makes it hard to identify sickness rates in the ambulance workforce (NHS Education for Scotland 2023). No data was identified for Northern Ireland.

92. A large-scale survey of the UK ambulance workforce conducted by Barrett et al (Barrett, Williams et al. 2022) found that a large proportion of the workforce experienced psychological distress during the first wave of the Covid-19 pandemic. While these stresses were observed to decrease, confidence in PPE and pre-existing mental health disorders appeared to be a significant factor in worsening psychological distress. The study collected data at three time points: Phase 1 recruited 3,717 participants, reducing to 2,709 (73%) by phase 2 and 2159 (58%) by phase 3. Participants were mostly male (58%, n = 2148) and registered paramedics (n = 1992, 54%). Mean (standard deviation) General Health Questionnaire (GHQ-12) (Liang, Wang et al. 2016) scores were 16.5 (5.2) during phase 1, reducing to 15.2 (6.7) by phase 3. A total of 84% of participants (n = 3112) had a GHQ-12 score ≥ 12 during the first phase, indicating psychological distress. Participants who had higher GHQ-12 scores reported feeling unprepared for the pandemic. Participants reported uncertainty and distrust in relation to what they saw as ambiguous and conflicting advice from a

range of bodies in relation to appropriate use of PPE in relation to procedures which might be regarded as aerosol generating (including responding to cardiac arrest).

93. Porter et al (in press) (TRIM Study team 2024) conducted qualitative interviews with 25 staff working for ambulances and associated providers across the UK, in a range of clinical and non-clinical roles. They identified numerous challenges to mental health and wellbeing associated with the response to the Covid-19 pandemic. These included: the work generated by additional calls and extended handover times at the ED; the work of implementing multiple changes in working practice as new evidence and guidance emerged; the emotional stress of worrying about infection, especially for those who had known colleagues die or become seriously ill through Covid; and the emotional stress resulting from having to provide care for seriously ill patients while keeping their loved ones at a distance. Distress and worry about infection were expressed by staff working in the EOC as well as in patient facing roles. In a separate study, by Harry and Brady (2024 in press) (Harry 2024) clinical advisors who switched to working from home rather than the EOC reported positive impacts on their wellbeing and levels of anxiety.

94. Front line paramedics were not amongst the first groups prioritised to receive vaccinations. Consultees reported to us that paramedics were attending, treating and conveying patients with Covid-19 symptoms without being vaccinated whilst receiving staff at hospitals had already been eligible to receive vaccinations. This was reported as being stressful and unjustified.

95. Rees, Smythe, Hogan and Williams (2021) (Rees, Smythe et al. 2021) interviewed 20 paramedics in a qualitative study in the Welsh Ambulance Service and found that all participants stated that they faced "*rapid disruption*" to their personal and working lives. All but one expressed concern for themselves and their families due to a perception of the risks associated with their occupation, and they felt that practising in this context was unlike anything they had experienced before, with an ever-present sense of fear, burden and risk (Rees, Smythe et al. 2021).

96. The value of providing appropriate support for ambulance service staff wellbeing was acknowledged by the College of Paramedics, who issued "Guidance for Managers on Psychosocial Support and Mental Wellbeing of Ambulance Personnel in a Pandemic Crisis in 2020" (College of Paramedics 2020). Three elements were recommended as being pertinent to ensuring staff health and wellbeing and they included, preparation and education, communication and a good understanding of influencing factors to reduce the impact upon psychosocial resilience. An emphasis was also placed on managers to be compassionate and understanding, encouraging all to take care of one another and share their experiences. It is thought that these practices along with human connectivity were able to create cohesion, teamwork, solidarity and group resilience which, upon reflection, are fundamental to positive mental health wellbeing.

97. In an interview study with 33 ambulance service managers, clinical staff and control room staff in three English ambulance services, conducted before and during the pandemic, Phung and colleagues (Phung, Sanderson et al. 2022) found participants reporting on the negative health impacts of doing the job; some stigma in the

workplace around mental health issues (though this was not universal); and a culture of "presenteeism", that is, staff wanting to be seen to be at work despite illness. Policy and practice for supporting staff wellbeing varied greatly between services.

### c. Career development and training and the numbers of paramedics leaving compared to the number of new paramedics

98. Alongside sustained increases in volume of demand, there has generally been year-on-year growth in the number of ambulance staff, with the number of paramedics and emergency medical technicians in England growing by just over 50% in 11 years, to a total of 17,847 in June 2022, with 24,979 support staff (Lobont 2022). Figure 18 summarises paramedic (including specialist/advanced paramedic numbers from 2019 to 2022, illustrating an overall upwards trend. While the graph shows a slight drop off in 2022, current data shows a large increase since June 2022 – from 15,747 full time equivalent (FTE) paramedics to 17,514 in March 2024 (NHS England Digital 2024).

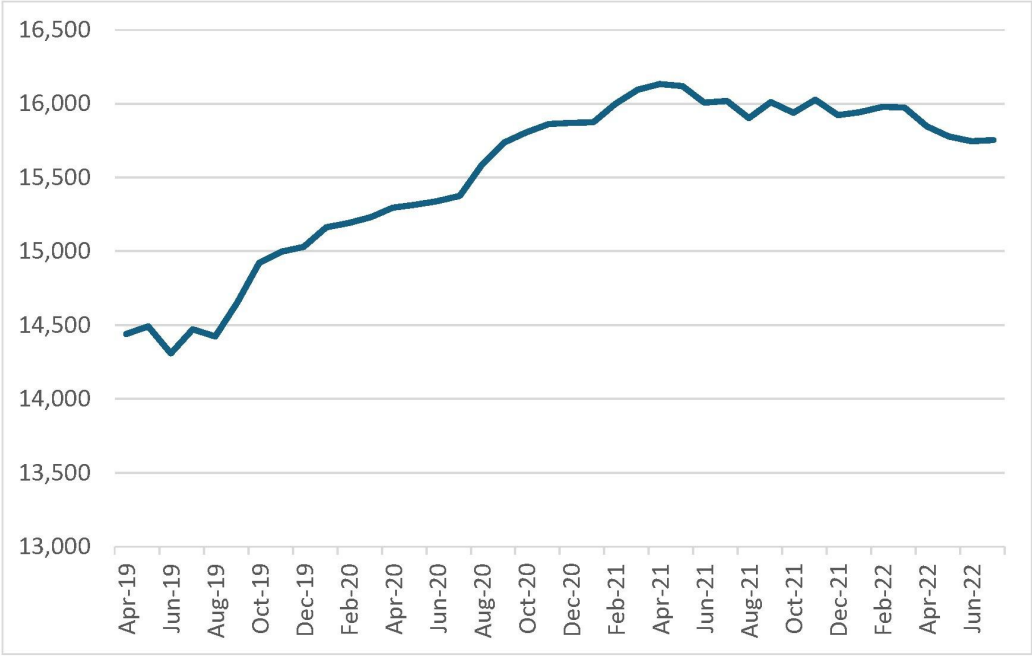



*Figure 18: Full Time Equivalent (FTE) paramedics April 2019 - June 2022 (source data: NHS England Digital 2024)*

99. However, there is substantial turnover in the workforce. Between June 2021 and June 2022, the proportion of ambulance service staff (in a range of roles) in England who left their role was 10.3% (or 1,761 people) (Lobont 2022). This compares with an annual turnover rate of ambulance staff in England between June 2010 and June 2011 of 4.8%. Over the same 11-year period, the average turnover rate for all NHS staff went from 10.6% to 12.5% over the same 11 years, suggesting that although turnover rates are currently lower than for the NHS workforce as a whole, the trajectory within ambulance services is for a substantial increase in turnover of staff.

100. Challenges with staff retention have continued since 2022. Drawing on Freedom of Information requests, the Observer newspaper reported in April 2023 that ambulance services were experiencing high levels of staff turnover, particularly within the south of England (Jayanetti 2023). Overall staff turnover at South Central Ambulance Service was 20% (one in five staff members leaving over the course of a year). Rates were higher among the roles of dispatchers (40%) than among patient facing clinical staff, including paramedics.

101. Coster et al (Coster, O'Hara et al. 2022) researched ambulance staff perspectives on the impact of working through the pandemic on ambulance staff wellbeing, resilience and intention to leave. In two English ambulance trusts, during April 2021– December 2021, they conducted two rounds of an online survey (n=500) and qualitative interviews (n=20). Interview participants were sampled purposively to include frontline staff (paramedics, Emergency Medical Technicians (EMTs) and call-handlers), line managers and senior managers. Compared with prior to the pandemic, staff perceived things were worse in terms of staffing levels (80%), stress (77%), workloads (76%), morale (73%) and their mental health (66%). Key concerns related to abnormally high levels of staff absence, the impact of work on mental and physical health, inadequate time to do the job and making mistakes because of workloads. Almost one-in-five respondents had applied for a non-NHS job in the last six months, including 25% paramedics, and 27% wished to be working elsewhere in 5 years' time. The interviews provided complementary detail on experiences and employment intentions, with key issues relating to staffing pressures, work demands and conditions, and burnout. The authors concluded that the Covid-19 pandemic had a continuing detrimental effect on workload, morale and both mental and physical health, with implications for staff retention and NHS care delivery.

*Summary of key points:*

102. *The immediate impact on the workload of paramedics and EMTs was highly varied, with periods of significantly increased demand as well as some periods of reduced demand. Changes in practice around use of PPE and vehicle cleaning, along with changes in handover processes at emergency departments, led to increased job cycle times. Workload in EOCs showed similar peaks and troughs of demand. Activity by EOC clinical advisors increased significantly, though additional staff were placed in that setting.*

103. *Survey and qualitative studies suggest that Covid-related levels of stress and anxiety were very high in the ambulance sector; even before the pandemic, rates of ill health associated with anxiety and depression were particularly high in this sector. Levels of sickness absence are also generally high in the ambulance sector, and Covid-19 led to high levels of staff absence at certain times, with knock-on effects on the remaining staff. There are concerning indications that the enduring impact of the pandemic, including staff burnout, is leading to increased rates of attrition from the workforce.*

## Managing avoidable admissions

104. The emergency ambulance service responds to 999 calls and urgent calls from doctors and other health professionals. The ambulance service links in with other services to some extent (e.g. for high intensity users of services where many ambulance services collaborate with ED clinicians, GPs and other community-based services to provide a case management type service for people who call 999 frequently). Many of these patients have chronic conditions, with falling known to be one of the most common reasons for "frequent calling". Every UK ambulance service has a designated lead for this concern which burdens the ambulance service as well as indicates that callers' problems are unresolved (Edwards, Bassett et al. 2015). Although emergency ambulance services receive many calls for patients with chronic problems, their ability to refer to specialists routinely is limited. In the case of palliative care there are some examples of new initiatives which started during the pandemic. This includes a fast-track initiative by the Welsh Ambulance Service where ambulances carried additional medications for patients at the end of their lives (in anticipation of end-of-life Covid-19 cases) to avoid the need for hospital attendance. This initiative has continued to operate since the pandemic (after the service found that medications were mostly used to support non-Covid patients) and is being evaluated (HCRW 2024).

105. More broadly, decisions to refer for emergency admission are made from general practice or directly from the ED. There has been much concern over recent years about persistent rises in emergency admissions, with several important policy initiatives to try to reduce these admissions, which are recognised to be detrimental to patients unless unavoidable (Deeny 2018, Snooks, Bailey-Jones et al. 2019). Interventions have not necessarily been effective and further research is underway to try to understand effects, for instance of predictive risk stratification tools and mechanisms of change underlying observed impact (Evans, Dale et al. 2022, Snooks 2023).

# Section 2: Shielding

106. I have been asked to comment on the shielding policy as implemented across the UK, its likely effects on health outcomes, and any learning to inform how more vulnerable people should be better protected in the next pandemic. I understand that the evaluation of shielding or segmentation as an alternative to other non-pharmaceutical interventions is being covered in another module.

## Changes to the shielding list over time

107. The shielding policy was introduced across the UK in March 2020 following discussions at the Scientific Advisory Group for Emergencies (SAGE) (UK Government 2020). In England, the Secretary of State for Housing, Communities and Local Government announced that people at highest risk of being admitted to hospital with Covid-19 should shield themselves and stay at home for an initial period of 12 weeks. Policies in each of the four nations of the UK were aligned, though the formal decision making and communications processes were separate. In each of the four nations, people identified as Clinically Extremely Vulnerable (CEV) received a letter from the relevant Chief Medical Officer strongly advising them that they should stay at home and avoid contact with other people, including those they lived with. Support was provided through Local Governments and Third Sector (voluntary/charity/not for profit) organisations to deliver food parcels and prescribed medications to their homes. However, there was no formal provision of psychological support or guidance for those shielding. Shielding was different to usual voluntary quarantine measures which apply to those with a disease (e.g. extremely drug resistant tuberculosis) not those at risk of contracting the disease. There was very little experience of such an approach, which had only really been used for people with severe immune deficiency. There was no evidence of effectiveness of a large-scale public health policy of any similar intervention before shielding was introduced. Although Sweden implemented a controversial policy of targeted public health information for those at highest risk (the elderly) (Bjorklund K 2020), the only other example of a similar policy which involved personalised letters sent to home addresses that we know of was that known as “cocooning” which was introduced in the Republic of Ireland (Bailey, Ward et al. 2021). At this stage of the pandemic, transmission was not well understood and there were limited data available about risk factors for susceptibility to severe disease.

108. In each of the 4 UK nations, people were categorised as CEV on the basis of medical conditions including those who had received organ transplants, with specific cancers, severe respiratory conditions and people on immunosuppressant medications. Two lists were derived – those deemed to be at high risk (CEV) and those at moderate risk (clinically vulnerable). Those defined as CEV were included in the shielding programme, whilst those deemed to be at moderate risk were initially advised that they could go out to work if they could not work at home, and to get food or exercise, but to try to stay at home as much as possible. Inclusion of medical conditions was based on clinical judgement, rather than any specified threshold of infection fatality in that group.

109. As per the NHS website (NHS 2020), CEV people included in the Shielding People List were, initially, those who:

- have had an organ transplant
- are having chemotherapy or antibody treatment for cancer, including immunotherapy
- are having an intense course of radiotherapy (radical radiotherapy) for lung cancer
- are having targeted cancer treatments that can affect the immune system (such as protein kinase inhibitors or PARP inhibitors)
- have blood or bone marrow cancer (such as leukaemia, lymphoma or myeloma)
- have had a bone marrow or stem cell transplant in the past 6 months, or are still taking immunosuppressant medicine
- have been told by a doctor they have a severe lung condition (such as cystic fibrosis, severe asthma or severe chronic obstructive pulmonary disease (COPD))
- have a condition that means they have a very high risk of getting infections (such as Severe Combined Immunodeficiency or sickle cell)
- are taking medicine that makes them much more likely to get infections (such as high doses of steroids or immunosuppressant medicine)
- have a serious heart condition and are pregnant

110. The four Chief Medical Officers met to agree criteria for shielding (known in Scotland as "the highest risk list") that were "*exclusively clinical to identify people at the highest risk of mortality and serious illness from Covid-19 … based on the limited evidence at the time*" (Ministry of Housing Communities and Local Government 2021). Algorithms were developed for use on central NHS records to identify people in the defined groups and letters were sent to individuals at their home addresses with strong advice to stay at home and strictly self-isolate even within the home from family members.

111. By 7th May 2020, 2.2 million people had been identified as CEV in England, and over 510,000 people had received at least one food box – at a cost of £308 million by the beginning of August (National Audit Office 2021).

112. In Scotland, around 180,000 people were on the highest risk list (Scottish Government 2022), and advised to shield. In Wales 127,787 people were identified as CEV and advised to shield (4.1% of the Welsh population) (The Health Foundation 2021). In Northern Ireland, around 80,000 were on the shielding list (BBC News 2021).

113. Further to this centralised identification, people were added to or taken off the shielding list by secondary and primary care doctors, on the basis of local records. There was variation regionally and by country, although processes were largely the same. Although risk factors related to age, ethnicity and deprivation were starting to be known, these were not included explicitly in identification of individuals who would receive shielding letters. The National Audit Office report on Shielding, published in February 2021, states in its Key Facts section that around 375,000 people were not reached due to missing or inaccurate NHS records, that 94% of CEV people reported that they were mostly or completely following shielding advice but that it was not

known whether the shielding programme led to fewer deaths than otherwise would have been the case (National Audit Office 2021).

114. People identified as being in the medium risk category of "clinically vulnerable", including those aged over 70, pregnant women, those with a chronic condition or morbid obesity, (25% of the UK population) were also advised to "try to stay at home as much as possible" (NHS 2020) and to be strict in social distancing but were not included in the Shielded Patient List and did not receive letters or support to self-isolate through the shielding initiative.

115. The first letters were sent in late March 2020 (with follow up texts and phone calls in some instances) and included advice to strictly self-isolate for a period of 12 weeks, but this period was extended and overlapped with periods of lockdown over the following 18 months, with local variations. The shielding programme was first announced on March 22nd, with strict self-isolation advice to be followed immediately. Letters from the CMO and Local Authorities followed as CEV people were identified with some variations at local level. It is important to note that, although shielding was introduced first, it was followed very quickly by a general "lockdown" with restrictions across the whole population. Shielding was voluntary – CEV people were advised to self-isolate and were supported by Local Authorities and other local initiatives with food parcel deliveries, priority slots for supermarket deliveries and prescription pick-ups. By contrast, many aspects of lockdown were statutory, with legal sanctions for those who did not adhere to new restrictions on travel and social distancing / mixing. Nevertheless, against a backdrop of frequently changing guidance and regulations, there was some confusion about who could do what, when, and with how many.

116. Over the next few months, criteria for inclusion changed several times, based on some emerging evidence – largely from public health surveillance and risk prediction modelling (Clift, Coupland et al. 2020). The QCOVID risk prediction algorithm was developed and tested using data from 1,205 general practices in England, linked to Covid-19 test results, Hospital Episode Statistics and death registry data. The final algorithms included age, ethnicity, body mass index and a range of comorbidities and were found to perform well in terms of sensitivity for identifying deaths from Covid-19 (sensitivity for identifying deaths within 97 days was 75% for the highest 5%). In February 2021 1.7 million people were added to the shielding list, with inclusion of variables such as ethnicity, deprivation, weight and prescribed medications bringing the total to around 3.8 million people being included in the shielding initiative in England (UK Government 2021).

117. Although the stated rationale for shielding was to reduce mortality in the most vulnerable (Porter, Akbari et al. 2023), it was also suggested that shielding may help to reduce overall infections and therefore the burden on the NHS. The strength of the evidence base for inclusion in shielding was unclear and there has been some criticism of the accuracy of identification of those at highest risk (BBC News 2021). In addition, there were some operational difficulties in reaching those identified, with some initial mix ups over mailing lists, for instance, contacting deceased patients. Some people felt they were included when they shouldn't have been, and others felt they had been excluded when they could have benefited. With people being added to

or taken off the Shielded Patient List (SPL), there was confusion about what people should do to keep themselves safe. Torjesen reported that around 50 charities, including the British Liver Trust, Asthma UK and the British Lung Foundation had written to the UK government in May 2020 asking for clear advice for people who had been told to shield but then received texts send from central sources, without the knowledge of patients' GPs, telling them they no longer needed to shield (Torjesen 2020).

*Summary of key points:*

118. *As shielding was a new policy that was almost unique to the UK, there was no existing evidence about effectiveness or who should be included in the programme. As new information became known about risk factors during the pandemic, new categories of people were added to the Shielded Patient List but evidence about whether they were the right people, whether they would benefit from shielding was still lacking – and is not available to this day.*

## Research on the positive and negative impacts of the shielding programme

### a. Covid-19 infection rates

119. There has been limited high quality evidence on the impact of shielding on Covid-19 infection rates. As the policy was introduced at the same time across all four nations of the UK, it has been challenging to measure effects – with no clear "control" group who did not receive the intervention. Nevertheless, several authors based in Scotland and Wales have looked at this, where systems (Electronic Data Research and Innovation Service (eDRIS) (Public Health Scotland 2024) and the Secure Anonymised (SAIL) Databank) (Jones, Ford et al. 2019) for retrieving linked data across routine datasets are well developed. We have not found any robust evidence concerning the effectiveness of shielding across the UK, in England or Northern Ireland. Jani and colleagues (Jani, Ho et al. 2021) used linked health care records to study the impact of shielding in the population of Greater Glasgow and Clyde during the period March 2020 to May 2020. Of the total regional population of 1,315,071, 2.03% were on the shielding list due to being classed as clinically extremely vulnerable. The authors also identified 26.5% of the population as "moderate risk" – those with some identified health conditions but who were not on the shielding list. The remainder of the population was classed as "low-risk". People on the shielding list were found to be eight times more likely to have confirmed Covid-19 infections recorded in their routine data source than the low-risk category; 299 people on the shielding list (1.12% of those shielding) had confirmed infections during the study period, and 230 were admitted to hospital with Covid-19. The confirmed infection rate for people at moderate risk was 0.53% (n=1,859) and for those at low risk 0.13% (n=1,190). This association between inclusion in the shielding programme and rate of infection does not indicate that one caused the other. The authors note that rates of testing for Covid-19 are likely to have been much higher in the shielding group than in the general population, so this

confounds these results to an unknown extent. Compared with the low-risk category, the shielded group were 18 times more likely to have been hospitalised but only 4 times more likely to have been admitted to ICU. The higher infection rates may have been partly related to higher testing rates, and partly related to healthcare contact rates amongst the clinically vulnerable and extremely vulnerable at a time when healthcare transmission rates were not well controlled. Changes in rates of admission to ICU are addressed in the expert report from Prof Charlotte Summers and Dr Ganesh Suntharalingam on Intensive Care (INQ000474255).

120. The authors of this report, together with colleagues, conducted the EVITE study, part of which involved an analysis of a large, linked dataset covering the whole population of Wales, 3.2 million people (Snooks, Watkins et al. 2023). We conducted a retrospective comparison of linked demographic and clinical data for cohorts comprising people identified for shielding from 23 March to 21 May 2020, a comparator group (matched and therefore similar in terms of age, sex and healthcare utilisation rates during the previous year), and the rest of the population. It is important to note that this matching process reduces the influence of confounding factors, that is, other possible explanations for changes in infection rates, but it cannot control for all factors so the groups may differ in other important ways. Entire codes e.g. many cancers were included in the SPL, so it was not possible to match participants clinically. This problem has been faced by all those who have attempted to evaluate shielding in terms of effects.

121. Health records were extracted with event dates between 23 March 2020 and 22 March 2021 for the comparator cohort and from the date of inclusion until 1 year later for the shielded cohort. Recorded Covid-19 infection rates were similar between the shielded and comparator cohorts at 1 year: 6.1% (7,469 people) compared to 6.2% (7,509 people). The Adjusted Odds Ratio is 0.97 with 95% Confidence Interval 0.94 to 1.00, meaning that the small difference between these groups was not statistically significant, and could have occurred by chance – essentially this means there is no reliable evidence of a difference in infection rates between groups. The Covid-19 infection rate observed in the shielded cohort was higher than the general population (5.8% n = 164,394). Importantly, nosocomial (hospital-acquired) infection rates were significantly higher in the shielded cohort (1.1%, n = 1,305; OR 1.68, 95% CI 1.53, 1.84) than amongst people in the matched cohort (0.6%) – and much higher than the general population (0.2%). It is important to note that testing rates were higher in the shielded group, with 130,039 Covid-19 tests recorded during 1-year follow-up for 44,523 individuals in the shielded cohort, an average of 1.11 tests per person, and 37.9% of the cohort tested. The average in the non-shielded cohort was 0.83 tests per person and 30.8% tested. The adjusted odds ratio for persons tested was 1.616 for the shielded cohort relative to the non-shielded cohort. Within persons tested, 15.6% (6939/44,523) of the shielded cohort recorded a positive test; compared with 18.5% (176,120/ 950,818) in the non-shielded cohort. The testing rate again confounds the infection rate result, as it is not possible to adjust this rate for the unknown rate in the untested population. The infection rates reported are therefore “known” infection rates rather than true infection rates.

122. In Scotland the REACT-SCOT study examined Covid-19 rates and transmission factors associated with eligibility for shielding (McKeigue, McAllister et al. 2021). Using a matched case-control design, 178,578 diagnosed Covid-19 cases were matched with 1,744,283 controls from the general population and linked to the 212,702 on the Scottish shielding list. They found that rates for severe Covid-19 associated with shielding conditions increased and fell alongside rates of infection in the community; that recent hospital exposure and the number of adults in the household were associated with severe Covid-19 among those eligible for shielding and the general population; and excluding care home residents, the proportion of severe cases attributable to hospital attendance reached a peak of 65% during the second wave. They concluded that policymakers should consider extra efforts to avoid hospital acquired infection and support for household members to isolate with vulnerable individuals.

123. Cooksey and colleagues (Cooksey, Underwood et al. 2022) investigated the risk of adverse outcomes in relation to shielding for people with inflammatory arthritis living in Wales in a retrospective, population-based cohort study using linked, anonymised electronic health data from SAIL Databank. They analysed data on healthcare for testing positive for Covid-19 between March 2020 and May 2021 with READ Codes present for rheumatoid arthritis, psoriatic arthritis and ankylosing spondylitis (Cleaton, Raizada et al. 2021). They found that amongst people with inflammatory arthritis, incidence of Covid-19 infection in the study period was lower than in the general population in Wales (3.5% n = 1,966 vs 6% n = 166,602), 49.4% (972) of the people with inflammatory arthritis who tested positive for Covid-19 infection were shielding. Shielding status was associated with over 50% increased risk of mortality in people with IA compared with people without IA. This was probably due to these individuals having multiple features that are classified as "vulnerable" by the UK government and so having more complex disease. Because shielded individuals have a lower incidence of Covid-19–19 in both IA and the general population, data from this study validates and supports the criteria and recommendation for shielding. Findings from this study may not be generalisable to people with other clinical conditions who were shielding.

124. A further small study carried out in February to May 2020 in rheumatology patients in the West Midlands used a survey approach backed up by use of routine records. The authors reported results from a population of 10,387 patients, of whom 7,911 had linked mobile numbers. 12 patients died from Covid-19 (0.12%) which they compared to the local population mortality rate of 4,131/7,415,149 (0.12%). 21% of patients with mobile phones responded and of these, 1,605 completed the SF12, a survey broadly assessing self-reported physical and mental health. Nearly half of the respondents were shielding 792/1,693 (47%), with most following shielding advice (81%). In 1,545 Covid-negative patients, those shielding had lower quality of life scores for mental health and physical health: MCS (− 2.1; 95% CI − 2.8 to − 1.4) and PCS (− 3.1, 95% CI − 3.7 to − 2.5), both $P < 0.001$. The authors concluded that their rheumatology cohort had no excess of Covid-19 deaths compared to the general local population; and that their survey results suggested that shielding adversely affects both mental and physical health in this population. However, numbers in this study are low and response rates very low – so results should be interpreted with caution.

125. In conclusion, although there were challenges in evaluation design (due to implementation nationally and the lack of a clear control or comparator group), the two large scale studies across the population of shielded people came to similar conclusions. Neither of these studies found a protective effect related to shielding in terms of infection rates. The two studies which focused on rheumatology patients had mixed findings, with one reporting reduced infection rates, the other no effect. All of the studies were affected by confounding, with higher testing amongst shielded people at a time when there was restricted availability of testing. It has not been possible to adjust for this differential testing rate, with all studies reporting recorded – or known - infection rates, the true infection rates remain unknown.

### b. All cause and Covid-19 mortality

126. Similar evaluation design issues have affected studies investigating the impact of shielding on mortality as those which have affected studies on infection. It is very difficult to identify a comparator group with similar characteristics or risk of death prior to the pandemic. As entire clinical codes were included in the shielding initiative across the UK e.g. many cancers, it was not possible to match these patients exactly. Some researchers have tried to create comparator groups through other methods such as propensity scores (Zarif, Filipe), identifying others at moderate risk or low risk (Jani), or the creation of a matched comparator cohort (Snooks). Without a robust comparator group, it is very difficult to isolate effects of shielding. For instance, if researchers compare mortality or Covid-19 related mortality rates in shielded people with the general population they leave themselves open to criticism about the validity of their findings – not comparing like with like.

127. None of these teams found sustained protective effects associated with shielding, although both Zarif and Filipe et al reported some limited reductions in mortality compared to matched non-shielding groups.

128. Zarif and colleagues (Zarif, Joy et al. 2021) included 77,360 shielded patients and the same number of propensity matched controls taken from a nationally representative database of primary care patients in England for the period 16th March 2020 to 27th September 2020, with a maximum observation period of 195 days depending on the date GPs contacted their patent with shielding advice. They concluded that there was a short-term reduction in all-cause mortality, with a Hazard Ratio of 0.5 (95% CI, 0.41 – 1.59) at 12 weeks; followed by increased risk of death over the following nine weeks (HR 1.54, 96% CI 1.41 - 1.70) and then higher again after shielding ended (HR 2.61 95% CI 2.38 – 2.87).

129. Jani and colleagues (Jani, Ho et al. 2021) reported that shielded people were five times more likely to die after confirmed infection than low risk people and 49 times more likely to die from Covid-19 overall. In this study of 1.3 million people in the west of Scotland from March to May 2020, 27,747 (2.03%) were advised to shield, and 353,085 (26.85%) were classified *a priori* as moderate risk. Covid-19 testing was more common in the shielded (7.01%) and moderate risk (2.03%) groups, than low risk (0.73%). Compared to those at low-risk, the shielded group had higher confirmed infections (RR 8.45, 95% 7.44-9.59), case-fatality (RR 5.62, 95% CI 4.47-7.07) and

population mortality (RR 57.56, 95% 44.06-75.19). The moderate-risk had intermediate confirmed infections (RR 4.11, 95% CI 3.82-4.42) and population mortality (RR 25.41, 95% CI 20.36-31.71). These results are confounded by testing rates and differences between groups. The authors conclude that high risk individuals were at increased risk of death despite shielding and that criteria would have to be expanded in order for shielding to be effective, including for instance, the elderly.

130. Our EVITE study (Snooks, Watkins et al. 2023) found that deaths from all causes were approximately 2.3 times as likely in shielded patients compared to the comparator cohort, matched by age, sex and healthcare utilisation in the previous year (n = 8,665 (7.0 %); 95% CI 2.19, 2.37); and importantly, Covid-related deaths were also raised, with an adjusted odds ratio of 1.43 (95% CI 1.31, 1.56).

131. Filipe and colleagues (Filipe, Barnett et al. 2023) evaluated the effect of the Covid-19 shielding programme on mortality in Liverpool, comparing data from linked routine health records for shielded and propensity score matched non-shielded people from April 2020 to June 2021. They found that, over the entire study period, people on the shielding list were significantly more likely to die than a matched cohort (HR 1.55, 95% CI 1.43 - 1.67). During pandemic waves (periods of high infection risk in the general population), mortality risk increased for both the shielding and non-shielding population; however, the increase in risk was greater in the non-shielding population. Statistical modelling conducted by the authors suggested that shielding would have reduced mortality risk during these pandemic waves by 34% (HR 0.66, 95% CI:0.58 to 0.76). They also found that, during these waves, the protective effect of shielding was higher in more affluent areas (HR 0.27, 95% CI: 0.16 to 0.44) compared to the most deprived areas (HR 0.75, 95% CI: 0.7=64 to 0.87); the authors speculate that this may have been because they were likely to have been living in larger homes, which allowed for more effective separation. The authors reported that differences in mortality may have been due to differences between groups:

> *"we find that shielded individuals were more likely to die during the pandemic, even after accounting for observable differences in morbidity. However, this is likely to be the result of unobserved mortality risks, for example, severity and stage of underlying conditions not reflected in our data set…. The use of propensity score matching and inverse probability weighting are important steps in addressing the comparability issues, but they are limited by how much of the underlying propensity to die is reflected in the observable data."*

### c. Shielding patients' access to healthcare to treat or manage underlying health conditions

132. The EVITE study (Snooks, Watkins et al. 2023) reported a high level of unplanned (emergency/urgent) healthcare contacts amongst the shielded group: ED attendances, 25.1% (n = 30,910) compared to 20.3% (n = 24,561) in the comparator cohort (OR 1.32, 95% CI 1.29, 1.34); Critical Care Admissions 0.9% (n = 1,058) compared to 0.4% (n = 530) (OR 1.86 95% CI 1.67, 2.07); emergency admission to hospital 19.3% (n = 32,735) compared to 12.4% (n = 15,043) (OR 1.70 95% CI 1.68, 1.74). In all cases,

these levels of unplanned healthcare usage were much higher than in the general population.

133. Sharp and colleagues (Sharp, Laidlaw et al. 2023) took a co-production approach to a qualitative study with people with autoimmune conditions who shielded. Recruiting through social media, they interviewed 28 people and conducted two focus groups in late 2021, after the end of the formal shielding programme. Data collection was remote and participants came from across the UK. Participants reported a broad range of experiences accessing health care. Some were positive, such as being offered early morning appointments to avoid contact with other patients, while others were negative, with some patients reporting bad experiences with remote consultations, or struggles to have contact with specialists. Overall, patients described perceiving a shift in responsibility for long term management of their conditions from a secondary care model to a primary care one, with some confusion about clinical responsibility. The authors reported three types of work which shifted during the pandemic: "illness work" e.g. gaining access to vaccines; "lifework" e.g. accessing food and "biographical work" e.g. changing self-identity. Participants reported that they felt of less value to society. "Emotional work" was added, with shielding bringing "fear, stress, devastation, shock and disbelief, balanced by a feeling of being protected" Emotions reported included anxiety, guilt, anger and frustration, with some participants reporting mental health problems for the first time. Some changes to care provision were regarded as positive, including medication delivery by pharmacies. Others, however, were not, with a switch to remote consultation being identified by some respondents as reducing the quality of care and creating a safety risk: *"because the GPs were obviously only doing telephone appointments, it was remote, they couldn't see you in person, nobody really noticed how swollen my abdomen was getting, and how actually unwell I was"* (FG10). There was range of perceptions about whether care was interrupted, reduced or delayed: for one participant, *"none of [the treatment] has been delayed or interrupted"* (ID9); while others felt *"on your own"* (FG5) and like the *"safety net [was] disappearing"* (FG5). Participants reported less contact with secondary care as hospital staff were redeployed to care for patients with Covid-19.

134. The qualitative part of the EVITE study (EVITE Study Team 2024) interviewed 16 healthcare professionals in Wales who were providing care for patients who were shielding to understand their perspective of the shielding intervention and their experience of putting it into place. Participants described a range of modifications to care practices, including primary and secondary care clinicians managing people with long term conditions shifting to remote consultations. Primary care clinicians felt that patients had a perception that GP practices were closed, even though this was not the case, and so patients would keep away from making contact. These issues are discussed more fully in Professor Edwards' expert report on primary care as they relate to general patients' experiences of access and care provision during the pandemic period. Staff working in secondary and community care settings described shifting focus to concentrate on managing acute Covid-19 patients, with levels of routine care for patients with long term conditions being reduced as a result. We were not able to identify any equivalent studies from the other nations of the UK.

### d. Other measures such as quality of life and mental health

135. There was a lot of concern about the potential adverse effects of isolation and lack of physical exercise on mental and physical health. There was some evidence of an impact on anxiety and depression, but it is difficult to disentangle the effects of shielding from lockdown more generally, which may have affected the vulnerable disproportionately. Questions remain about the long-term impact of shielding on quality of life and mental health.

136. Returning to the all-Wales linked data part of the EVITE study (Snooks, Watkins et al. 2023), the authors reported self-reported physical health related quality of life was lower amongst shielding respondents, with some uncertainty around differences in mental health. The SF12 is a well validated short (12 item) questionnaire that is widely used for the assessment of general health status or health related quality of life. It is quick and easy to complete and provides an opportunity for people to report their own health status; the questionnaire produces two scores – one focused on physical health, the other on mental health. Scores are between 0 and 100, with higher scores indicating better health. SF12 (Ware, Kosinski et al. 1996) physical health scores for shielded people 35.5 (n = 364) compared with 39.1 in the comparator cohort (n = 304), difference 3.75, 95% CI -4.82, -2.68), SF12 mental health scores 39.4 compared to 41.0 difference 1.21 95% CI -2.58, 0.15). Mean scores for depression (PHQ-9) were slightly higher (showing worse mental health), with 6.53 for shielded respondents compared with 5.06 in the matched cohort, difference 1.20 (95% CI 0.19, 2.22). A higher proportion of respondents in the shielded cohort met the threshold score for classification with anxiety, at 31.7% compared with 23.3% in the comparator cohort, with borderline statistical significance OR 1.425, 95% CI 1.00, 2.03). Safety concerns were reported by a similar proportion in each cohort (25.7%, 26.1%). Due to differences between groups at baseline, these differences in Health-related quality of life may not be effects of the shielding intervention, but may reflect differences in case-mix/severity between groups. In addition, these results may be affected by relatively small sample size and response rate bias.

137. Di Gessa and Price (Di Gessa and Price 2022) analysed data from the 5,146 people aged 50 or over signed up to the English Longitudinal Study of Ageing (ELSA) to investigate associations between patterns of shielding during the pandemic and mental health. The ELSA study provided baseline data, supplemented by COVID sub-studies, from April 2020, June/July 2020 and Nov/Dec 2020. The COVID sub study used four measures of mental health and wellbeing: CES-D, to identify people at risk of depression; GAD-7 to assess anxiety; CASP-12 to assess subjective quality of life; and ONS Well-being scale. Researchers identified people as shielding if they said they had not left their home for any reason and had stayed away from non-household members; they did not gather data on CEV status or shielding letters. 22% of respondents said they were shielding in April, 15% in June/July and 12% in November/December. Respondents who shielded at all times reported the highest percentages of elevated depressive symptoms (42%), the lowest life satisfaction (mean ONS well-being scale score of 6.4) and the lowest quality of life (mean CASP-12 score of 20.7).

138. Overall, Di Gessa and Price found that staying at home throughout the pandemic or shielding at all (whether at one, two or all three points considered) were strongly associated with greater risk of elevated depressive symptoms, anxiety, poorer quality of life and lower life satisfaction. The authors found that socioeconomic position and physical health substantially attenuated the relationships between shielding and poorer mental health. Even controlling for possible mediating and confounding factors, strong and significant associations remain between staying at home or shielding at all times during the pandemic. The authors emphasised the potential risks of shielding *"perhaps because of the psychological impact of being told so starkly of your own vulnerability and mortality and the policing of your own behaviour and resulting anxiety and stress"*.

139. The qualitative study by Sharp and colleagues (Sharp, Laidlaw et al. 2023) explored the emotional impact of being asked to shield, and emotional work entailed in managing personal risk and relationships, including fear and other impacts on mental wellbeing. They found fear was common among shielding people early in the pandemic, but over time for many people this turned to anger and frustration. Participants expressed anger with the way the shielding programme was communicated, with members of the public who were not seen to be taking Covid-19 seriously enough or respecting the position of shielding people; and frustration at their struggles to access healthcare. One participant said: "*so there were lots of tears, feeling really awful, feeling very angry about things, not so much frightened. I wasn't frightened of COVID, if you like, I just didn't want to be in the position I was in"* (ID 23).

140. Hume et al (2020) (Hume, Armstrong et al. 2020) examined the impact of shielding on levels of physical activity and quality of life in 10 patients with COPD who attended a pulmonary rehabilitation course. They found that shielding was associated with a 39% reduction in daily steps taken by the patients. Patients felt increasingly limited when conducting daily physical activities and showed increased levels of feelings of depression and concerns about breathing.

141. Cleaton et al (Cleaton, Raizada et al. 2021) examined the impact of Covid-19 and shielding on rheumatology patients in the West Midlands. Their study included a survey in April 2020, to which they received 1966 responses (25% response rates); 792 of the respondents were shielding. In terms of health-related quality of life, in the cohort of patients without Covid-19 (1545), the "shielding" group reported significantly lower mental (− 2.1; − 2.9, − 1.4, $P < 0.001$) and physical health (− 2.2; − 3.8, − 2.5; $P < 0.001$) than those not shielding.

### e. Any other important impacts of the programme

142. The shielding programme had an impact on public finances in that it cost money to deliver it. The various components which made up the programme were spelled out by Porter et al. (Porter, Akbari et al. 2023), and are shown in the logic model in Figure 18 below. These included the process of devising the clinical criteria for definition as CEV and identifying individuals who met those criteria, both of which took time of clinicians. Communication with CEV individuals took place by letter at a number of time points. Shielding people were entitled to statutory support as needed: food parcels delivered to the home, free delivery of prescriptions items, and entitlement to Statutory Sick Pay for people who were not eligible for furlough (e.g. self-employed).

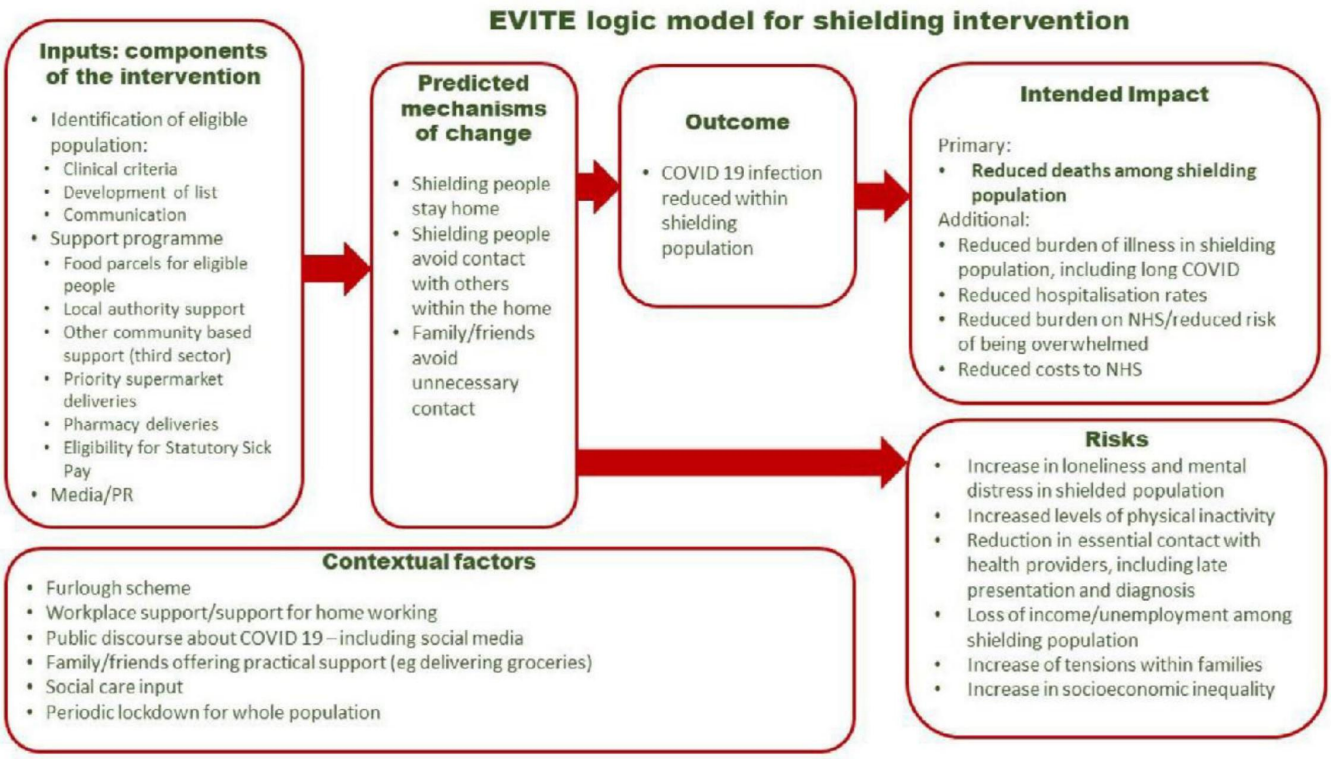



*Figure 19: Logic model for the shielding intervention (Porter, Akbari et al. 2023)*

143. Sewell et al (Sewell, Farr et al. 2023) estimated the costs of delivering the shielding programme based on data from Wales. They estimated the cost of sending out the letters to inform CEV people of the programme; the cost of providing food parcels; and the cost of delivery of prescriptions. Based on the population number at the beginning of the shielding period of 117,415 the total additional cost of the shielding intervention etc. was £13,307,654 or £113 per person shielded. By the end of the study period (June 2020), the number in Wales who were shielding was 130,000, bringing the estimated cost down to £102 per person. Sewell et al were not able to include in their calculation the cost of identifying who should go on the shielding list, nor the cost of Statutory Sick Pay for shielding people. Nor did they account for the cost to shielding people if they had to stop work and move from their usual income to Statutory Sick Pay.

144. Sharp et al (2023) (Sharp, Laidlaw et al. 2023), in their qualitative study with people who had shielded, identified difficulties in accessing basic supplies, the impact of shielding on work and home life, and the sense of helplessness. They also examined the impact of shielding on people's sense of identity and place in society – and for some a sense of abandonment when the protection of shielding was removed at the end of the programme.

145. Snooks et al reported that a benefit of the shielding programme was the ability to target vaccinations to the most vulnerable, reporting that shielded people were more

likely to have been vaccinated at one year following their enrolment in the study, (85.7% versus 69.0%; OR 2.99, 95% CI 2.92, 3.06); both rates were much higher than the general population (36.9%).

*Summary of key points:*

146. *Shielding was implemented and evaluated in the context of almost simultaneous introduction of general lockdown. Findings therefore related to the effectiveness of shielding must be viewed in this context. Without lockdown the effects of shielding may have been different.*

147. *There is no evidence of overall reductions in Covid-19 infection associated with shielding, except in the subgroup of rheumatoid arthritis. There is evidence that hospital acquired infection was higher in the shielded group. As the mechanism for protecting CEV people from serious harm or death during the pandemic is to avoid infection, these results cast doubt on the effectiveness of the shielding policy.*

148. *There is little high-quality evidence on the impact of shielding on mortality but those researchers that have investigated this have not found consistent or sustained effects – in the majority of studies, mortality has been found to be higher than the general population and comparator groups (as may be expected by the nature of conditions included for shielding), but in particular, Covid-19 related mortality has been found to be significantly higher. If the intervention had been effective we would have expected this to reduce. We cannot rule out the possibility that Covid-19 related mortality would have been even higher without the shielding programme, but there is no evidence for this. Although some uncertainty remains, with findings from several studies – using different approaches – showing increased infections, mortality and Covid-19 related mortality associated with shielding, we conclude that shielding did not have the protective effect that was hoped for.*

149. *Usage of unplanned healthcare may have been higher because of changes or restrictions on access to primary and planned secondary care, but this is uncertain. Shielded people reported feeling that they were falling through gaps.*

150. *Effects on quality of life and mental health are uncertain, with some evidence that shielded people were less well than other vulnerable people, however attribution remains challenging. Shielded people reported positive and negative effects – there is no doubt that restrictions were severe and this affected fitness levels and social contact, but the background of general lockdown makes it difficult to separate our effects.*

151. *Shielding was a relatively inexpensive intervention per person included, nevertheless across a whole population, costs were significant (over £13 million in Wales alone). People were impacted in many aspects – access to necessities, sense of identity and feelings of safety.*

## Barriers to the effectiveness of shielding

152. Shielding was an advisory programme, not a mandatory one, and so individuals were free to choose whether or not they complied with the advice to shield. It is not clear whether all those affected understood this as the letters were very strongly worded. Research has reported varying levels of adherence to guidance.

153. The EVITE study (Snooks, Watkins et al. 2023) reported higher levels of isolation initially and 1 year later than in a non-shielded comparator group. Respondents in the shielded cohort reported that they had been and remained more likely to self-isolate than counterparts in the matched cohort across most behaviours and activities covered in the questionnaire distributed to randomly sampled people in each cohort. A very high proportion of respondents from both cohorts initially strictly avoided contact – with an even higher proportion in the shielded group (91.4% versus 85.9%; OR=1.78; 95% CI 1.11, 2.88). Over 60% of shielded respondents reported that they always stayed at home during March 2020, compared with just under half of people in the comparator cohort. Over a third (35.2%) of respondents in the shielded cohort reported always feeling scared to go outside during the initial period, more than twice the proportion (16.5%) in the comparator cohort. The proportion that reported never going out for shopping, leisure or travel was significantly higher in the shielded cohort (59.5% versus 28.2%).

154. Bachtiger et al 2021 (Bachtiger, Adamson et al. 2021) examined determinants of shielding behaviour by analysing data from 7,240 people across all four nations of the UK taking part in an ongoing participatory epidemiology study of wellbeing during the pandemic. Participants completed weekly online questionnaires over a 17-weeks period from 9th April 2020, and allowed the study team access to their routine NHS records. 2391 of the participants were identified as CEV, based on screening questions about clinical conditions. Of the CEV people 47.3% (n=1133) were shielding at baseline, and of these, 53.2% (n=523) were still shielding at week 9, and 29.0% (n=255) were still shielding at week 15. The mean age of the CEV group who were shielding was 60.2; 66.9% were white. Overall, 50% of the CEV people reported having received a letter advising them to shield. 32.4% (n=4240) of the CEV people who were shielding did so despite reporting not having received a letter telling them that they should. Among the CEV people who were not shielding, 32.9% (n=414) reported having received a letter telling them that they should shield. Among the CEV people who were not shielding at baseline, 14.5% (n=159) were shielding at week 9, and 7.4% (n=76) at week 15. There was a wide range of clinical conditions associated with shielding, but the single biggest category of shielding people was the 25.2% (n=285) who were shielding because of "expert clinical advice" to shield. CEV people were more likely to adhere to shielding advice if female, Asian, older and if they had access to outside space. The response rate to the survey was high (75% of questionnaires completed) with older people more likely to be under-represented because the survey was online.

155. Sharp and colleagues (Sharp, Laidlaw et al. 2023) found that some shielding people reported that messages around shielding were confusing or felt inconsistent, especially when they sought advice from medical professionals: *"It just wasn't clear as to what I*

*should or shouldn't do"* (ID11); *"one consultant was saying one thing and one was saying the other"* (ID9).

156. Bridgen and colleagues (Bridgen, Jewell et al. 2022) surveyed 5,143 people, of whom 353 described themselves as shielding, about their contacts with people outside their household in a seven day period at the end of the first lockdown, July-August 2020. This coincided with the first "pause" of the shielding programme, on 1st August 2020. The authors found that shielding participants were less likely to leave their home compared with those reporting their situation to be "not self-isolating or shielding": 58.6% (95% CI 53.2% to 63.8%) of shielding individuals, and 82.7% (95% CI 81.6% to 83.8%) of other participants reported leaving their home during the contact day. Shielding individuals made fewer contacts per day outside of the household than non-shielding or isolating individuals. The unadjusted rate of non-household contact was 1.3 contacts per day (95% CI 1.1 to 1.5) among shielding participants, and 3.1 contacts per day (95% CI 2.9 to 3.2) for participants who were not self-isolating or shielding. Although the authors identified high rates of leaving the house and non-household contacts for shielding people, the timing of the survey means that the relevance to the main shielding people is limited. Other potential limitations of this study are that the respondents were entirely self-selected (potentially leading to bias), and the shielding status of respondents was self-identified, and not defined as having received a shielding letter, as it included participants who may have been shielding voluntarily to protect a household member. Porter et al (EVITE Study Team 2024) in their qualitative study with healthcare professionals identified a range of potential obstacles to the effectiveness of the programme: people choosing not to shield, including those in key worker posts who felt reluctant to not be "doing their bit"; fall off in shielding over time; unclear messaging; people at risk not being identified as CEV; the challenges of achieving full isolation at home, especially for people living in households with others who were in key worker roles, and for people dependent on social care workers; and the risk of infection to people admitted to hospital for other conditions, since physically separating patients was very challenging.

157. We (Snooks, Watkins et al. 2023) concluded that as long as healthcare associated infection was not under control, shielding could not be effective, as CEV people had such high contact rates with health care and unplanned healthcare services including ED attendances and hospital admissions.

158. Not everyone advised to shield did so, and there was a fall off in shielding behaviour over time, although some people reported continuing to shield themselves even after the end of the formal policy period. Some CEV people may not have received a shielding letter. The necessity of attending hospital either regularly (e.g. cancer treatment, dialysis etc) or for unplanned / emergency attendance for many people who were shielding placed them at continuing high risk for exposure and infection with Covid-19, and which was not fully mitigated by the shielding programme.

159. Although there were some differences between the four countries in implementation, the overall policy was similar and there has not been any comparative research of effects between nations within the UK, to our knowledge.

# Section 3: lessons learned and recommendations

## Lessons learned

### a. Prehospital emergency care including 111

160. The emergency ambulance, alongside other frontline services, bore the brunt of variable and unpredictable demand, with some very high peaks, particularly at the start of the pandemic. With other services closing their doors for face-to-face contact, the 999 and 111 services - accessible to all – were seen to provide a safety net for seriously ill as well as worried callers. However, both services were overwhelmed at times and unprepared for the peaks in demand. Staff sickness, shortages of essential equipment, delayed handovers and new requirements for vehicle de-contamination resulted in chaotic service provision, with many patients and staff exposed unnecessarily to infection.

161. Efforts were made to triage calls, with additional resources (staff and links to other providers) brought in to try to cope with the volume of calls. Prioritisation of calls was undertaken to try to minimise face to face contact with infected patients where they were not at risk of deterioration, and to identify those that needed further assessment and conveyance to hospital for acute care. Clinical frontline staff were worried about their own safety and the safety of their families and many staff with patient contact – whether by telephone or face to face - were very stressed by what they witnessed. Triage systems had medium sensitivity, but missed some cases that needed a higher level of care; and tended to be overcautious, with low specificity, thereby exposing patients and staff to risk of infection without clear clinical need.

162. As the pandemic progressed there were very many changes to protocols for triage and care, based on local and national guidance - further causing confusion and stress for staff.

163. Emergency preparedness was inadequate in terms of training, protocols and equipment, particularly to keep staff safe.

### b. Shielding

164. Shielding was introduced before lockdown, without prior evidence or experience, possibly in an effort to avoid wider lockdown measures. There were few comparable interventions, internationally.

165. Shielding directly affected over 4 million people in the UK and evidence suggests that the policy did not consistently protect CEV people from infection and serious illness or death from Covid-19, although there was some uncertainty around effects in particular subpopulations and regionally. This seems to have been because of the high contact this group had with health services e.g. ED attendances, hospital admissions where they were at risk of nosocomial infection. People who were shielding may also have

had higher contact with healthcare workers in their homes but we have not found any evidence about whether this may have contributed to infection rates. Covid-19 related deaths and hospital acquired infection were significantly higher in the shielded population than non-shielded people and matched controls – although methodological limitations have to be noted here – research found that it was not possible to identify comparator groups of patients with similar conditions and severity as the shielded group.

166. Many people's lives were affected by the strict self-isolation strongly advised to those who were included in the shielding programme. There is some evidence that physical and mental health outcomes were affected, but it is challenging to attribute this to the shielding intervention as these outcomes may be related to poorer health generally, pre-pandemic.

## Recommendations

### a. Prehospital emergency care including 111

167. Resources should be devoted to emergency preparedness immediately to ensure that in a future pandemic, emergency services are not overwhelmed. Plans should be in place, with secure supply chains for PPE and other essential equipment. Bureaucracy in the processes must be minimised. Services need to have contingency plans in place so that the sickest receive the care they need, in the place they need, while minimising unnecessary face to face contact with healthcare staff and other patients.

168. The impact of working through the pandemic on the ambulance service workforce was significant, and for many continues to be felt in the form of psychological impact. Consideration should be given to providing more support for staff in a workforce sector which went into the pandemic already suffering from high levels of mental distress and burnout.

169. Paramedics and other frontline emergency prehospital care staff should be prioritised for early vaccination in future pandemics.

170. Triage is key. Data available from the pandemic should be used to improve triage tools e.g. within AMPDS – this will require investment in the short to medium term but will potentially improve safety and care for patients and staff alike. Research should be commissioned e.g. through NIHR to address this. At the start of the next pandemic or major epidemic, new data also needs to be used to update triage tools to ensure that they are accurate for patients with the new disease.

171. Real time sharing of information between researchers and the NHS could help to develop triage and response systems by feeding in the latest knowledge about risk factors. Although COPI notices helped to speed up the permissions processes for data sharing between NHS organisations, overall research commissioning, NHS delivery and academic publishing routes were unnecessarily lengthy. All of these processes are overly bureaucratic and repetitive (Snooks, Khanom et al. 2023) which should be addressed as a matter of urgency – for scientific knowledge generation and service reform in routine circumstances as well as in a future pandemic.

172. Specific improvements that should be made include:

- Rapid access for researchers to NHS data;
- Preparation of research protocols for pandemic research, regulatory approval, databases, data management processes, and plans for analysis;
- Processes for rapid peer review and dissemination of findings that do not rely on current dysfunctional models of academic publishing.

173. Predictive risk models need to be based on ability to select those that can benefit most from emergency care – **not** those at highest risk of mortality.

174. Messaging needs to be clear so that the public – who clearly did heed messages – understand who to contact, when, how and for what.

175. As a matter of urgency, the now routine practice of queuing ambulances outside Emergency Departments needs to be addressed so that delayed handovers and knock on effects across the whole emergency care system are reduced or avoided altogether. Although queuing has existed for many years, it became "normalised" during the pandemic and has remained a feature of the UK emergency care system ever since. There is variation – locally and regionally – and this presents an opportunity to understand what works to reduce blockages in patient flows. This is a matter for research and health policy/strategic prioritisation. Numerous attempts to tackle this problem have failed, largely due to entrenched interests and territorialism between the different parts of the healthcare system.

### b. Shielding

176. Although strict self-isolation may be appropriate for individuals, as a national public health policy it does not appear to have been effective in reducing infections in the most vulnerable patients. We cannot recommend that shielding is introduced in a future pandemic as the best current evidence does not show that it was effective in terms of reduced infections or Covid-19 related mortality; that it cost resources from the public purse and was restrictive without clear benefit. Further work could be done to see whether subgroups of the population might benefit from shielding – not necessarily those at greatest risk of harm, but those most likely to be protected from infection/harm, e.g. people on immunosuppressant therapy or other groups who may not require inpatient care. This would require further investment in secondary analysis of existing datasets. Further research is also needed to explore how CEV people can be supported to effectively self-isolate.

177. In a future pandemic we recommend that attention needs to be paid to healthcare transmission as a priority because shielding cannot work while infection rates from hospital and other healthcare contacts are high.

178. Further research should be commissioned into the effects of shielding policy on different ethnic groups.

### c. Cross cutting recommendations

179. More account needs to be taken of the inequitable impact of the pandemic (in relation to both emergency/urgent care and the shielding programme), and more evidence gathered that focuses particularly on questions of inequality. For some questions of inequality data is available (e.g. age, sex, deprivation), but for ethnicity, data is often lacking or poor quality and results are usually not available with analysis broken down by ethnic group. It is likely that existing inequalities in access, experience, ability to comply or outcomes may have been exacerbated.

180. In particular, emergency staff and call handlers should be trained to understand and respect cultural differences in symptom presentation, risk assessment, and communication.

181. Disaggregation of research findings and performance data by ethnic group should be prioritised and supported. This will include the need for research and quality improvement initiatives to improve completeness and accuracy of data related to ethnicity.

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## Appendix

*Table 2: Prehospital triage outcomes February – July 2020*

| Ambulance Service (AS) | Suspected COVID-19 calls | | | | Non-suspected COVID-19 calls | | | Odds Ratios | |
|---|---|---|---|---|---|---|---|---|---|
| | Calls received [a] (%) | Calls per 100,000 | Response dispatched (% of [a]) | Conveyed to Hospital (% of [a]) | Calls received [b] (%) | Response dispatched (% of [b]) | Conveyed to Hospital (% of [b]) | Response dispatched (95% CI) | Conveyed to Hospital (95% CI) |
| AS1 | 49292 (10.0%) | 795 | 37276 (75.6%) | 21037 (42.7%) | 444724 (90.0%)) | 300385 (67.5%) | 177869 (40.0%) | 1.491 (1.459, 1.523) | 1.117 (1.096, 1.138) |
| AS2 | 26127 (8.4%) | 544 | 20180 (77.2%) | 11437 (43.8%) | 286231 (91.6%) | 199532 (69.7%) | 131489 (45.9%) | 1.474 (1.431, 1.519) | 0.916 (0.893, 0.940) |
| AS3 | 150690 (18.8%) | 1752 | 88833 (59.0%) | 51468 (34.2%) | 651505 (81.2%) | 366524 (56.3%) | 231183 (35.5%) | 1.117 (1.104, 1.129) | 0.943 (0.932 0.954) |
| AS4 | 8801 (3.7%) | 326 | 6206 (70.5%) | 2862 (32.5%) | 232246 (96.3%) | 163089 (70.2%) | 107104 (46.1%) | 1.014 (0.968, 1.063) | 0.563 (0.538, 0.589) |
| AS5 | 78650 (16.7%) | 1049 | 70344 (89.4%) | 42105 (53.5%) | 391099 (83.3%) | 349113 (89.3%) | 230099 (58.8%) | 1.019 (0.993, 1.044) | 0.806 (0.794, 0.819) |
| AS6 | 42292 (13.6%) | 769 | 36815 (87.0%) | 22782 (53.9%) | 268940 (86.4%) | 214138 (79.6%) | 150009 (55.8%) | 1.720 (1.670, 1.772) | 0.926 (0.907, 0.945) |
| AS7 | 10866 (4.4%) | 155 | 8478 (78.0%) | 3480 (32.0%) | 237176 (95.6%) | 214860 (90.6%) | 111197 (46.9%) | 0.369 (0.352, 0.387) | 0.534 (0.512, 0.556) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| AS8 | 15063 (4.8%) | 320 | 15062 (100.0%) | 7281 (48.3%) | 298084 (95.2%) | 277237 (93.0%) | 167812 (56.3%) | >1000 | 0.726 (0.73, 0.751) |
| AS9 | 47241 (13.4%) | 859 | 42412 (89.8%) | 21496 (45.5%) | 304178 (86.6%) | 289217 (95.1%) | 164473 (54.1%) | 0.454 (0.439, 0.470) | 0.709 (0.696, 0.723) |
| AS10 | 14764 (8.3%) | 461 | 12006 (81.3%) | 6622 (44.9%) | 163357 (91.7%) | 128121 (78.4%) | 80633 (49.4%) | 1.197 (1.147, 1.250) | 0.834 (0.807, 0.863) |
| AS11 | 98471 (19.3%) | 1758 | 93889 (95.3%) | 43820 (44.5%) | 412482 (80.7%) | 337777 (81.9%) | 180116 (43.7%) | 4.532 (4.395, 4.673) | 1.034 (1.020, 1.049) |
| AS12 | 61889 (25.7%) | 1238 | 47137 (76.2%) | 28157 (45.5%) | 179179 (74.3%) | 113292 (63.2%) | 73430 (41.0%) | 1.858 (1.820, 1.897)6 | 1.202 (1.180, 1.224) |
| All | 604146 (13.5%) | 911 | 478638 (79.2%) | 262547 (43.5%) | 3869201 (86.5%) | 2953285 (76.3%) | 1805414 (46.7%) | 1.183 (1.175, 1.191) | 0.879 (0.874, 0.883) |

Notes:

Odds ratios are unadjusted; OR = 1 corresponds to equal proportions; an OR > (<) 1 indicates a greater (smaller) proportion for calls coded as suspected COVID-19 compared with the corresponding proportion for non-suspected COVID-19 calls.