

Impact of COVID-19 on hospital admissions for acute coronary syndromes (updated analyses including admissions up to 18 October 2020)

Introduction

Researchers in the Nuffield Department of Population Health and the Radcliffe Department of Medicine, working with NHS Digital and a team of experts from other UK universities, analysed the number of admissions to hospitals in England for acute coronary syndrome (ACS) during the COVID-19 pandemic.

Results based on data collected by NHS Digital from NHS Hospital Trusts in England up to 24 May 2020 were published in *The Lancet* on 14 July 2020.¹ Updated monthly analyses (**Figures 1-7**) are published here.

Updated Methods

The study methods are described in the main publication and supplementary appendix, including the adjustment that was made for incomplete clinical coding for the 8 most recent weeks.¹ For the analyses reported here, an additional adjustment is made to the estimated number of ACS admissions (for the 4 most recent weeks of data only) to account for delays in the reporting of admissions by NHS hospitals. This was done by estimating the *additional* number of ACS admissions that tend to be identified when a subsequent monthly data extract becomes available, as described below.

For each of the July, August, September, October and November data extracts, we first calculated the percentage increase in the number of reported ACS admissions seen in that data extract compared with the previous month's extract, for the last 4 weeks reported in the previous month's extract (**Table 1**). For example, for the week commencing 15th June 2020 (which was week '-1' for the July data extract), the number of reported ACS admissions was 2694 in the July data extract but 2891 by the time of the August data extract. Therefore, the 'August vs July' inflation factor for week -1 was 7.3% (since $2891/2694=1.073$). By estimating each of these statistics five times (ie, July vs June, August vs July, etc), and taking the average of the five values, we were able to calculate *average* inflation factors for each of weeks -1 through -4, which were then used to adjust the reported number of ACS admissions for the four most recent weeks of data.

Table 1: Proportional increase in weekly ACS admissions observed with subsequent data extract

Week number (relative to earlier data extract)	July vs. June	August vs. July	September vs. August	October vs. September	November vs. October	Average % of four estimates
-1	9.2%	7.3%	6.4%	4.2%	5.7%	6.6%
-2	4.9%	2.7%	3.2%	1.1%	6.4%	3.7%
-3	2.8%	1.3%	2.3%	1.3%	3.8%	2.3%
-4	1.7%	1.2%	0.6%	0.1%	1.6%	1.0%

The current updated analysis includes admissions for ACS from all 147 acute hospital NHS trusts in England from 1 January 2019 to 18 October 2020. To investigate the effect of season on expected ACS admissions, weekly ACS admissions during 2019 are also shown (Figure 2).

Updated figures

Figure 1: Weekly numbers of admissions with an acute coronary syndrome, by type

Figure 2: Weekly numbers of admissions to acute NHS hospital trusts for acute coronary syndrome between January and July in 2019 and 2020

Figure 3: Weekly numbers of admissions with an acute coronary syndrome that received a particular coronary procedure

Figure 4: (a) Weekly numbers and (b) weekly proportions of admissions to acute NHS hospital trusts with an acute coronary syndrome that received percutaneous coronary intervention on day of admission

Figure 5: (a) Weekly numbers and (b) weekly proportions of admissions to acute NHS hospital trusts with an acute coronary syndrome that received any percutaneous coronary intervention

Figure 6: Weekly median and interquartile range of length of stay for admissions to acute NHS hospital trusts with an acute coronary syndrome, by type

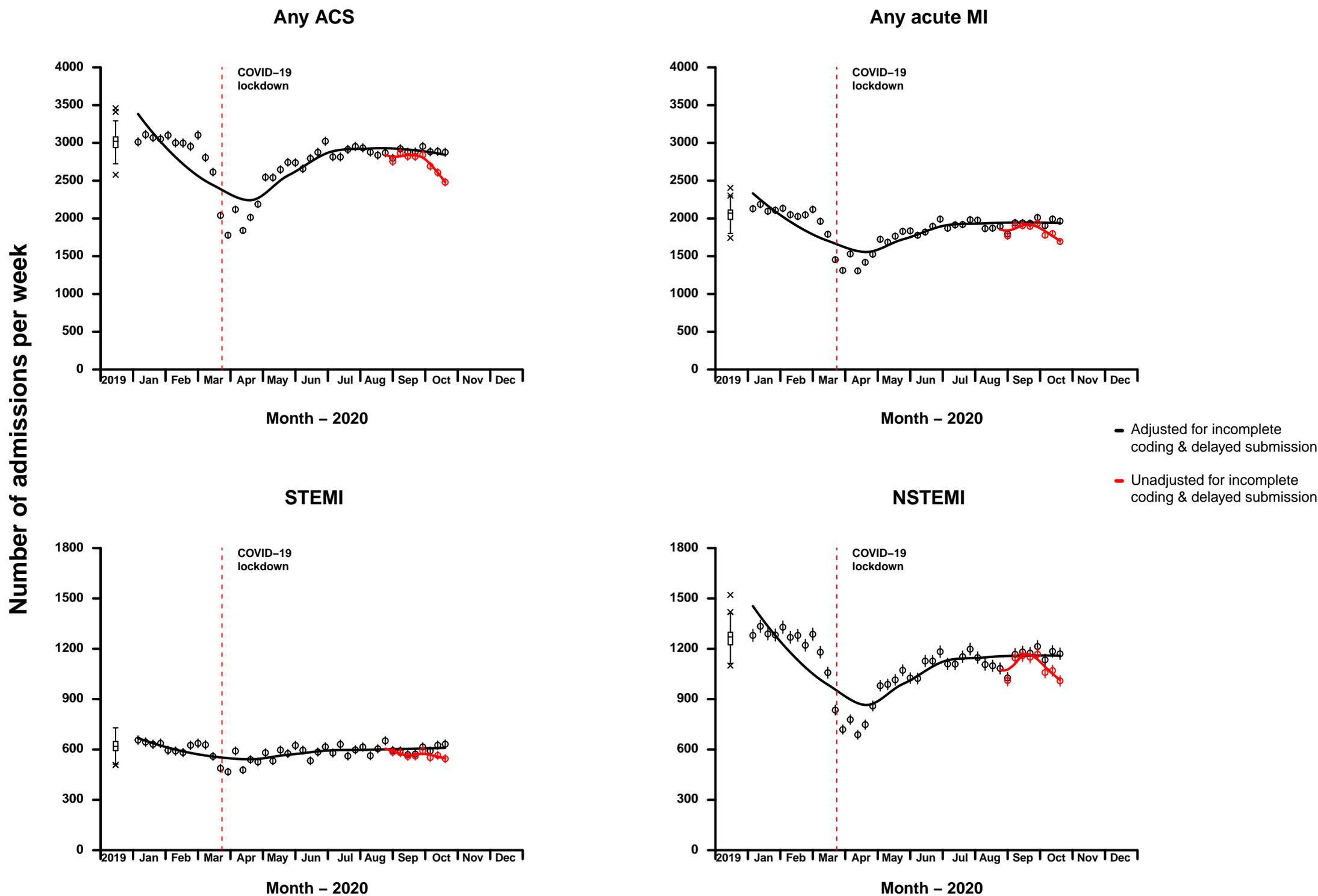
Figure 7: Weekly number of admissions to acute NHS hospital trusts with an acute coronary syndrome, by age, sex, Charlson index, ethnicity and region

Summary

As described in the main publication, weekly admissions for ACS fell between the middle of February and the end of March 2020, with larger reductions in non-ST-elevation myocardial infarction (NSTEMI) than ST-elevation myocardial infarction (STEMI) admissions. After accounting for incomplete coding and delayed reporting by NHS hospitals (see supplementary methods provided online with the main publication and additional adjustment described above) weekly ACS admissions had approximately returned to the 2019 weekly average by August 2020 (Figure 1). These updated analyses suggest that weekly ACS admissions in early October 2020 appear to be similar to those seen in equivalent weeks during 2019 (Figure 2). The number of ACS admissions involving a coronary artery bypass graft remains lower than the 2019 average (Figure 3). The adjusted weekly number of admissions for 2019 and 2020 are provided in Table 2. Updated analyses will be made available at <https://www.ctsu.ox.ac.uk/research/covid-19-acute-coronary-syndromes>.

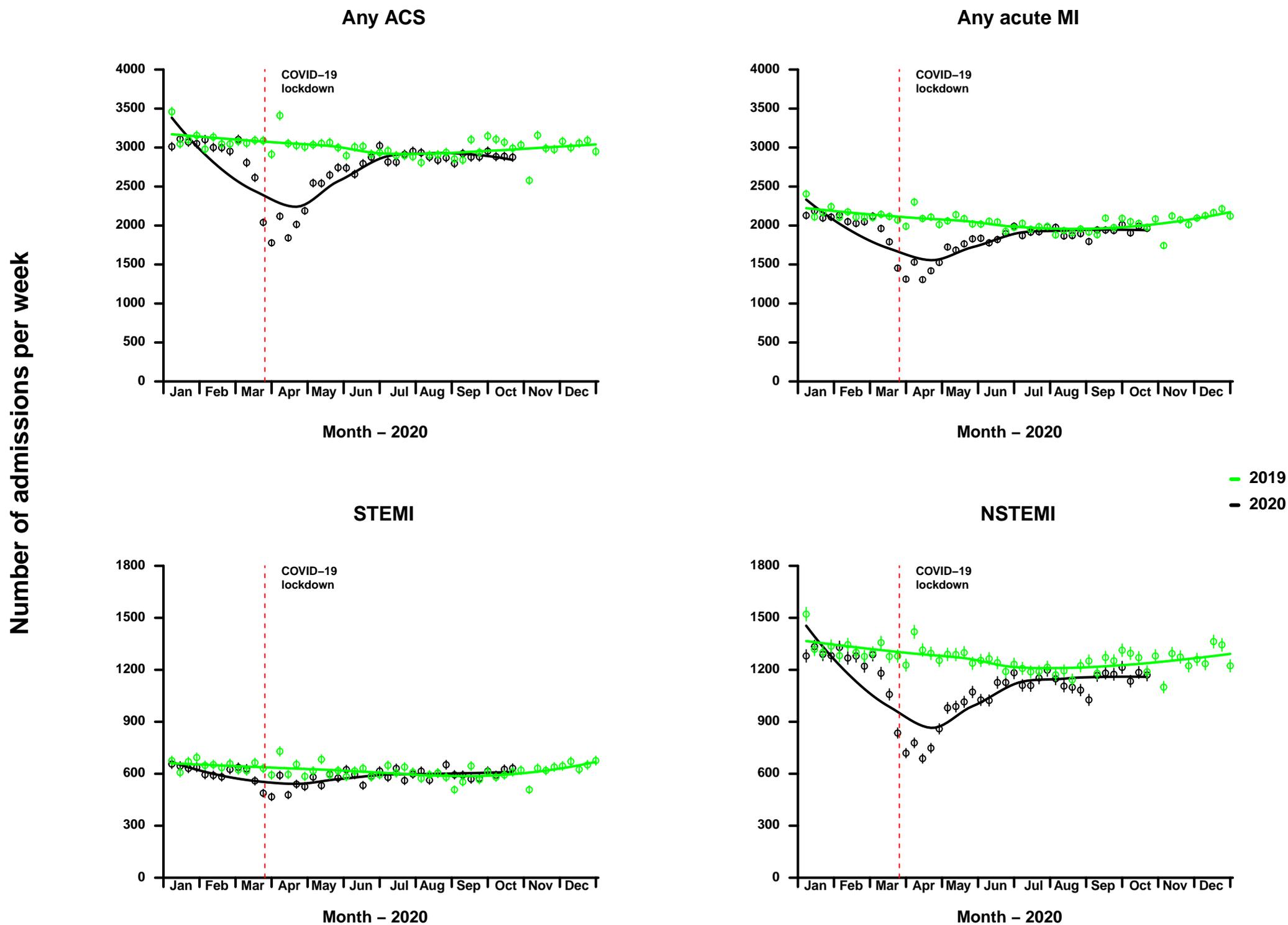
¹ Mafham MM, Spata E, Goldacre R, Gair D, Curnow P, Bray M, Hollings S, Roebuck C, Gale CP, Mamas MA, Deanfield JE, de Belder MA, Luescher TF, Denwood T, Landray MJ, Emberson JR, Collins R, Morris EJA, Casadei B, Baigent C. COVID-19 pandemic and admission rates for and management of acute coronary syndromes in England. *Lancet*. 2020 Aug 8;396(10248):381-389.

Figure 1: Weekly numbers of admissions to acute NHS hospital trusts with an acute coronary syndrome, by type



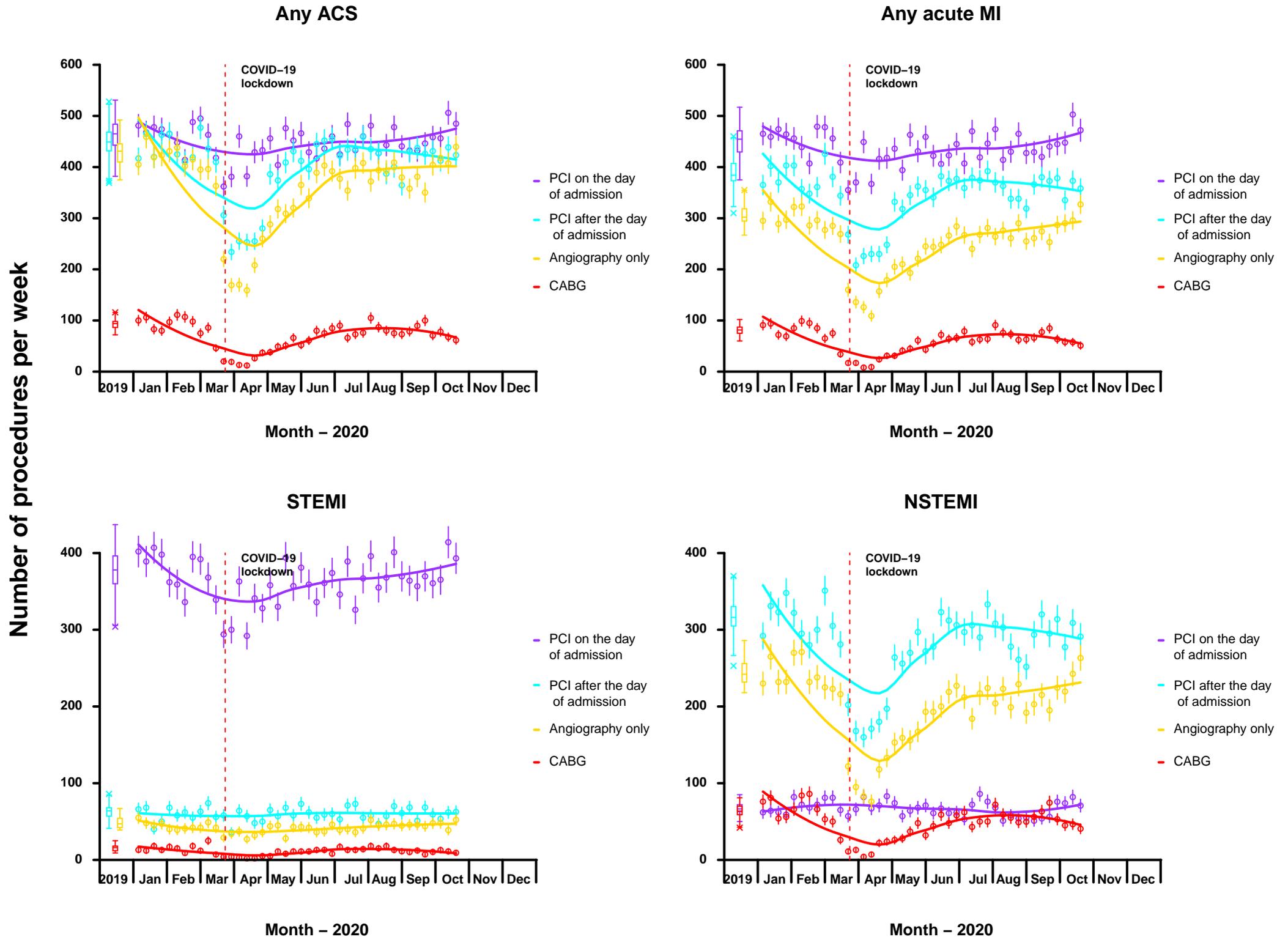
For weekly admissions in 2019, boxplots shows the median and IQR, with whiskers extending (up to) 1.5 times the IQR above the upper quartile and below the lower quartile, with any weekly counts beyond those ranges indicated by x. For 2020, a LOESS smoothing spline is fitted through the weekly reported counts, with datapoints and SEs plotted. The date of the UK COVID-19 lockdown (March 23, 2020) is shown with a vertical dotted line. ACS=acute coronary syndrome. STEMI=ST-elevation myocardial infarction. NSTEMI=non-ST-elevation myocardial infarction. LOESS=locally estimated scatterplot smoothing.

Figure 2: Weekly numbers of admissions to acute NHS hospital trusts with an acute coronary syndrome, by type



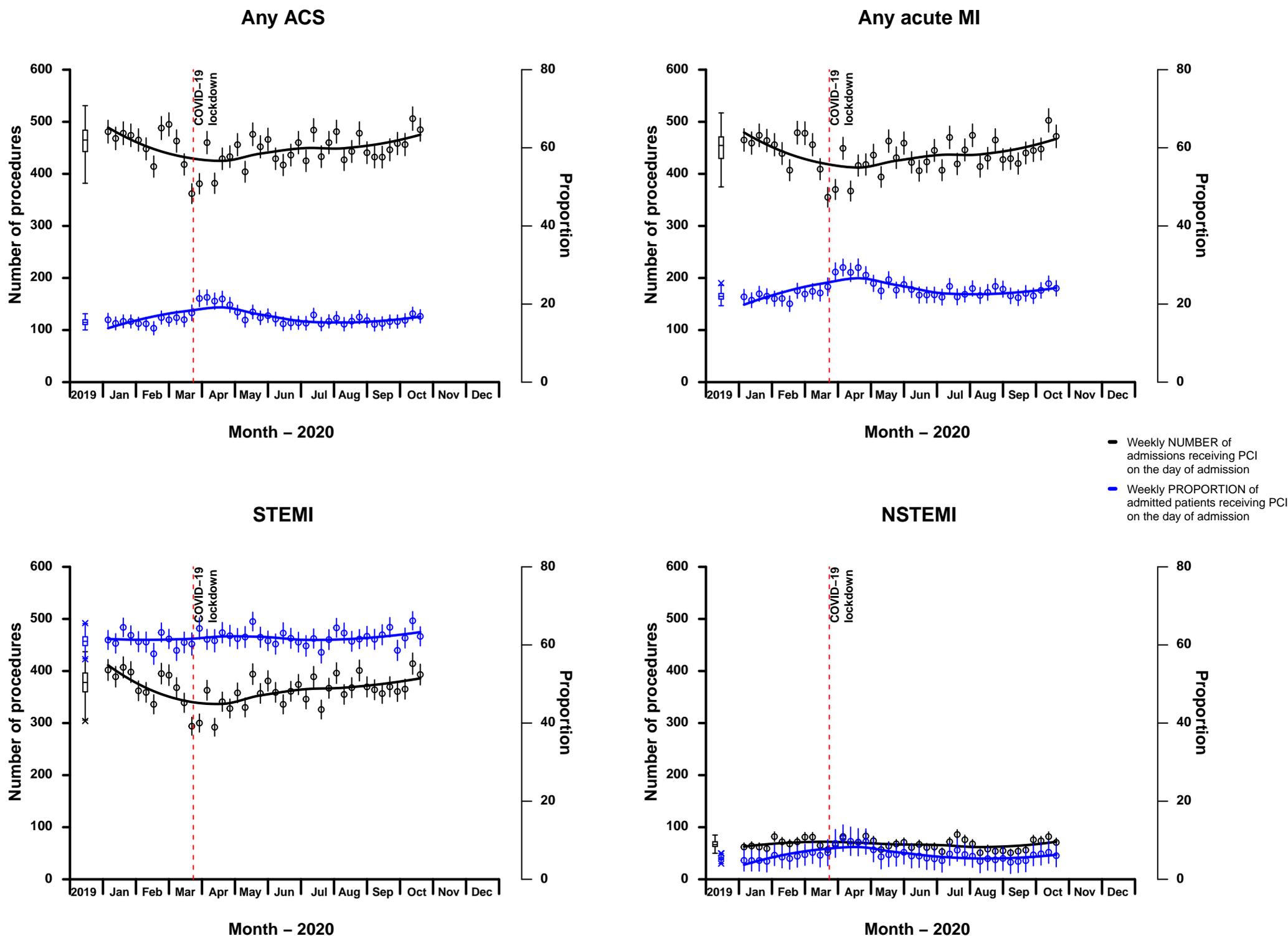
For both 2019 and 2020, a LOESS smoothing spline is fitted through the weekly reported counts, with datapoints and SEs plotted. The date of the UK COVID-19 lockdown (March 23, 2020) is shown with a vertical dotted line. ACS=acute coronary syndrome. STEMI=ST-elevation myocardial infarction. NSTEMI=non-ST-elevation myocardial infarction. LOESS=locally estimated scatterplot smoothing.

Figure 3: Weekly admissions to acute NHS hospital trusts with an acute coronary syndrome that received a particular coronary procedure



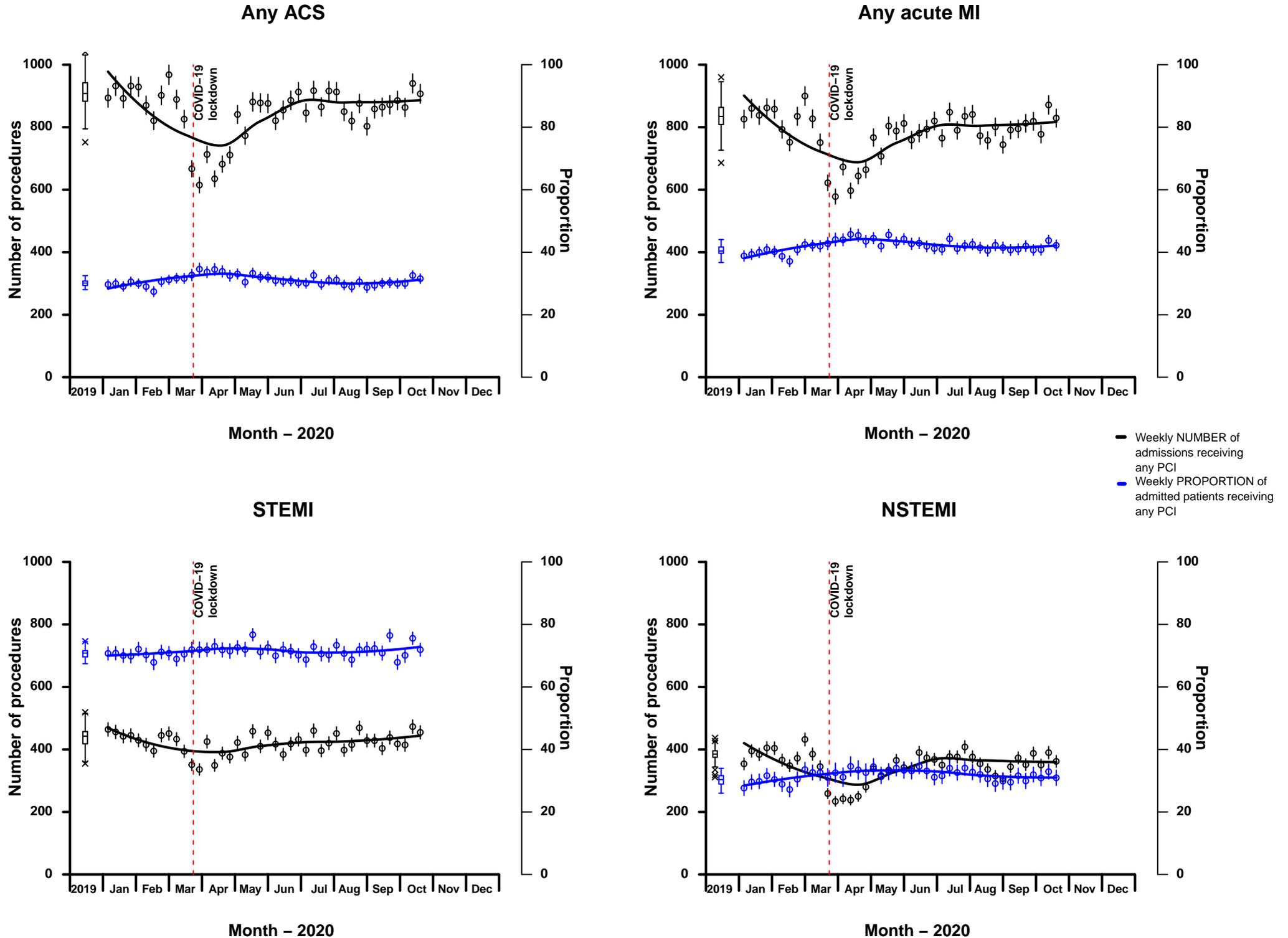
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Figure 4: (a) Weekly numbers and (b) weekly proportions of admissions to acute NHS hospital trusts with an acute coronary syndrome that received percutaneous coronary intervention on day of admission



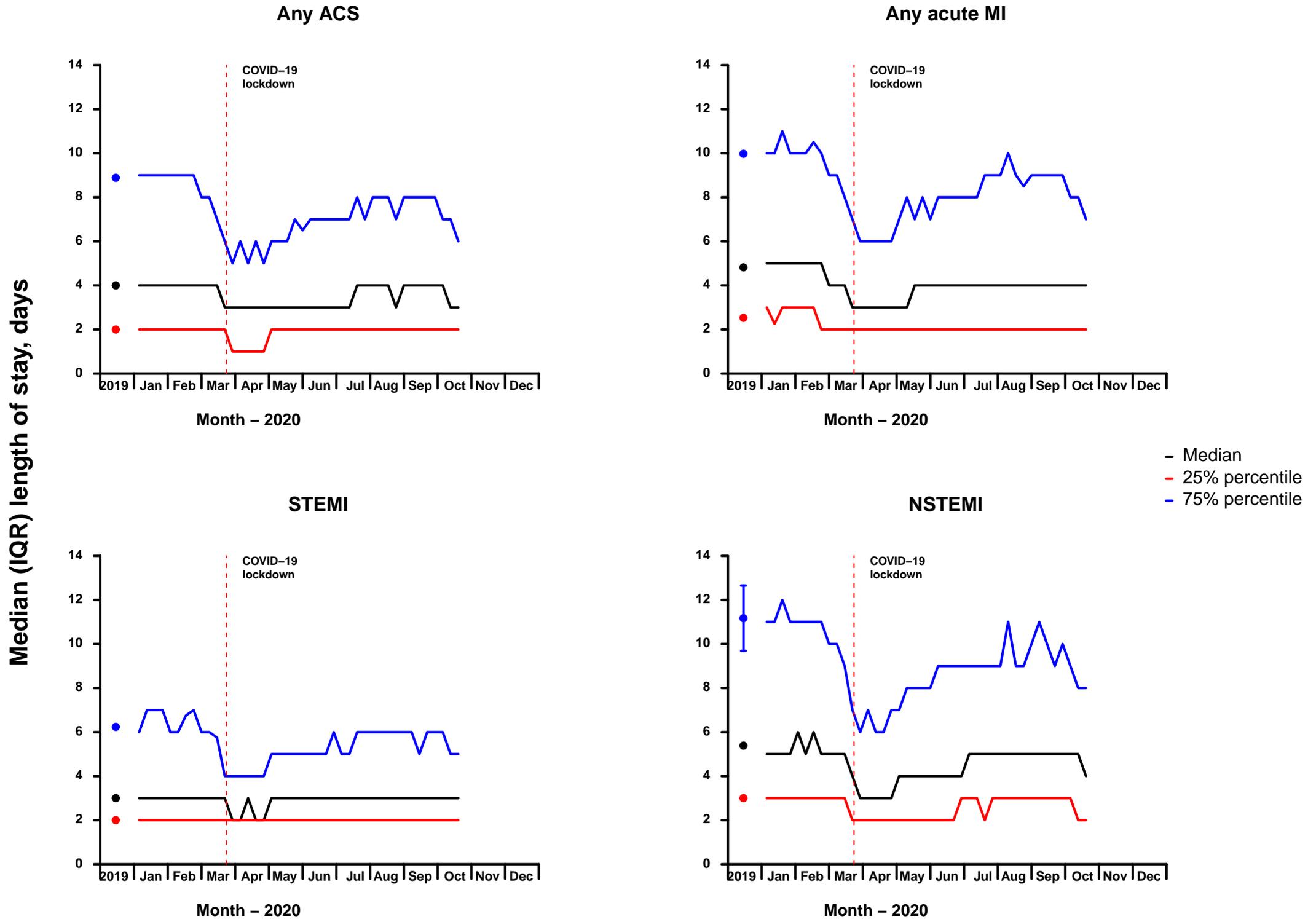
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Figure 5: (a) Weekly numbers and (b) weekly proportions of admissions to acute NHS hospital trusts with an acute coronary syndrome that received any percutaneous coronary intervention



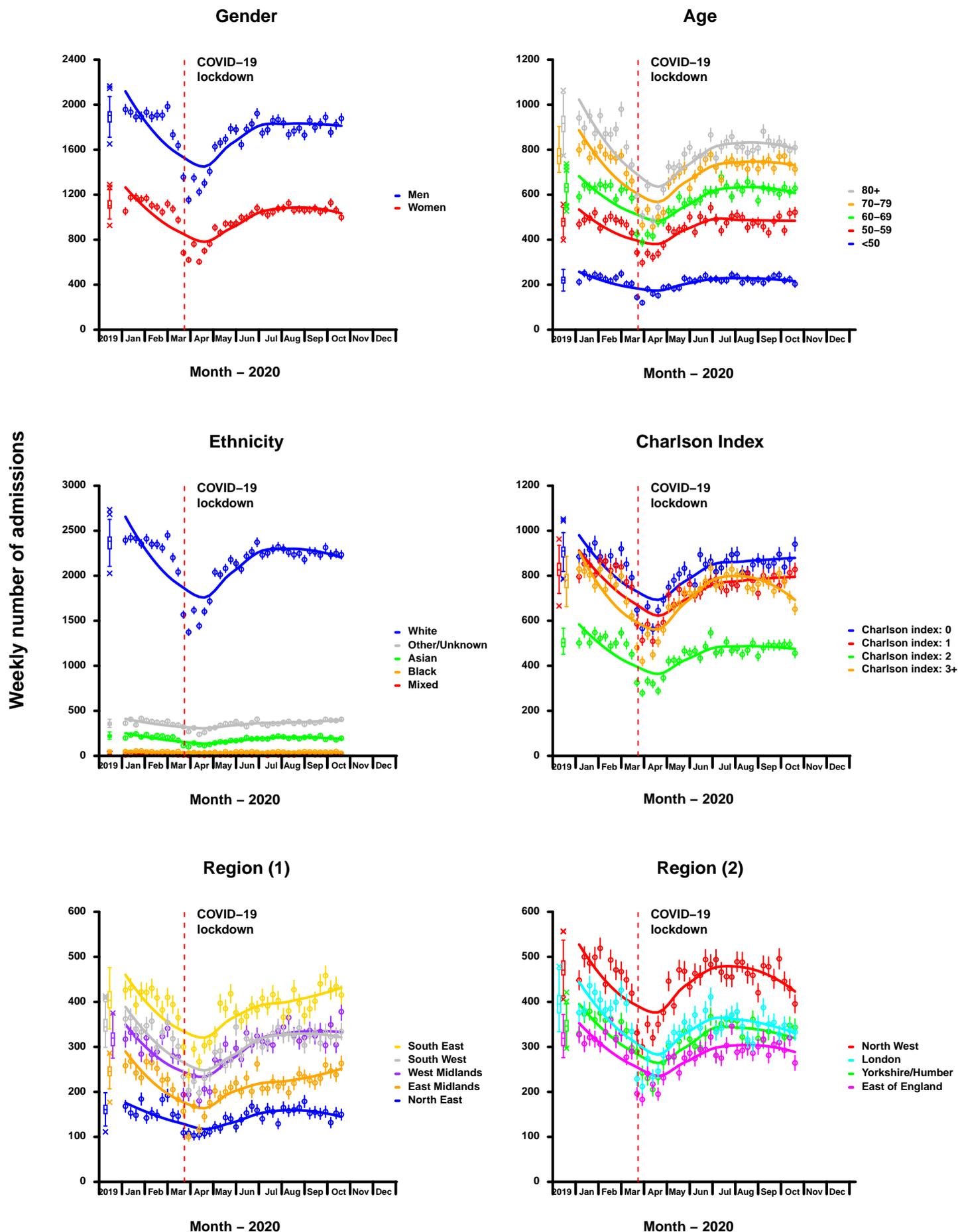
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Figure 6: Weekly median and interquartile range of length of stay for admissions to acute NHS hospital trusts with an acute coronary syndrome, by type



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Figure 7: Weekly number of admissions to acute NHS hospital trusts with an acute coronary syndrome, by age, sex, Charlson index, ethnicity and region



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Table 2: Weekly number of admissions from acute coronary syndrome, any acute myocardial infarction, ST-elevation myocardial infarction and non-ST-elevation myocardial infarction in 2019 and 2020

Weekly admissions in 2020 are adjusted for incomplete coding and delayed reporting (see methods above)

Week	Any ACS		Any acute MI		STEMI		NSTEMI	
	2019	2020	2019	2020	2019	2020	2019	2020
1	3,459	3,012	2,405	2,129	676	656	1,521	1,280
2	3,048	3,110	2,111	2,187	607	644	1,318	1,334
3	3,098	3,070	2,166	2,096	670	631	1,301	1,289
4	3,156	3,051	2,241	2,109	694	637	1,335	1,282
5	2,980	3,101	2,105	2,134	648	595	1,282	1,329
6	3,135	3,001	2,175	2,050	653	591	1,345	1,268
7	3,047	2,998	2,109	2,027	635	582	1,301	1,280
8	3,047	2,953	2,105	2,048	658	625	1,277	1,221
9	3,081	3,104	2,102	2,119	622	637	1,298	1,287
10	3,055	2,806	2,144	1,962	617	628	1,357	1,180
11	3,093	2,614	2,117	1,791	664	559	1,277	1,058
12	3,088	2,040	2,070	1,454	631	488	1,279	835
13	2,913	1,778	1,990	1,312	593	467	1,227	719
14	3,411	2,119	2,302	1,530	729	591	1,419	778
15	3,052	1,841	2,090	1,306	596	478	1,314	688
16	3,027	2,014	2,110	1,419	655	540	1,295	748
17	3,009	2,189	2,012	1,526	585	526	1,254	859
18	3,037	2,545	2,059	1,724	616	581	1,289	980
19	3,054	2,541	2,139	1,685	683	532	1,288	988
20	3,065	2,647	2,090	1,765	594	597	1,300	1,015
21	2,999	2,743	2,019	1,829	618	576	1,237	1,072
22	2,896	2,738	2,018	1,836	584	624	1,254	1,026
23	3,009	2,658	2,056	1,778	616	596	1,264	1,023
24	3,017	2,794	2,047	1,820	631	533	1,242	1,127
25	2,916	2,876	1,926	1,896	582	585	1,190	1,127
26	2,935	3,023	1,976	1,991	594	616	1,232	1,183
27	2,959	2,815	2,029	1,870	648	579	1,208	1,110
28	2,897	2,813	1,952	1,915	605	631	1,188	1,109
29	2,897	2,913	1,985	1,920	639	561	1,190	1,153
30	2,883	2,953	1,989	1,983	609	598	1,215	1,198
31	2,807	2,934	1,879	1,977	573	615	1,171	1,148
32	2,903	2,878	1,936	1,866	594	563	1,194	1,106
33	2,908	2,838	1,907	1,871	605	604	1,142	1,099
34	2,938	2,869	1,956	1,896	580	652	1,224	1,083
35	2,854	2,796	1,915	1,795	508	594	1,250	1,026
36	2,840	2,923	1,881	1,944	553	592	1,179	1,167
37	3,101	2,877	2,095	1,941	645	570	1,271	1,181
38	2,938	2,880	1,974	1,936	566	573	1,252	1,174

Week	Any ACS		Any acute MI		STEMI		NSTEMI	
	2019	2020	2019	2020	2019	2020	2019	2020
39	3,148	2,954	2,093	2,012	611	615	1,313	1,214
40	3,105	2,883	2,050	1,905	580	591	1,295	1,134
41	3,067	2,888	2,027	1,992	593	626	1,270	1,185
42	2,992	2,876	1,978	1,965	611	632	1,189	1,170
43	3,033		2,084		621		1,280	
44	2,579		1,744		508		1,101	
45	3,159		2,124		633		1,294	
46	2,989		2,073		619		1,274	
47	2,975		2,011		639		1,223	
48	3,079		2,096		645		1,260	
49	2,999		2,127		671		1,235	
50	3,056		2,165		624		1,363	
51	3,094		2,216		651		1,345	
52	2,949		2,121		676		1,223	