

Title: Pandemic impacts on healthcare utilisation: a systematic review

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Supplementary File 5 –

- 5.1 Table of Study Characteristics and reference list of all included studies.
- 5.2 Table of Results of the primary outcome of the included studies
- 5.3 Table of Results of secondary outcomes of the included studies
- 5.4 Figures of changes in healthcare utilisations reported in included studies

Supplementary Table. Characteristics of Included Studies of pandemic related changes in healthcare utilization

Author; Country; Scope; Design	Setting; Population	Pandemic and comparator periods*	Primary Outcomes	Secondary Outcomes
Abdulmalik; Qatar; National; Same period single year	Outpatient/Primary care; 27 primary health care centres	March - May; 2020 vs. 2018-19	Overall utilization of all primary healthcare services across all health centres	N/A
Andersson; Denmark; National; Same period single year	Hospital; Danish Nationwide Patient Registry	March 12 - March 31; 2020 vs. 2019	Incidence rates of new-onset HF and hospitalization for worsening HF	Mortality
Angoulvant; France; Multi-centre; Time trend multiple years	ED & Hospital; 6 Paediatric EDs from academic hospitals being part of Assistance Publique – Hôpitaux de Paris	March 18 - April 19; 2020 vs. 2017-19	Number of hospital visits and admissions	N/A
Antonucci; Italy; Multi-centre; Same period single year	ED & Hospital; 3 high volume urology departments in Rome, Italy	March - April; 2020 vs. 2019	Number of ED admissions for urolithiasis; Number of hospitalisations	N/A
Athiel; France; Multi-centre; Same period single year	ED & Hospital; 12 gynaecological emergency units of the Greater Paris University Hospitals	March - May; 2020 vs. 2019	Number of emergency gynaecological hospitalisations	N/A

Baum; USA; National; Time trend single year	Hospital; Veterans Affairs Hospitals' Corporate Data Warehouse, a national repository of electronic health records from visits to any VA facility	March 11 – April 21; 2020 vs 2019	All admissions for any condition	N/A
Bayles; USA; Multi-centre; Same period single year	ED; 3 acute care facilities from the Marin County Department of Health and Human Services	March 17 - May 4; 2020 vs. 2018-19	Average number of daily ED visits	N/A
Benazzo; Italy; Multi-centre; Same period single year	ED & Hospital; 15 orthopaedic and trauma units	February 23 - April 4; 2020 vs. 2019	Outpatient consultations; Trauma ED visits; Surgeries	N/A
Bollman; Germany; Multi-centre; Same period single year	Hospital; 66 Helios hospitals	March 1 - April 30; 2020 vs. 2019	Admissions for heart failures and arrhythmias	N/A
Bozovich; Argentina; Multi-centre; Same period single year	ED & Hospital; 31 private hospitals	April 1 - April 30; 2020 vs. 2019	ED consultations and procedures	N/A
Braiteh; USA; Multi-centre; Same period single year	Hospital; 4 hospitals	March - April; 2020 vs. 2019	Admissions for any cause; Presentations for Acute Coronary Syndrome (also describes as admissions)	Rates of STEMI versus NSTEMI

Bramer; USA; Multi-centre; Same period single year	Community; vaccinations from one state immunization system	May; 2020 vs. 2017-19	Proportion of children with up-to-date status for all recommended vaccines	N/A
Butt; Qatar; Multi-centre; Same period single year	ED; 2 hospitals in Qatar that see over 80% of patients in Qatar with suspected Acute Coronary Syndrome	March - April; 2020 vs. 2019	Total ED visits; ED presentations with cardiac symptoms	Rates presenting with Acute Coronary Syndrome (ACS)
Cano-Valderrama; Spain; Multi-centre; Same period single year	Hospital; 3 tertiary care centres	March 16 - April 26; 2020 vs. 2019	Acute care surgeries	SOFA scores
Cheek; Australia; Multi-centre; Same period single year	ED; 2 tertiary hospitals and 2 urban district hospitals	March 22 - May 23; 2020 vs. 2019	Number of attendances at paediatric ED; Number of attendances at paediatric ED for mental health diagnoses; Number of neonatal presentations	N/A
Chou; Taiwan; Multi-centre; Same period single year	Community/Primary care; Hospice homecare services, hospice inpatient services and non-hospice services provided by 2 branches of health care organisation in Northern Taiwan	January - April; 2020 vs. 2019	Number of hospice home care visits; Number of new enrolments in hospice home care; Bed occupancy rates in hospice and non-hospice units; Monthly patient days in hospice and non-hospice units	N/A
Claeys; Belgium; National; Same period single year	Hospital; 36 of the 49 PCI-capable hospitals in the Belgian STEMI database and Belgian Coronary Stent Registry	March 13 - April 3; 2020 vs. 2017-19	Number of STEMI admission	Mortality; % cardiac arrest; Killip class

Clerici; Italy; Multi-centre; Same period single year	Hospital; 7 general hospital psychiatric wards in the Lombardy region of Italy	February 21 - March 31; 2020 vs. 2019	Average daily number of admissions by week, total number of weekly admissions; Annual rates of admissions/1000 adults	Number of voluntary and involuntary admissions
Collado-Mesa; USA; Multi-centre; Same period single year	Community/Outpatient; five breast imaging centres	April; 2020 vs. 2018-19	Number of breast imaging examinations; Number of image-guided procedures	Proportion of positive biopsy of image guided biopsy
CVD-Covid-UK Consortium; UK; Multi-centre; Same period single year	Hospital; 9 hospitals in England and Scotland	March 23 - May 10; 2020 vs. 2018-19	Number of ED attendances and hospital admissions	procedures for cardiac, cerebrovascular, other vascular conditions
De Filippo; Italy; Multi-centre; Same period single year	Hospital; 15 hospitals in Northern Italy	February 20 - March 31; 2020 vs. 2019	Incidence rate ratio for hospital admissions for ACS	Incidence rate ratio for STEMI/NSTEMI
de Havenon; USA; Multi-centre; Same period single year	Hospital; 65 academic and community hospitals	February - March; 2020 vs. 2018-19	Number of hospitalisations for stroke and ACS; Number of procedures for stroke and ACS	N/A
De Rosa; Italy; Multi-centre; Same period single year	Hospital; cardiac care units at 54 Italian hospitals affiliated with Italian Society of Cardiology	March 12 - March 19; 2020 vs. 2019	Number of admissions for acute myocardial infarction	Case fatality rates; Number of admissions per diagnosis (STEMI/NSTEMI)

Diegoli; Brazil; Multi-centre; Same period single year	Hospital; 6 hospitals in Joinville, Brazil	March 17 - April 15; 2020 vs. 2019	Admissions for stroke/100000 inhabitants	Admissions for severe stroke (NIH stroke scale score)
Egol; USA; Multi-centre; Same period single year	ED & Hospital; The NYU Langone Orthopaedic Department is responsible for the musculoskeletal care at 7 different hospitals within the New York City area.	February 1 - April 15; 2020 vs. 2019	Number of ED presentations with hip fracture	Mortality; Non/operative case
Enache; Monaco; National; Same period single year	ED & Hospital; Monaco public health care system	March; 2020 vs. 2019	Number cardiovascular and emergency admissions	N/A
Franco; Italy; Multi-centre; Same period single year	Hospital; 10 cardiology centres in Northern Italy	February 23 - March 28; 2020 vs. 2019	Number of hospitalisations for NSTEMI	N/A
Frankfurter; Canada; Multi-centre; Same period single year	ED & Hospital; University Health Network (Toronto General Hospital and Toronto Western Hospital), in Toronto, Canada	March 1 - April 19; 2020 vs. 2019	Number ED visits and hospitalised with heart failure	ICU admission; Mortality; Hospitalisation; NYHA class III-IV
Garcia; USA; Multi-centre; Time trend single year	Hospital; 18 sites representing primary percutaneous coronary intervention (PPCI) hospitals and healthcare systems across the US	March - April; 2020 vs. 2019	Monthly volume of cardiac catheterisation leading to intervention (angiography)	N/A

Gawron; USA; National; Time trend single year	Hospital & Outpatient; 170 medical centres and 1074 outpatient sites	March - April; 2020 vs. 2019	Average number of upper gastrointestinal endoscopies per month	N/A
Giuntoli; Italy; Multi-centre; Same period single year	Hospital; three of the major trauma and elective orthopaedic surgery centres of north-west Tuscany	March; 2020 vs. 2019	Number of patients treated	Hospitalisation
Gruttadauria; Italy; Multi-centre; Same period single year	Hospital; 22 Italian Liver Transplant Programs.	March 1 - March 15; 2020 vs. 2018-19	Number of liver transplants	N/A
Hartnett; USA; Multi-centre; Same period single year	ED; subset of hospitals in 47 states capturing approximately 73% of ED visits in the USA	March 29 - April 25; 2020 vs. 2019	Mean weekly ED presentations	N/A
Houshyar; USA; Multi-centre; Same period single year	ED & Hospital; 5 University of California Health Centres with academic radiology programs.	March 19 - April 2; 2020 vs. 2019	Daily number of ED radiologic examinations	N/A
Hoyer; Germany; Multi-centre; Same period single year	ED & Hospital; 4 German comprehensive stroke centres.	March 16 - April 12; 2020 vs. 2019	Numbers of patients admitted with final diagnoses of ischemic stroke or TIA	TIA/ Stroke

Isba; UK; Multi-centre; Same period single year	ED; 2 hospitals in greater Manchester	February - March; 2020 vs. 2019	Weekly PED attendances	N/A
Jasne; USA; Multi-centre; Same period single year	ED & Hospital; 3 hospitals in New Haven, Connecticut	March 1 - April 28; 2020 vs. 2019	Weekly stroke code calls	N/A
Kadavath; USA; Multi-centre; Same period single year	Hospital; 12 fellowship training sties	March 1 - April 15; 2020 vs. 2019	Number of invasive cardiac procedures	N/A
Kerleroux; France; Multi-centre; Same period single year	Hospital; 32 centres in all French administrative regions.	February 15 - March 30; 2020 vs. 2019	Number of patients receiving MT between study periods	% unwitnessed onset; Baseline NIHSS; ASPECTs
Kessler; Germany; Multi-centre; Same period single year	Hospital; 15 cardiac care centres distributed across Germany providing 24/7 interventional cardiac care.	March 1 - April 30; 2020 vs. 2019	Number of patients presenting with Acute Coronary Syndrome	STEMI/NSTEMI
Kim; USA; Multi-centre; Same period single year	ED; seven EDs include one urban academic hospital, five suburban community hospitals, and one free-standing ED.	March 8 - May 2; 2020 vs. 2019	Weekly Emergency Department visits	N/A

Kolbaek; Denmark; Multi-centre; Same period single year	Community/Outpatient; Psychiatric services	February 23 - May 2; 2020 vs. 2019	Number of referrals to psychiatric service	N/A
Krenzlin; Germany; Multi-centre; Same period single year	Hospital; Two major neurosurgical departments in Germany	March 16 - April 19; 2020 vs. 2018-19	Number of emergency admissions	N/A
Langdon-Embry; USA; Multi-centre; Same period single year	Community; childhood immunisation facilities in New York City	March 16 – May 31; 2020 vs. 2019	Number of childhood vaccine doses administered; Number of unique facilities reporting administration of at least one childhood vaccine	N/A
Lantelme; France; Multi-centre; Same period single year	Hospital; 3 public centres in Lyon.	March 9 - April 5; 2020 vs. 2019	Weekly rate of hospital admissions for myocardial infarction	N/A
Lazaros; Greece; Multi-centre; Same period single year	Hospital; 2 large hospitals of the National Health System belonging to the larger Metropolitan area of Athens	March 12 - May 7; 2020 vs. 2019	Number of cardiac surgery procedures	Emergency vs non- emergency
Lazzerini; Italy; Multi- centre; Same period single year	ED; 5 Pediatric ED (three third- level referral hospitals and two second-level hospitals)	March 1 - March 27; 2020 vs. 2019	Number of paediatric emergency department visits	N/A

Li; Taiwan; Multi-centre; Same period single year	Hospital; 40 major hospitals	February - April; 2020 vs. 2019	Number of patients admitted for STEMI	N/A
Lui; Hong Kong; National; Same period single year	Hospital; all public hospitals	January 21 - March 31; 2020 vs. 2017-19	Upper and lower endoscopies	Positive rate for colon cancer and gastric cancer
Mafham; UK; National; Same period single year	Hospital; 147 acute NHS hospital trusts	January 6 - May 30; 2020 vs. 2019	Admissions for Acute Coronary Syndromes	Proportions of STEMI vs NSTEMI
Manzoni; Italy; Multi-centre; Same period single year	ED; 2 emergency paediatric departments	March - April; 2020 vs. 2019	Volume of ED visits	Hospitalisation
Mazzatenta; Italy; Multi-centre; Same period single year	Hospital; 5 neurosurgery departments and 1 paediatric centre	March 13 - April 13; 2020 vs. 2018-19	Outpatient consultations; Surgical activities	Urgent/nonurgent surgery
McDonald; UK; National; Same period single year	Community; electronic patient records of vaccination	March 2 - April 25; 2020 vs. 2019	Hexavalent vaccines; MMR first vaccination	N/A

Mitchell; Australia; Multi-centre; Time trend multiple years	ED & Hospital; 2 Emergency Departments	March 26 - April 25; 2020 vs. 2017-19	Daily number of ED presentations	Triage category
Naidich; USA; Multi-centre; Same period single year	Hospital & Outpatient; 92 centres across NY state	March 2 - April 18; 2020 vs. 2019	Volume of imaging	N/A
Norbash; USA; Multi-centre; Same period single year	Hospital & Outpatient; 6 academic medical systems	January 6 - May 23; 2020 vs. 2019	Volume of imaging	N/A
Novara; Italy; Multi-centre; Same period single year	ED; EDs within 8 academic and non-academic urology centres	March 12 - March 16; 2020 vs. 2019	ED urological consults	Triage category/hospitalisation
Onteddu; Multi-national; Multi-centre; Same period single year	Hospital; TriNetX, a global health collaborative clinical research platform collecting real-time electronic medical record data from a network of health care organizations	January 20 - May 16; 2020 vs. 2019	Number of ischemic stroke patients	N/A
Papafakis; Greece; Multi-centre; Same period single year	Hospital; Greek public hospitals with PCI capability, including a primary PCI service	March 2 - April 12; 2020 vs. 2019	Number of patients admitted for Acute coronary syndrome	ACS presentation

Pignon; France; Multi-centre; Same period single year	ED; 3 psychiatric emergency services	March 17 - April 13; 2020 vs. 2019	Emergency psychiatric consultations	Rates of hospitalisation
Pinar; France; Multi-centre; Same period single year	Hospital; 8 academic urology departments	March 12 - March 27; 2020 vs. 2019	Urological surgeries	N/A
Polo Lopez; Spain; Multi-centre; Same period single year	Hospital; 13 public hospitals where most congenital heart disease surgery in Spain is performed	March 13 - May 13; 2020 vs. 2019	Number of congenital heart disease surgeries	N/A
Pop; France; Multi-centre; Same period single year	Hospital; 3 hospitals with stroke units	March 1 - March 31; 2020 vs. 2019	Stroke alerts (following initial consult)	Proportion of alerts resulting in admissions for stroke; Initial NIHSS score
Qasim; USA; Multi-centre; Same period single year	ED; 4 adult and 2 paediatric Level 1 Trauma centres	March 9 - April 19; 2020 vs. 2019	Trauma contacts	Rates of highest acuity ("alerts")
Range; France; Multi-centre; Time trend single year	Hospital; 12 interventional cardiology centres	March 15 - April 4; 2020 vs. 2019	Patients enrolled in Percutaneous Coronary Intervention registry (follows all STEMI patients undergoing PCI)	N/A

Reeves; UK; Multi-centre; Time trend multiple years	Hospital; University hospitals in one NHS Foundation Trust	March 22 - April 25; 2020 vs. 2016-19	Admissions for STEMI and stroke	N/A
Requena; Multi-national; Multi-centre; Same period single year	Community; 2 fertility facilities in Spain and 1 in Italy	February 3 - March 23; 2020 vs. 2019	Fertility related procedures	N/A
Romaguera; Spain; Multi-centre; Same period single year	Hospital; 10 percutaneous coronary intervention hospitals	March 1 - April 19; 2020 vs. 2019	STEMI admissions	Proportion of more severe Killip classes; Proportion of sudden cardiac death; mortality
Scaramuzza; Italy; Multi-centre; Same period single year	ED; 2 paediatric emergency departments	February 20 - March 30; 2020 vs. 2019	Presentations to paediatric ED	Reductions across different triage categories
Salerno; Italy; National; Same period single year	Hospital; 35 endoscopy units in Italy	March; 2020 vs. 2019	Number of urgent endoscopic procedures	Proportion of positive procedures (i.e. diagnostic yield) for urgent EGDs and lower endoscopy
Santana; Portugal; National; Time trend multiple years	ED; emergency services in mainland Portugal	March; 2020 vs. 2019	Number of emergency episodes	Triage category

Scholz; Germany; Multi-centre; Same period single year	Hospital; 41 percutaneous coronary intervention centres participating in a trial	March; 2020 vs. 2017-19	Number of STEMI patients treated	Mortality; TIMI score
Secco; Italy; Multi-centre; Same period single year	Hospital; 3 high volume centres in North and Central Italy	March; 2020 vs. 2019	Number of admissions for ACS	Type of ACS; TIMI score; GRACE score; Admission peak hs-troponin; Mortality
Seiffert; Germany; National; Same period single year	Hospital; Health insurance claims from second largest insurer in Germany	March 2 - May 31; 2020 vs. 2019	Rate of admissions/100000 insured for cardiovascular or cerebrovascular emergencies	Number per diagnosis (STEMI, NSTEMI, stroke, TIA); Number of invasive procedures; Mortality
Smalley; USA; Multi-centre; Same period single year	ED; 20 EDs across a large Midwest integrated healthcare system	March 25 - April 24; 2020 vs. 2019	Number of ED encounters; Number of behavioural health visits to the ED	N/A
Tinay; Turkey; Multi-centre; Same period single year	Hospital; Surgical urologic oncology practices	March 11-April 11; 2020 vs. 2019	Number of nondeferrable uro-oncological procedures	ASA score
Toro; Chile; National; Time trend multiple years	ED; public health hospitals, emergency care services in 16 regions of Chile	March 8 - April 18; 2020 vs. 2015-19	Number of emergency service consultations	N/A

Toyoda; Multi-national; Multi-centre; Same period single year	Hospital; 3 liver speciality clinics	February 1 - May 1; 2020 vs. 2018-19	Number of clinic visits; Number of ultrasounds performed; Number of CT/MRIs performed	Visits in advanced disease patients
Wong; Hong Kong; National; Same period single year	Hospital & Outpatient; 43 Hong Kong public hospitals and 122 outpatient clinics	January 25 - March 27; 2020 vs. 2016-19	Mean weekly orthopaedic operations; Mean weekly orthopaedic emergencies treated operatively	Elective and emergency operations
Xu; USA; Multi-centre; Same period single year	Outpatient; retinal care centres	March 8 - May 16; 2020 vs. 2018-19	Mean weekly office visits; Mean weekly intravitreal injections; Mean weekly optical coherence tomography, fluorescein angiography and indocyanine green testing	N/A
Zhao; China; Multi-centre; Same period single year	Hospital; 280 stroke centres across China participating in Big Data Observatory platform	January - February; 2020 vs. 2019	Number of stroke admissions; Number of thrombolysis treatments; Number of thrombectomy treatments	N/A

Abbreviations: CT: Computed Tomography Scan; ED: Emergency Department; MRI: Magnetic resonance imaging; N/A: Not applicable; NIHSS: NIH Stroke Scale Score; NSTEMI: Non-ST elevation myocardial infarction; PED: Paediatric Emergency Department; STEMI: ST-elevation myocardial infarction; TIA: Transient Ischaemic Attack.

Note: *This is the period of time analysed in this Systematic Review, not necessarily all of the time period reported in each study. For a few studies that did not clearly define the pandemic period, we defined that period using any indication/reference in the same article for a lockdown or a surge in the number of COVID-19 cases.

Study design label explanations: 'Same period single year' - Preinterruption measurement at a comparable time period in 2019 only with basic pre-post analysis (unadjusted or adjusted comparison of mean utilisation across the two comparator periods). An example is a study comparing utilisation in the month of March 2020 with utilisation in the month of March 2019; 'Same period multiple years' - Preinterruption measurement at comparable time periods in prior years (2 or more) with basic pre-post analysis. An example is a study comparing utilisation for weeks 10-16 of 2020 with utilisation during weeks 10-16 in 2019 and 2018 (using the average utilisation from the comparator years) ; 'Time trend single year' – This category refers to studies considering data

from an entire year preinterruption time period rather than a single month or period of weeks. An example is a study documenting utilisation for the period January 2019 to some time point in 2020. In these studies preinterruption utilisation trends may be modelled using data from the prior year to estimate predicted utilisation. This category also includes studies that do not model prior data but average utilisation across the prior year for comparison to a postinterruption period. An example is a study comparing the monthly average utilisation for the period Jan 1 2019 to Feb 29 2020 with the monthly average utilisation for March in 2020. Both these types of studies would be rated as moderate risk of bias; 'Time trend multiple years' – This category refers to studies considering data from more than one entire year prior to the pandemic interruption. An example is a study documenting utilisation from the period January 2014 to some point in 2020. In these studies preinterruption utilisation trends may be modelled using observations from previous years to estimate utilisation that would have occurred in the absence of the pandemic.

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5.2 Table Percentage change in healthcare utilisation for each individual study grouped by category of healthcare utilisation.

Study	Outcome	Comparator time period*	Weeks being compared	Total volume of services	% Change (95% CI)
Admissions					
Andersson	Worsening HF	2019	12 to 13	568	-30
				(C: 353; P: 215)	
Angoulvant	Ped ED Hospitalisation	2017/18/19**	12 to 16	NR	-45 (-32.4 to -57.0)
Athiel	Gynaecological ED Hospitalisation	2019	10 to 22	1761	-20 (C: 976; P: 785)
Baum	Admissions for any cause	2019	11 to 16	130353 (C: 85326; P: 45027)	-43 (-36.0 to -49.0)
Bollmann	HF	2019	10 to 18	6424 (C: 3604; P: 2820)	-21.8 (-18.0 to -26.0)
Bollmann	Bradycardia	2019	10 to 18	624 (C: 334; P: 290)	-13.2 (-26.0 to +1.0)
Bollmann	Atrial Fibrillation	2019	10 to 18	2962 (C: 1640; P: 1322)	-19.4 (-13.0 to -25.0)
Bollmann	Supraventricular tachycardia	2019	10 to 18	525 (C: 283; P: 242)	-14.5 (-28.0 to +1.0)
Bollmann	Ventricular tachyarrhythmia	2019	10 to 18	433 (C: 251; P: 182)	-27.5 (-13.0 to -40.0)
Braiteh	ACS	2019	10 to 18	180 (C: 113; P: 67)	-40.71
Braiteh	Admissions for any cause	2019	10 to 18	6108 (C: 3496; P: 2612)	-25.29
Claeys	STEMI	2017/18/19	12 to 14	NR	-26

Clerici	Psychiatric hospitalisation	2019	8 to 13	618 (C: 354; P: 264)	-25.42
CVD-Covid-UK Consortium	Total	2018/19	6 to 19	1113075 (C: 599372; P: 513703)	-58.2 (-57.5 to -58.9)
De Filippo	ACS	2019	9 to 13	1320 (C: 775; P: 545)	-29.6 (-22.0 to -37.0)
de Havenon	Stroke	2018/19	6 to 13	33867 (C: 17380; P: 16487)	-5.14
de Havenon	ACS	2018/19	6 to 13	24441 (C: 12111; P: 12330)	1.81
De Rosa	AMI	2019	12 to 19	937 (C: 618; P: 319)	-48.4 (-44.6 to -52.5)
De Rosa	HF	2019	12 to 19	236 (C: 154; P: 82)	-46.8 (-39.5 to -55.3)
De Rosa	Atrial Fibrillation	2019	12 to 19	129 (C: 88; P: 41)	-53.4 (-43.9 to -64.9)
De Rosa	Pulmonary Embolism	2019	12 to 19	29 (C: 17; P: 12)	-29.4 (-0.14 to -0.61)
Diegoli	Stroke	2019	8 to 16	1169 (C: 713; P: 456)	-36.15 (-7.7 to -64.6)
Egol	Hip fracture	2019	6 to 16	253 (C: 115; P: 138)	20
Enache	Cardiovascular disease	2019	10 to 13	765 (C: 419; P: 346)	-17.42
Franco	STEMI	2019	9 to 13	215 (C: 105; P: 110)	4.8
Franco	NSTEMI	2019	9 to 13	1249 (C: 1105; P: 144)	-87
Frankfurter	Worsening HF	2019	10 to 16	256 (C: 149; P: 107)	-39.3 (-8.6 to -78.5)
Hoyer	Strokes admissions	2019	10 to 15	NR	-15.2
Hoyer	TIA admissions	2019	10 to 15	NR	-38.5
Jasne	Strokes admissions	2019	8 to 17	863	-37.2

				(C: 530; P: 333)	
Kessler	ACS	2019	10 to 18	5920 (C: 3411; P: 2509)	-27 (-23.0 to -30.0)
Lantelme	AMI	2019	11 to 14	240 (C: 142; P: 98)	-30.99
Li	STEMI	2019	6 to 18	2130 (C: 1092; P: 1038)	-4.95
Mafham	ACS	2019	2 to 22	120076 (C: 65375; P: 54701)	-40 (-37 to -43)
Manzoni	Ped	2019	10 to 18	91 (C: 73; P: 18)	-75
Onteddu	Strokes	2019	4 to 20	104615 (C: 66674; P: 37941)	-43.09
Papafaklis	ACS	2019	10 to 15	1848 (C: 1077; P: 771)	-28.41 (-21.0 to -35.0)
Reeves	STEMI	2016/17/18/19	13 to 17	155 (C: 85; P: 70)	-17.3
Reeves	Stroke	2016/17/18/19	13 to 17	230 (C: 175; P: 155)	-15.6
Romaguera	STEMI	2019	10 to 16	919 (C: 524; P: 395)	-24.6 (-14.0 to -34.0)
Secco	ACS	2019	10 to 13	246 (C: 162; P: 84)	-48.15 (-33.0 to -61.0)
Seiffert	Cardiovascular or cerebrovascular emergencies	2019	10 to 22	67443 (C: 35841; P: 31602)	-14.97
Zhao	Stroke	2019	6 to 9	56306 (C: 34725; P: 21581)	-37.9
Diagnostics					
Collado-Mesa	Breast imaging	2018/19	14 to 18	8239 (C: 7142; P: 1097)	-84.64
Houshyar	ED volume of all imaging	2019	13 to 14	5871 (C: 3552; P: 2319)	-34.7 (-12.0 to -57.4)

	(MRI, CT, x-ray, US, fluoroscopy)				
Lui	Upper endoscopies	2017/18/19	4 to 13	2700 (C: 1813; P: 887)	-51.1
Lui	Lower endoscopies	2017/18/19	4 to 13	1681 (C: 1190; P: 491)	-58.7
Naidich	Total imaging volume	2019	10 to 16	408067 (C: 237388; P: 170679)	-28.1
Naidich	ED imaging volume	2019	10 to 16	195160 (C: 112579; P: 82581)	-26.6
Naidich	Inpatient imaging volume	2019	10 to 16	147070 (C: 78902; P: 68168)	-13.6
Naidich	Outpatient imaging volume	2019	10 to 16	65837 (C: 45907; P: 19930)	-56.6
Norbash	All radiological requests	2019	2 to 21	282749 (C: 203132; P: 79617)	-21.8
Toyoda	Abdominal US	2018/19	6 to 18	4506 (C: 2566; P: 1940)	-24.4
Toyoda	Abdominal CT/MRIs	2018/19	6 to 18	3553 (C: 1874; P: 1679)	-10.38
Xu	Optical coherence tomography, indocyanine green, fluorescent angiography	2018/19	11 to 20	566955 (C: 355458; P: 211497)	-40.5 (-26.4 to -54.7)
Therapeutics, Procedures, Surgeries					
Benazzo	Trauma surgeries	2019	9 to 14	1011 (C: 559; P: 452)	-19.2
Benazzo	Femoral neck fracture surgeries	2019	9 to 14	656 (C: 349; P: 307)	-12.2
Bollmann	Catheter ablations	2019	10 to 18	472 (C: 264; P: 208)	-21.2 (-6.0 to -44.0)
Bollmann	CRM device implantations	2019	10 to 18	675 (C: 365; P: 310)	-15.1 (-1.0 to -27.0)

Bozovich	Coronary angioplasties	2019	14 to 18	1330 (C: 946; P: 384)	-59.41 (-50.0 to -67.0)
Bozovich	Heart surgeries	2019	14 to 18	400 (C: 282; P: 118)	-58.16 (-46.0 to -100)
Bozovich	PCI	2019	14 to 18	2501 (C: 1850; P: 651)	-64.81 (-50.0 to -78.0)
Bozovich	General surgeries	2019	14 to 18	24805 (C: 19600; P: 5205)	-73.44 (-62.0 to -75.0)
Bozovich	Chemotherapy and radiotherapy	2019	14 to 18	9227 (C: 5005; P: 4222)	-15.64 (-3.0 to -52.0)
Bozovich	GI endoscopies	2019	14 to 18	8549 (C: 7137; P: 1412)	-80.22 (-77.0 to -93.0)
Bramer	Non-influenza immunisation for children	2017/18/19	1 to 18	NR	-21.5
Cano-Valderrama	Acute surgeries	2019	12 to 17	402 (C: 285; P: 117)	-58.95
de Havenon	MT	2018/19	6 to 13	725 (C: 319; P: 406)	27.3
de Havenon	tPA	2018/19	6 to 13	570 (C: 266; P: 304)	14.3
de Havenon	PCI	2018/19	6 to 13	2596 (C: 1330; P: 1266)	-4.81
Garcia	Cardiac catheterisation	2019	10 to 18	1332 (C: 779; P: 553)	-29.1
Gawron	Gastrointestinal endoscopies	2019	10 to 18	34053 (C: 23455; P: 10598)	-54.81
Gawron	Colonoscopies	2019	10 to 18	57183 (C: 43371; P: 13812)	-68.15
Giuntoli	Scheduled orthopaedic procedures	2019	10 to 13	583 (C: 444; P: 139)	-68.69

Giuntoli	Trauma orthopaedic procedures	2019	10 to 13	488 (C: 270; P: 218)	-19.26
Gruttadauria	Liver transplantation and related procedures	2018/19	10 to 11	98 (C: 61; P: 37)	-39.34
Kadavath	Invasive cardiac procedures	2019	10 to 16	7219 (C: 4671; P: 2548)	-45.45
Kerleroux	MT for stroke	2019	8 to 13	1512 (C: 844; P: 668)	-21 (-18.0 to -24.0)
Langdon-Embry	Routine childhood immunisation	2019	12 to 22	590000 (C: 344000; P: 246000)	-28.49
Lazaros	Cardiac surgery procedures	2019	12 to 19	330 (C: 246; P: 84)	-65.85
Mafham	PCI after the admission day	2019	2 to 22	17469 (C: 8055; P: 9414)	-47 (-37 to -52)
Mafham	PCI on the admission day	0	2 to 22	19277 (C: NR; P: NR)	-16 (-7 to -24)
Mafham	CABG	2019	2 to 22	3196 (C: 2663; P: 533)	-80 (-68 to -87)
Mafham	Angiography	2019	2 to 22	16079 (C: 11485; P: 4594)	-60 (-53 to -65)
Mazzatenta	Non-urgent surgical procedures	2018/19	12 to 15	918 (C: 713; P: 205)	-71.25
Mazzatenta	Urgent surgical procedures	2018/19	12 to 15	274 (C: 161; P: 113)	-29.6
McDonald	Hexavalent vaccine (first does)	2019	10 to 17	62692 (C: 31475; P: 31217)	-0.82
McDonald	MMR vaccine (first does)	2019	10 to 17	59809 (C: 30989; P: 28820)	-7
Onteddu	tPA	2019	4 to 20	1841	-50.93

				(C: 1235; P: 606)	
Onteddu	MV	2019	4 to 20	644 (C: 399; P: 245)	-38.6
Pinar	Urological surgeries	2019	12 to 13	1439 (C: 995; P: 444)	-55.4
Polo Lopez	Congenital heart diseases surgeries	2019	12 to 20	193 (C: 142; P: 51)	-51
Range	Coronary angiography for STEMI	2019	10 to 13	430 (C: 246; P: 184)	-25.2
Requena	Frozen embryo transfer	2019	6 to 12	4461 (C: 2500; P: 1961)	-21.5
Requena	IVF	2019	6 to 12	5441 (C: 3007; P: 2434)	-19.1
Requena	IUI	2019	6 to 12	1301 (C: 564; P: 467)	-17.3
Salerno	Urgent GI endoscopic procedures	2019	10 to 13	2305 (C: NR; P: NR)	-39.49
Tinay	Non-deferrable uro-oncological procedures	2019	11 to 15	290 (C: 200; P: 90)	-55
Wong	Orthopaedic operations	2016/17/18/19	5 to 13	928278 (C: 595814; P: 332464)	-44.2 (-54.7 to -33.7)
Xu	Intravitreal injections	2018/19	11 to 20	454765 (C: 235996; P: 218769)	-7.3 (2.2 to -16.8)
Zhao	Thrombolysis	2019	6 to 9	5930 (C: 3422; P: 2508)	-25.5
Zhao	Thrombectomy	2019	6 to 9	2268 (C: 1298; P: 970)	-22.7
Visits					
Abdulmalik	All primary care services	2018/19	10 to 22	1384037 (C: 872691; P: 511346)	-41.41

Angoulvant	Ped ED	2017/18/19**	12 to 16	871543 (C: NR; P: NR)	-68 (-55.8 to -81.2)
Antonucci	ED urological	2019	10 to 18	304 (C: 201; P: 103)	48.8
Athiel	Gynaecological ED	2019	10 to 22	39690 (C: 24982; P: 14708)	-41
Bayles, preprint	ED	2018/19	12 to 18	21527 (C: 17230; P: 4297)	-50.1 (-39.5 to -60.7)
Benazzo	Orthopaedic outpatient	2019	9 to 14	17041 (C: 6863; P: 10178)	-48.3
Benazzo	ED trauma	2019	9 to 14	14772 (C: 6050; P: 8722)	-44.17
Benazzo	Elective orthopaedic surgeries	2019	9 to 14	8113 (C: 3065; P: 5048)	-64.7
Bozovich	ED	2019	14 to 18	268899 (C: 213947; P: 54952)	-74.32 (-65.0 to -79.0)
Butt	ED	2019	10 to 18	102033 (C: 58858; P: 43175)	-26.7
Cheek	ED	2019	13 to 21	41041 (C: 26871; P: 14170)	-47.27 (-44.2 to -50.3)
Chou	Hospice home care visits	2019	1 to 18	1516 (C: 777; P: 739)	-4.89
CVD-Covid- UK Consortium	ED	2018/19	6 to 19	942169 (C: 506516; P: 435653)	-52.8 (-52.2 to -53.5)
CVD-Covid- UK Consortium	ED cardiac	2018/19	6 to 19	NR	-40.2 (-35.6 to -45.0)
CVD-Covid- UK Consortium	ED cerebrovascular	2018/19	6 to 19	NR	-31.8 (-26.2 to -38.0)

CVD-Covid-UK Consortium	ED vascular	2018/19	6 to 19	NR	-40.6 (-31.5 to -50.3)
Frankfurter	Symptoms suggestive of HF	2019	10 to 16	1906 (C: 800; P: 1106)	38.3 (26.3 to 51.6)
Frankfurter	HF	2019	10 to 16	314 (C: 186; P: 128)	-43.5 (-14.8 to -79.4)
Giuntoli	Orthopaedic first aid visits	2019	10 to 13	1679 (C: 1301; P: 378)	-70.95
Hartnett	ED	2019	11 to 22	3319945 (C: 2099734; P: 1220211)	-31.47
Isba	Ped ED	2019	6 to 13	NA (C: NA; P: NA)	-17.74
Kim	ED	2019	11 to 18	68384 (C: 38712; P: 29672)	-44 (-33.0 to -53.0)
Kolbaek	Referrals to psychiatric services	2019	9 to 18	7982 (C: 4419; P: 3563)	-19.4
Krenzlin	ED Neurosurgery	2018/19	12 to 16	2646 (C: 1824; P: 822)	-44.7 (-42.6 to -46.8)
Lazzerini	Ped ED	2019	10 to 13	10826 (C: 8818; P: 2008)	-77.72 (-73.0 to -88.0)
Manzoni	Ped ED	2019	10 to 18	1654 (C: 1428; P: 226)	-86 (-32.0 to -55.0)
Mazzatenta	Outpatient neuro-surgical	2018/19	12 to 15	2234 (C: 1768; P: 466)	-73.6
Mitchell	ED	2017/18/19	14 to 17	14059 (C: 8643; P: 5416)	-37.3 (-33.0 to -41.0)
Novara	ED urological	2019	12	399 (C: 275; P: 124)	-54.9
Pignon	ED psychiatric	2019	12 to 15	1777 (C: 1224; P: 553)	-54.8
Pop	Stroke	2019	10 to 13	462	-39.6

				(C: 288; P: 174)	
Qasim	Trauma	2019	11 to 16	2386 (C: 1328; P: 1058)	-20.3
Santana	ED	2019**	10 to 13	863414 (C: NR; P: NR)	-47.98
Scaramuzza	Ped ED	2019	9 to 13	3912 (C: 2958; P: 954)	-67.8
Scholz	STEMI	2017/18/19	10 to 13	1716 (C: 1329; P: 387)	-12.64
Smalley	ED	2019	13 to 17	87840 (C: 56453; P: 31387)	-44.4
Toro	ED	2015/16/17/18/19	10 to 18	5045647 (C: 3198508; P: 1847139)	-42.25
Toro	Circulatory system ED	2015/16/17/18/19	10 to 18	105471 (C: 58439; P: 47032)	-19.52
Toro	Stroke ED	2015/16/17/18/19	10 to 18	11004 (C: 6385; P: 4619)	-27.66
Toyoda	Liver clinics	2018/19	6 to 18	8568 (C: 5335; P: 3233)	-39.4
Xu	Retinal outpatient clinics	2018/19	11 to 20	813585 (C: 485433; P: 328152)	-32.4 (-20.4 to - 44.4)

*this is the comparator year that studies included in their comparison to the 2020 time period; **these studies compared the expected/forecasted utilisation for 2020 from data from these years

Abbreviations: ED: emergency department; HF: Heart Failure; IVF: In vitro fertilisation; IUI: Intrauterine insemination; MT: Mechanical thrombectomy; tPA: tissue Plasminogen Activator; CABG: Coronary artery bypass grafting; ACS: Acute Coronary Syndrome; AMI: Acute Myocardial Infarction; STEMI: ST Elevation Myocardial Infarction; MRI: Magnetic Resonance Imagine; CT: computerized tomography; US: Ultrasonography; CRM: Cardiac rhythm management; PCI: Percutaneous Coronary Interventions; GI: Gastrointestinal

For studies that reported the changes in healthcare services as incidence rate ratios, IRR, we estimated the % change in healthcare services as $100 * (1 - \text{IRR})$. For example, IRR of 0.75 converted to 25% reduction in healthcare services

5.3 Table of results of secondary outcomes of the included studies

Study	Secondary Outcome	Change in proportions of severe patients*	P-value, if provided
Andersson	Mortality	No change	0.45
Braiteh	STEMI/NSTEMI	No change	NR
Butt	% ACS from those presented with cardiac symptoms	Increase	NR
Cano-Valderrama	SOFA score >0	No change	0.16
Claeys	% Cardiac arrest	No change	0.7
Claeys	Killip class	No change	0.7
Claeys	Mortality	No change	0.6
Clerici	Voluntary/involuntary admission	Increase	NR
Collado-Mesa	Positive biopsy (diagnostic yield)	No change	NR
CVD-COVID	Procedures for cardiac, cerebrovascular, other vascular conditions	No change	NR
De Rosa	Mortality	Increase	<0.001
De Rosa	STEMI/NSTEMI	Increase	NR
De-Filippo	STEMI/NSTEMI	No change	0
Diegoli	Admissions for severe stroke (NIH stroke scale score)	Increase	NR
Egol	Mortality (In-patient and 30 day)	Increase	0.005-0.035
Egol	Non-operative cases	No change	0.793
Frankfurter	Hospitalisation	No change	0.22
Frankfurter	ICU admission	No change	0.86
Frankfurter	In-hospital mortality	No change	0.05
Frankfurter	NYHA class III-IV	No change	0.3
Giuntoli	Hospitalisation	Increase	NR
Hoyer	Stroke/TIA	Increase	NR
Kerleroux	% unwitnessed onset	Increase	0.004
Kerleroux	ASPECTs score	Increase	0.041

Kerleroux	Baseline NIHSS	No change	0.279
Kessler	STEMI/NSTEMI	No change	0
Lazaros	Emergency/nonemergency	Increase	<0.001
Lui	Positive rate for colon cancer	Increase	<0.001
Lui	Positive rate for gastric cancer	No change	0.14
Mafham	STEMI/NSTEMI	Increase	NR
Manzoni	Hospitalisation	Increase	<0.001
Mazzatenta	Urgent/Nonurgent	Increase	NR
Mitchell	Triage category	No change	NR
Novara	Hospitalisation	No change	0.8
Novara	Triage category	No change	0.06
Papafakis	STEMI/NSTEMI	Increase	NR
Pignon	Hospitalisation	No change	0.872
Pop	admission	Increase	NR
Pop	Initial NIHSS score	No change	0.886
Qasim	Changes in % of all trauma volume that was at the highest level of acuity (described as 'alert')	Increase	0.006
Romaguera	% of patients with sudden cardiac death	No change	0
Romaguera	10-day mortality	No change	0.459
Romaguera	Killip class II-IV	No change	0.8
Salerno	Diagnostic yield for urgent EGDs	Increase	<0.001
Salerno	Diagnostic yield for urgent lower endoscopy	No change	0.3
Santana	Triage category	No change	0
Scaramuzza	Triage category	Increase	0
Scholz	In-hospital mortality	No change	0.68
Scholz	TIMI score	No change	0.464
Secco	GRACE score	Increase	<0.01
Secco	Peak troponin	Increase	<0.01
Secco	STEMI/NSTEMI	Increase	<0.01
Secco	Mortality	No change	NS

Seiffert	Acute stroke/TIA	Increase	0
Seiffert	STEMI/NSTEMI	Increase	0
Seiffert	In-hospital mortality	No change	0
Seiffert	Intervention/surgeries	No change	0
Tinay	ASA scores	Increase	0.005
Toyoda	Visits in advanced disease patients	No change	0.11
Wong	Emergency/elective	Increase	NR

Note: *This secondary outcome domain is exploring, if there is a reduction in services, whether or not there is a greater or lesser reduction in the proportion of patients/people using the service who have milder or more severe forms of illness. If there is an increase in the proportions with more severe illness - which means a greater reduction among those with milder illness – then an “increase” is recorded in this column.

5.4 Figures Change in healthcare utilisation for each category of healthcare services:

Each dot represents a study estimate for each calendar week. For studies that only provided averages of changes for the whole study period, we plotted the average estimates for each calendar week of the corresponding study period.

Figure 5.4a visits

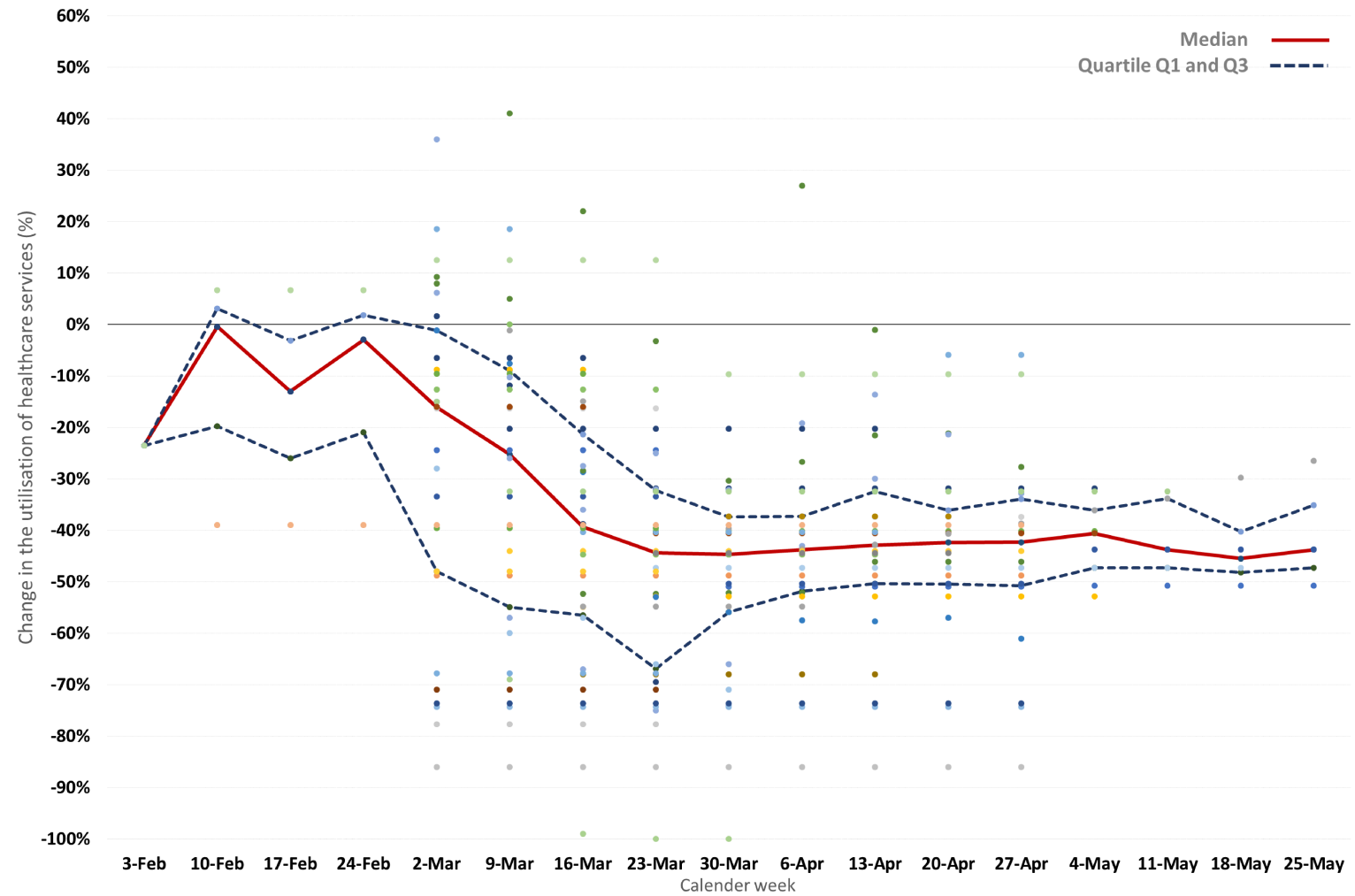


Figure 5.4b admissions

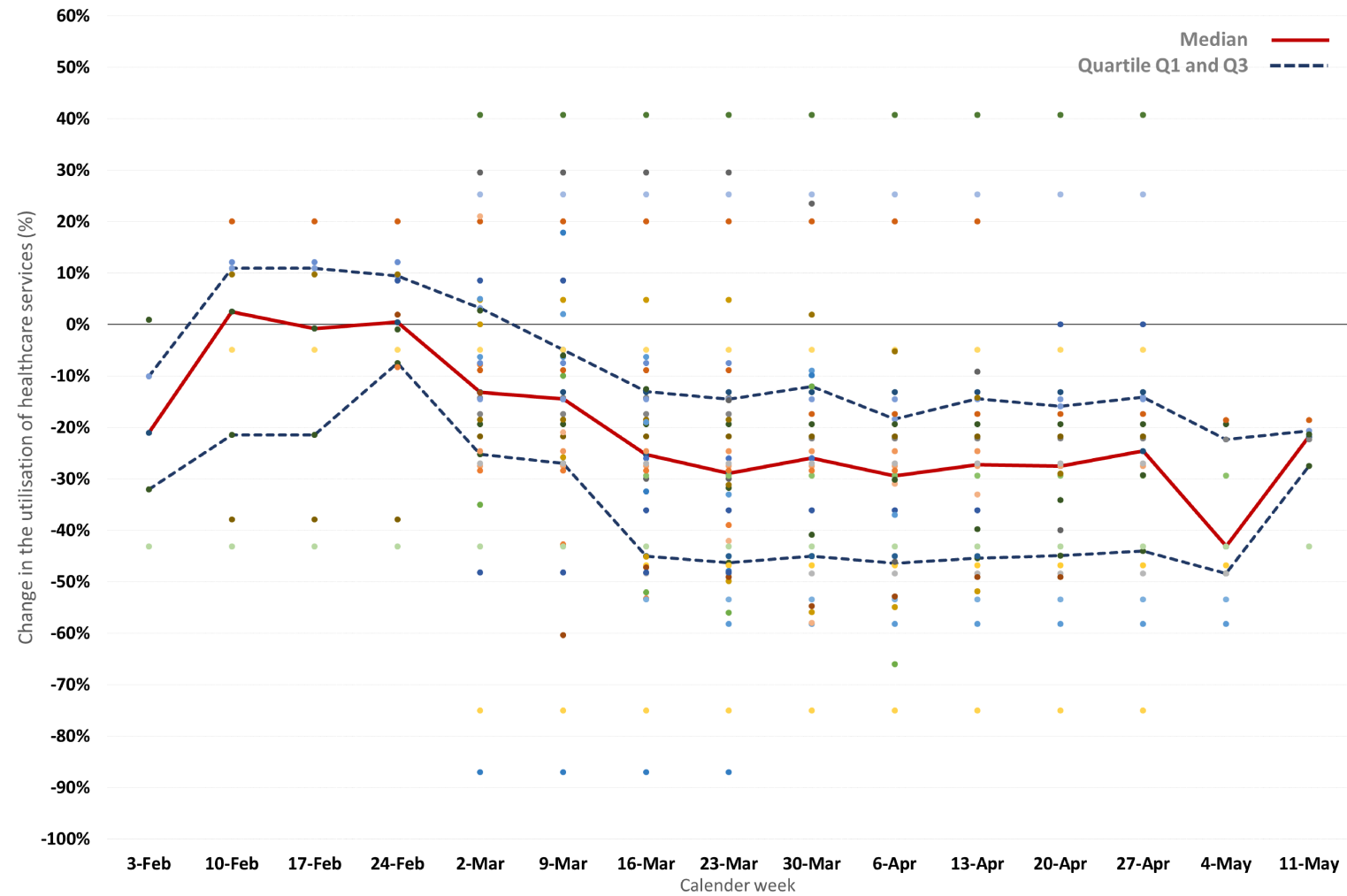


Figure 5.4c diagnostics

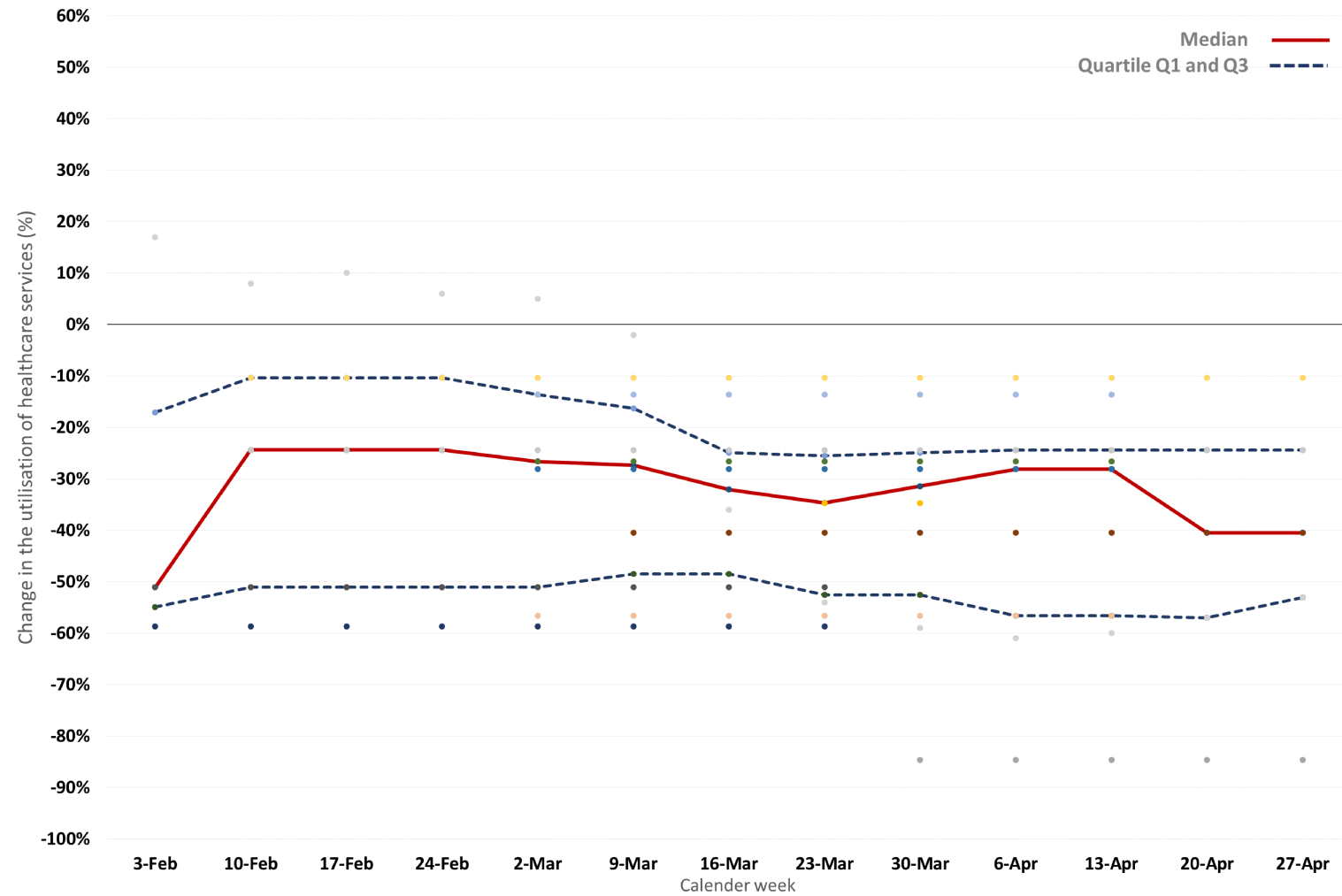


Figure 5.4d therapeutics

