

Impact of COVID-19 on hospital admissions for acute coronary syndromes (updated analyses including admissions up to 16 August 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.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 and September 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 three times (ie, July vs June, August vs July, and September vs August), and taking the average of the three 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.

Week number (relative to earlier data extract)	July vs. June	August vs. July	September vs. August	Average % of three estimates
-1	9.2%	7.3%	6.4%	7.6%
-2	4.9%	2.7%	3.2%	3.6%
-3	2.8%	1.3%	2.3%	2.1%
-4	1.7%	1.2%	0.6%	1.2%

The current updated analysis includes admissions for ACS from all 147 acute hospital NHS trusts in England from 1 January 2019 to 16 August 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

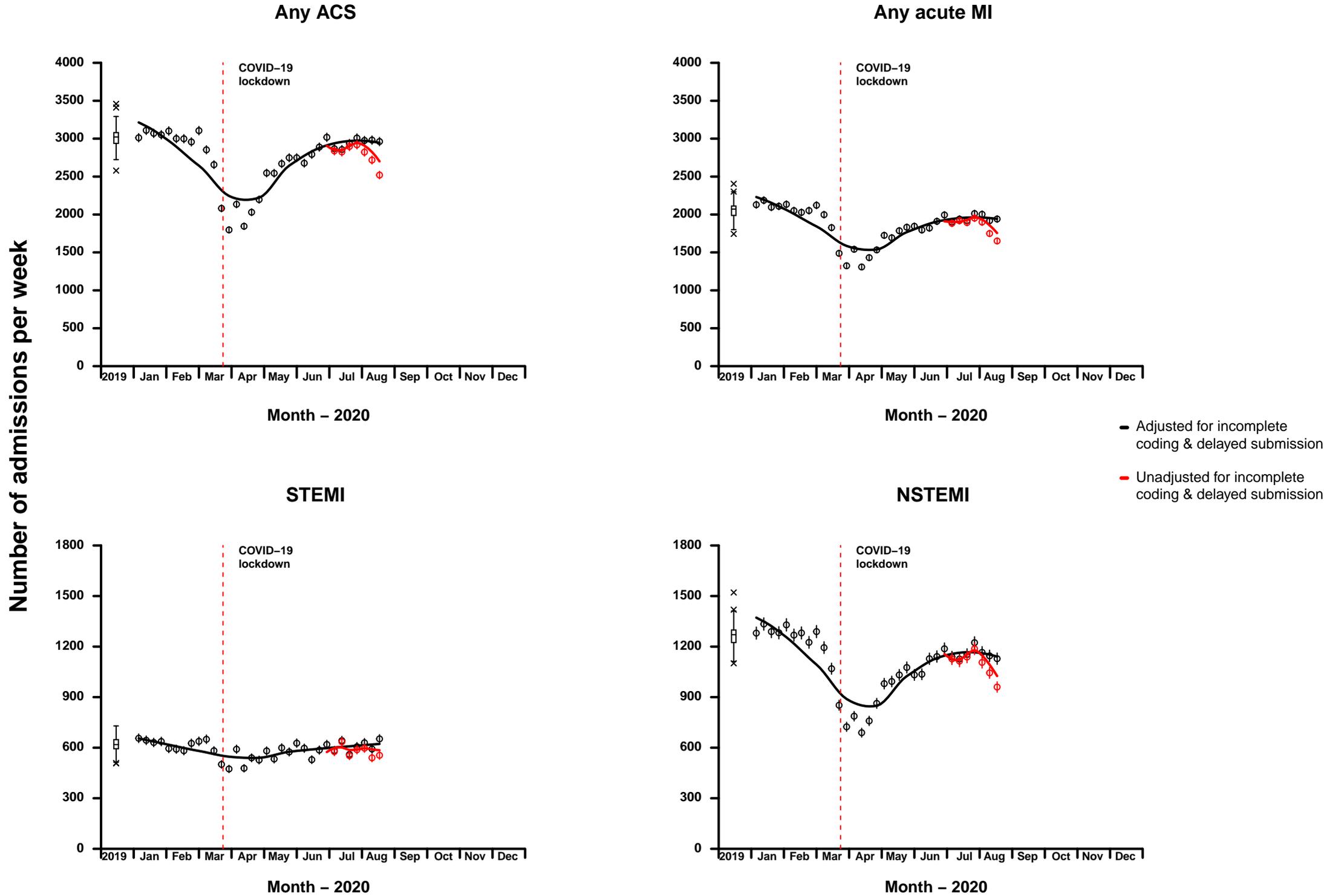
Figure 7: Weekly number of admissions to acute NHS hospital trusts with an acute coronary syndrome, by age, sex, Charlson index, ethnicity and region

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. These updated analyses show that, 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 mid-August 2020 (Figure 1). To enable assessment of any seasonal effects, the weekly ACS admissions between during 2019 are also plotted for comparison (Figure 2). The weekly number of ACS admissions involving percutaneous coronary intervention (PCI) on the day of admission, PCI after the day of admission or only diagnostic angiography had returned to approximately expected levels, while ACS admissions involving coronary artery bypass graft surgery remained slightly below expected levels. Given the adjustments made to the last few weeks of data, these results should be viewed as preliminary and updated analyses will be available at <https://www.ctsu.ox.ac.uk/research/covid-19-acute-coronary-syndromes>.

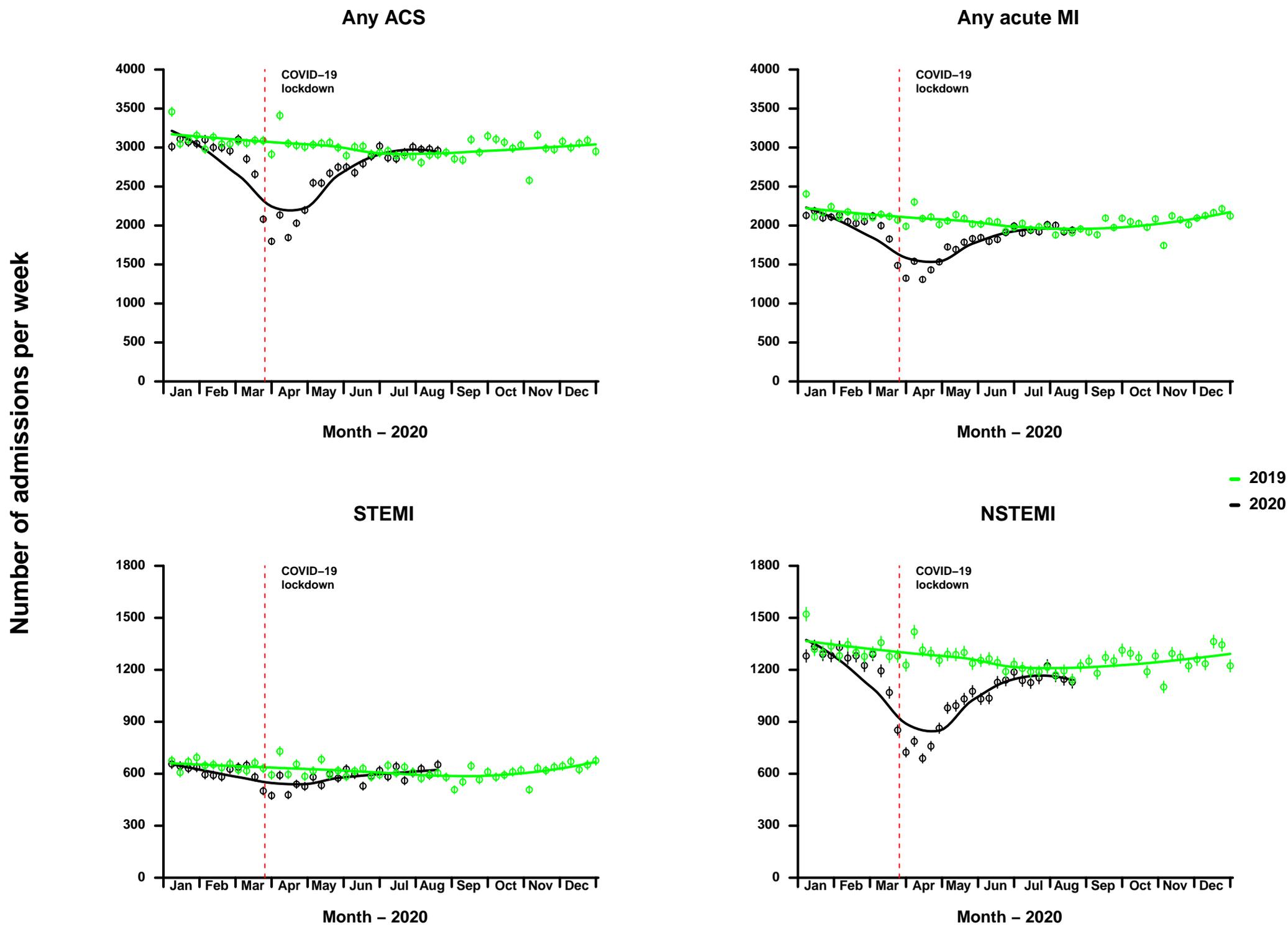
¹ Mafham MM, Spata E, Goldacre R, Gair D, Curnow P, Bray M, Hollings S, Roebuck C, Gale CP, Mamas MA, Deanfield JE, de Belder MA, Luescher TF, Denwood T, Landray MJ, Emberson JR, Collins R, Morris EJA, Casadei B, Baigent C. COVID-19 pandemic and admission rates for and management of acute coronary syndromes 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



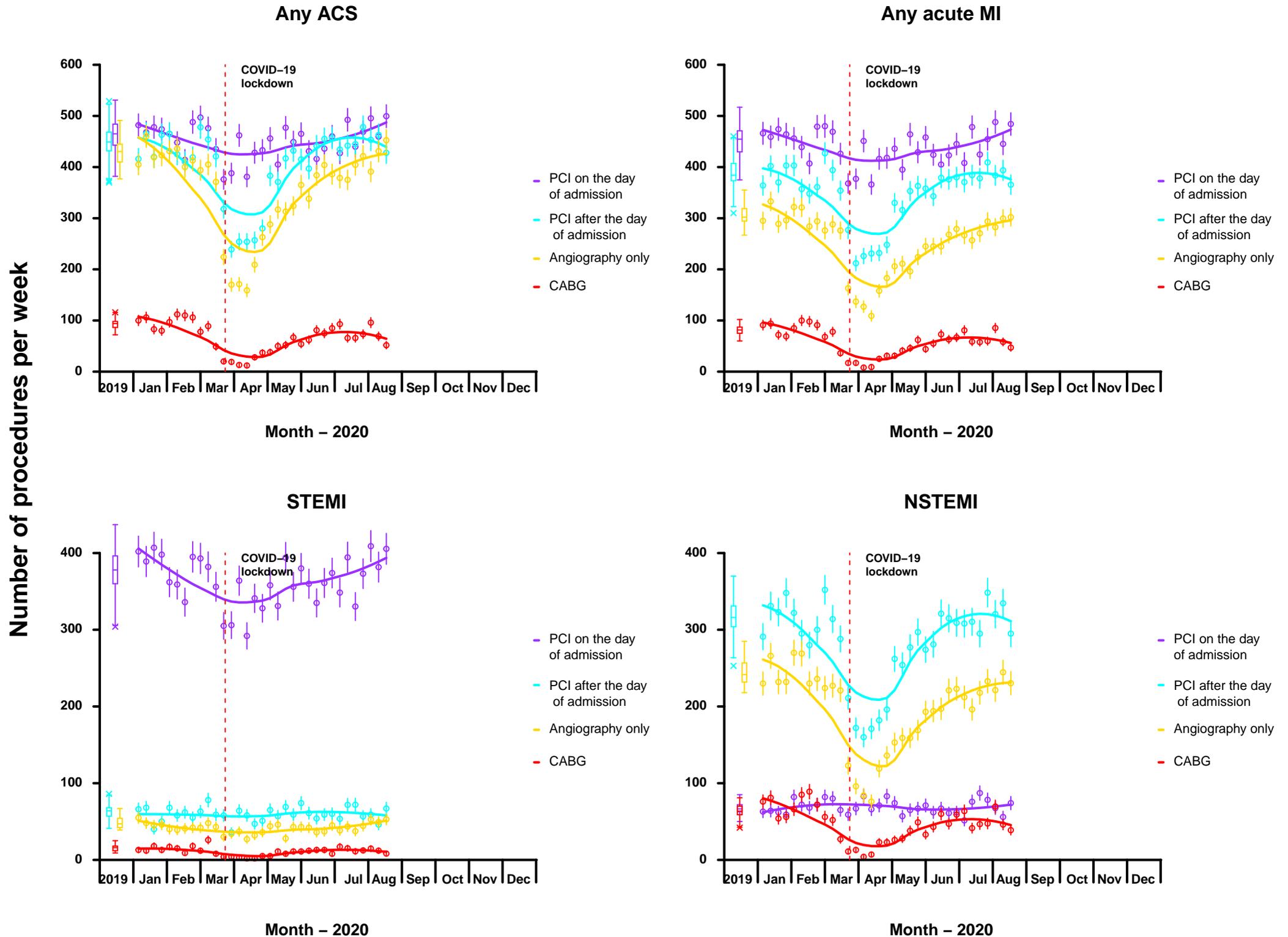
For weekly admissions in 2019, boxplots shows the median and IQR, with whiskers extending (up to) 1.5 times the IQR above the upper quartile and below the lower quartile, with any weekly counts beyond those ranges indicated by x. For 2020, a LOESS smoothing spline is fitted through the weekly reported 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



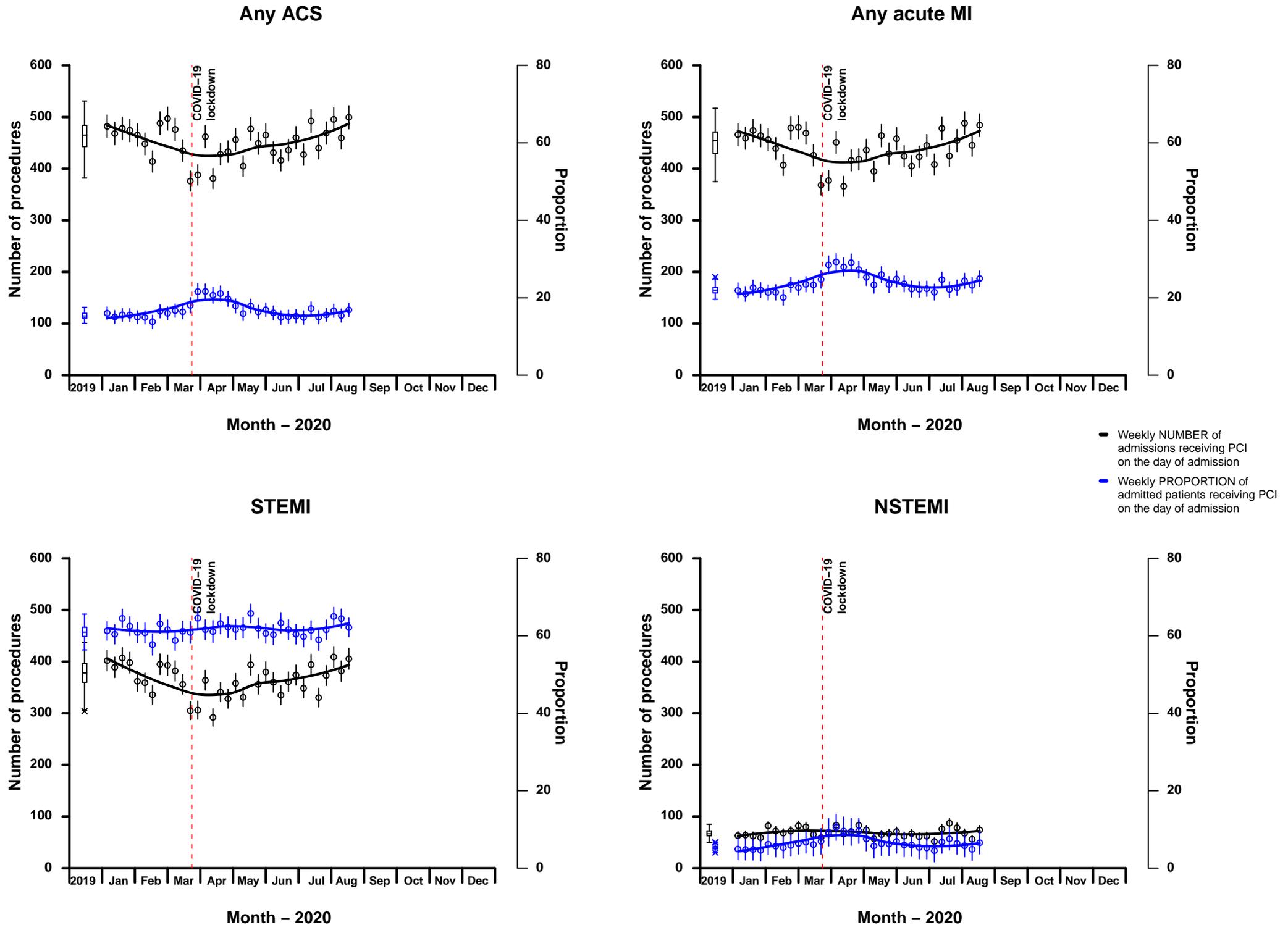
For both 2019 and 2020, a LOESS smoothing spline is fitted through the weekly reported counts, with datapoints and SEs plotted. The date of the UK COVID-19 lockdown (March 23, 2020) is shown with a vertical dotted line. ACS=acute coronary syndrome. STEMI=ST-elevation myocardial infarction. NSTEMI=non-ST-elevation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



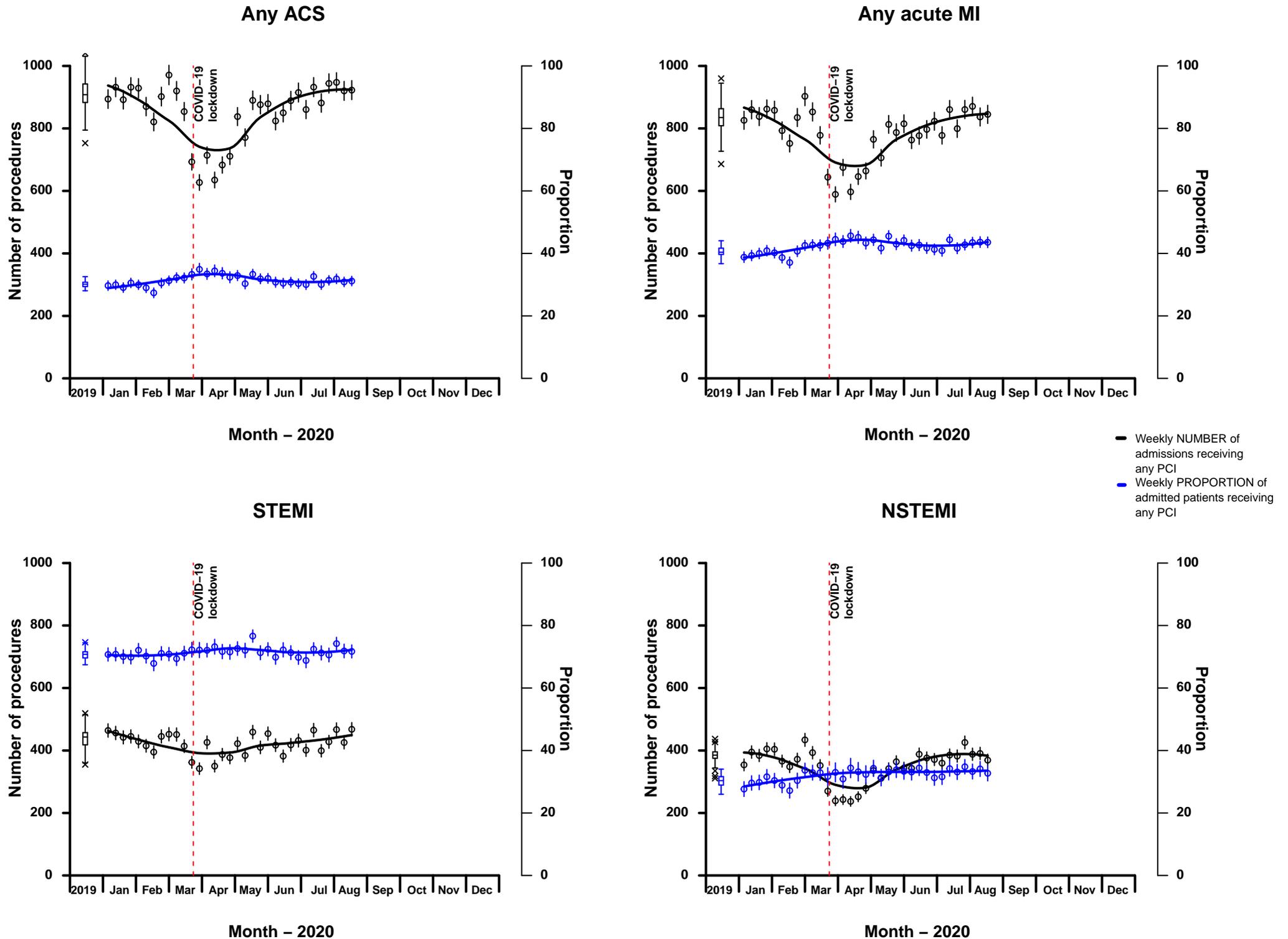
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Figure 4: (a) Weekly numbers and (b) weekly proportions of admissions to acute NHS hospital trusts with an acute coronary syndrome that received percutaneous coronary intervention on day of admission



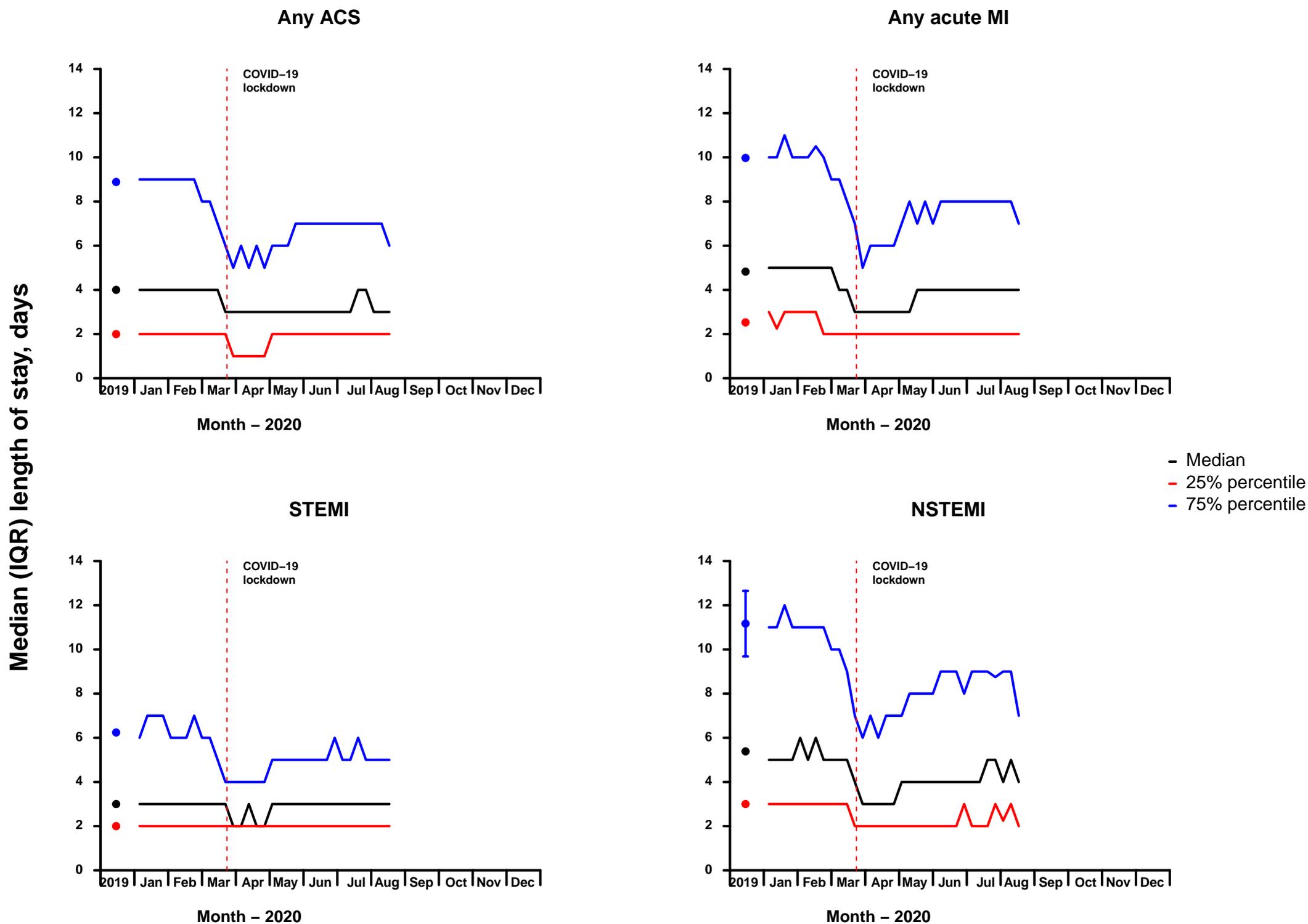
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Figure 5: (a) Weekly numbers and (b) weekly proportions of admissions to acute NHS hospital trusts with an acute coronary syndrome that received any percutaneous coronary intervention



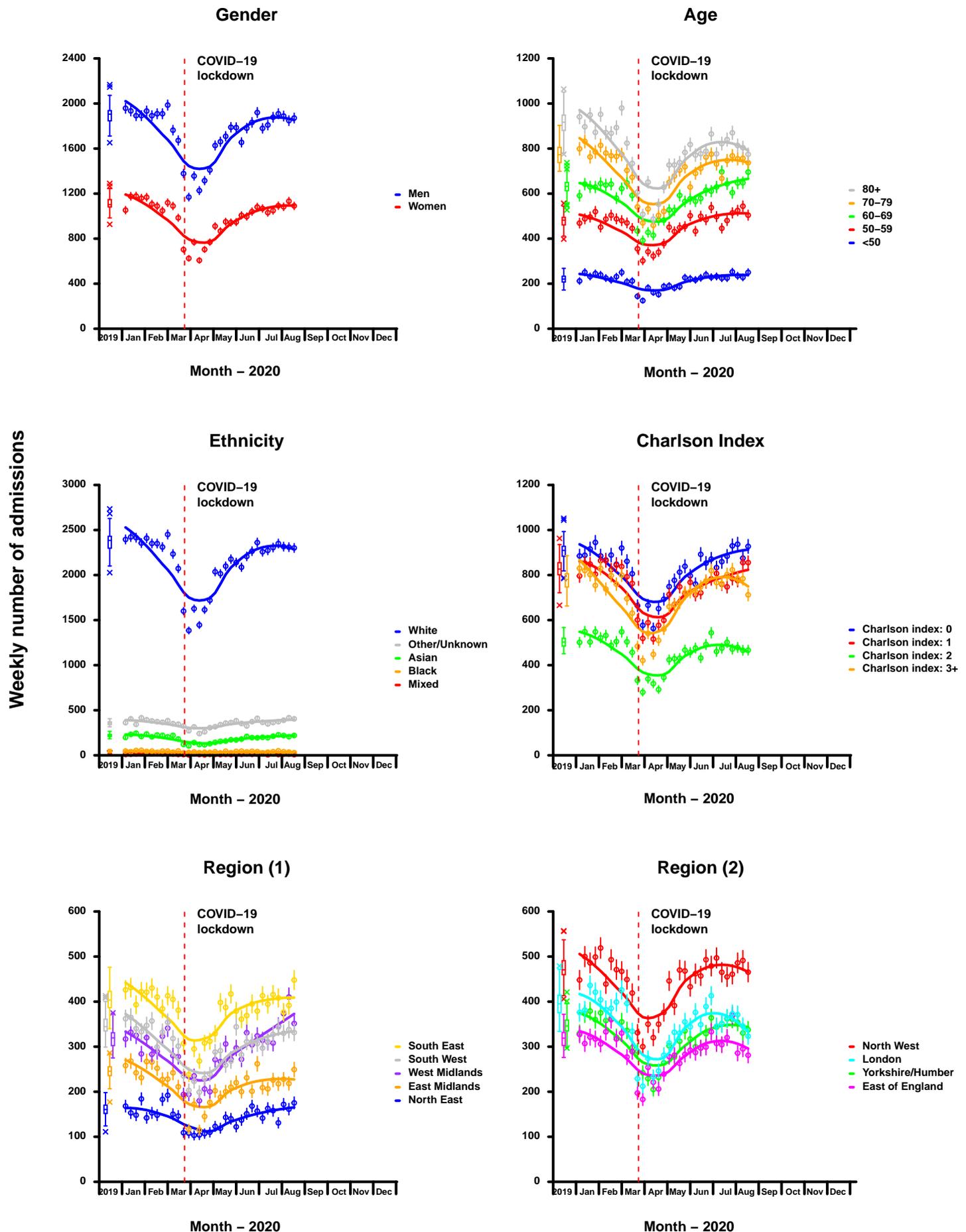
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Figure 7: Weekly number of admissions to acute NHS hospital trusts with an acute coronary syndrome, by age, sex, Charlson index, ethnicity and region



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