

## Supplementary tables

### Supplementary Table 1. List of self-reported symptoms and corresponding question used in the reporting app

Symptoms	Question
Fatigue	Are you experiencing unusual fatigue?
Anosmia/ageusia	Do you have a loss of smell/taste?
Cough	Do you have a persistent cough
Dyspnoea	Are you experiencing unusual shortness of breath?
Diarrhoea	Are you experiencing diarrhoea?
Delirium	Do you have any of the following symptoms: confusion, disorientation, or drowsiness?
Skipped meals	Have you been skipping meals?
Abdominal pain	Do you have an unusual abdominal pain?
Chest pain	Are you feeling an unusual chest pain or tightness in your chest?
Hoarse voice	Do you have an unusually hoarse voice?
Headache	Do you have a headache?
Sore throat	Do you have a sore throat?
Myalgia	Do you have unusual strong muscle pains?

### Supplementary Table 2. NSGAI parameters

Parameter	Value
Population size	80
Number of offspring	40
Total number of generations	500
Parent selection	Tournament Selection
Crossover	Two-point crossover
Crossover probability	0.9
Mutation	Random flip
Mutation probability	0.1

**Supplementary Table 3. Sensitivity, specificity, and TPC for the four clinically inferred symptom combinations computed on the UK-discovery cohort**

Symptom	Age group	3-day analysis						7-day analysis					
		Sensitivity (%)		Specificity (%)		TPC		Sensitivity (%)		Specificity (%)		TPC	
		UK	US	UK	US	UK	US	UK	US	UK	US	UK	US
Respiratory symptoms <sup>1</sup>	All	44.7	48.1	81.9	76.6	43	21	57.7	64.6	79.1	72.3	38	19
	[18-54]	45.2	45.2	81.6	76.8	38	20	58.2	64.3	78.4	71.6	33	18
	[55+]	42.9	51.4	82.7	76.5	64	22	55.8	64.9	80.5	73.0	54	20
WHO-defined pneumonia <sup>2</sup>	All	58.8	74.7	71.9	59.5	51	23	70.3	84.8	68.5	54.5	46	23
	[18-54]	59.2	69.0	71.1	61.3	45	22	70.5	83.3	67.5	55.5	41	21
	[55+]	57.5	81.1	73.3	57.8	73	24	69.6	86.5	70.7	53.6	65	25
COVID-19-specific symptoms <sup>3</sup>	All	67.4	79.7	69.8	57.6	48	23	81.0	92.4	66.4	52.6	43	22
	[18-54]	68.1	73.8	69.0	59.5	42	22	82.0	92.9	65.3	53.8	38	20
	[55+]	65.1	86.5	71.5	55.7	69	24	77.7	91.9	68.8	51.4	62	25
Extended Symptoms <sup>4</sup>	All	90.7	96.2	26.0	21.1	86	35	95.5	98.7	23.0	17.9	82	35
	[18-54]	91.2	95.2	25.0	22.2	75	32	95.5	100.0	21.7	18.6	72	32
	[55+]	88.9	97.3	28.1	20.1	128	38	95.4	97.3	25.7	17.3	119	39

<sup>1</sup>Cough, dyspnoea; <sup>2</sup>Cough, dyspnoea, fever; <sup>3</sup>Fever, cough, dyspnoea, and anosmia/ageusia; <sup>4</sup>Fever, cough, dyspnoea, anosmia/ageusia, fatigue, and headache  
TPC = Tests per case

**Supplementary Table 4. Pareto of optimal combination of symptoms for three-day analysis computed on the UK-discovery training data, ordered by decreasing sensitivity**

Symptom combinations	Sensitivity	Specificity	TPC
fatigue, anosmia/ageusia, cough, diarrhoea, headache, sore throat	93.8	11.8	88
fatigue, fever, anosmia/ageusia, cough, headache, sore throat	92.5	14.9	85
fatigue, anosmia/ageusia, cough, dyspnoea, headache, sore throat	92.2	15.3	85
fatigue, anosmia/ageusia, cough, hoarse voice, headache, sore throat	92.0	15.5	85
fever, anosmia/ageusia, cough, diarrhoea, headache, sore throat	91.7	17.8	82
anosmia/ageusia, cough, diarrhoea, hoarse voice, headache, sore throat	91.2	18.9	81
fatigue, fever, anosmia/ageusia, cough, diarrhoea, headache	90.6	22.4	78
fatigue, anosmia/ageusia, cough, dyspnoea, diarrhoea, headache	90.5	22.7	77
fatigue, anosmia/ageusia, cough, chest pain, sore throat, unusual muscle pains	89.9	24.0	76
fatigue, anosmia/ageusia, cough, dyspnoea, sore throat, unusual muscle pains	89.8	24.7	75
fatigue, fever, anosmia/ageusia, cough, dyspnoea, headache	89.4	26.1	74
fatigue, fever, anosmia/ageusia, cough, delirium, headache	88.6	26.9	73
fatigue, fever, anosmia/ageusia, cough, headache	88.4	27.3	73
fatigue, anosmia/ageusia, cough, dyspnoea, headache	87.7	27.7	72
fever, anosmia/ageusia, cough, dyspnoea, diarrhoea, headache	87.3	31.3	69

anosmia/ageusia, cough, dyspnoea, diarrhoea, hoarse voice, headache	87.0	31.7	68
fever, anosmia/ageusia, cough, diarrhoea, delirium, headache	86.7	31.9	68
anosmia/ageusia, cough, diarrhoea, delirium, hoarse voice, headache	86.1	32.2	68
anosmia/ageusia, cough, dyspnoea, hoarse voice, headache, unusual muscle pains	86.0	35.2	65
fever, anosmia/ageusia, cough, dyspnoea, hoarse voice, headache	85.8	35.8	64
fever, anosmia/ageusia, cough, delirium, hoarse voice, headache	85.1	36.1	64
fever, anosmia/ageusia, cough, dyspnoea, delirium, headache	84.9	36.4	64
anosmia/ageusia, cough, dyspnoea, delirium, hoarse voice, headache	84.6	37.2	63
anosmia/ageusia, cough, hoarse voice, headache, unusual muscle pains	84.2	37.4	63
fever, anosmia/ageusia, cough, dyspnoea, headache	84.1	38.3	62
anosmia/ageusia, cough, dyspnoea, hoarse voice, headache	83.7	39.2	61
fatigue, fever, anosmia/ageusia, cough, dyspnoea, unusual muscle pains	83.5	40.0	60
fatigue, anosmia/ageusia, cough, dyspnoea, hoarse voice, unusual muscle pains	83.2	40.3	60
fatigue, anosmia/ageusia, cough, dyspnoea, chest pain, unusual muscle pains	82.5	40.7	59
fatigue, fever, anosmia/ageusia, cough, dyspnoea, delirium	82.1	41.6	58
fatigue, fever, anosmia/ageusia, cough, dyspnoea	82.0	42.3	58
fatigue, anosmia/ageusia, cough, dyspnoea, unusual muscle pains	81.5	42.8	57
fatigue, fever, anosmia/ageusia, cough, delirium	80.6	43.4	57
fatigue, fever, anosmia/ageusia, cough	80.2	44.1	56
fatigue, anosmia/ageusia, cough, unusual muscle pains	79.4	44.7	55
fatigue, fever, anosmia/ageusia, delirium, unusual muscle pains	78.5	45.2	55
fatigue, fever, anosmia/ageusia, unusual muscle pains	78.2	45.9	54
fatigue, fever, anosmia/ageusia, dyspnoea	77.6	46.0	54
fatigue, anosmia/ageusia, dyspnoea, unusual muscle pains	76.9	46.7	53
fatigue, fever, anosmia/ageusia, delirium	76.1	47.7	52
fatigue, fever, anosmia/ageusia	75.6	48.5	52
fever, anosmia/ageusia, cough, diarrhoea, chest pain, unusual muscle pains	75.4	51.4	49
fever, anosmia/ageusia, cough, dyspnoea, diarrhoea, unusual muscle pains	75.0	52.4	48
fever, anosmia/ageusia, cough, diarrhoea, delirium, unusual muscle pains	74.2	53.1	47
anosmia/ageusia, cough, dyspnoea, diarrhoea, hoarse voice, unusual muscle pains	74.0	53.7	46
fever, anosmia/ageusia, cough, dyspnoea, abdominal pain, unusual muscle pains	73.8	53.8	46
fever, anosmia/ageusia, cough, dyspnoea, diarrhoea, hoarse voice	73.7	54.2	46
fever, anosmia/ageusia, cough, dyspnoea, hoarse voice, unusual muscle pains	73.5	58.5	42
fever, anosmia/ageusia, cough, dyspnoea, chest pain, unusual muscle pains	72.8	59.1	41
fever, anosmia/ageusia, cough, dyspnoea, skipped meals, hoarse voice	72.6	60.1	40
anosmia/ageusia, cough, dyspnoea, chest pain, hoarse voice, unusual muscle pains	72.1	61.3	39
fever, anosmia/ageusia, cough, dyspnoea, unusual muscle pains	71.1	62.6	37
anosmia/ageusia, cough, dyspnoea, hoarse voice, unusual muscle pains	70.2	64.8	35
fever, anosmia/ageusia, cough, dyspnoea, hoarse voice	69.2	65.4	35
anosmia/ageusia, cough, dyspnoea, chest pain, unusual muscle pains	68.1	65.6	34
fever, anosmia/ageusia, cough, dyspnoea, chest pain	67.9	65.9	34
fever, anosmia/ageusia, cough, dyspnoea, delirium	67.8	65.9	34
fever, anosmia/ageusia, cough, unusual muscle pains	67.6	66.9	33

fever, anosmia/ageusia, cough, skipped meals	66.4	69.0	31
fever, anosmia/ageusia, cough, dyspnoea	65.9	70.1	30
fever, anosmia/ageusia, cough, delirium	64.3	70.5	30
fever, anosmia/ageusia, cough	61.5	75.3	25
fever, anosmia/ageusia, dyspnoea	55.8	76.4	24
fever, anosmia/ageusia, skipped meals	55.3	76.6	23
anosmia/ageusia, cough, hoarse voice	53.9	79.3	21
anosmia/ageusia, cough, dyspnoea	53.2	79.5	21
anosmia/ageusia, cough, delirium	49.0	79.7	20
fever, anosmia/ageusia	47.5	83.7	16
anosmia/ageusia, cough	45.6	85.9	14
anosmia/ageusia, hoarse voice	35.5	87.1	13
anosmia/ageusia, delirium	24.6	89.2	11

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TPC = Tests per case

## Supplementary Table 5. Pareto of optimal combination of symptoms for seven-day analysis computed on the UK-discovery training data, ordered by decreasing sensitivity

Symptom combinations	Sensitivity	Specificity	TPC
fatigue, anosmia/ageusia, cough, diarrhoea, headache, sore throat	97.5	93.8	90
fatigue, fever, anosmia/ageusia, cough, headache, sore throat,	96.7	91.6	87
fatigue, fever, anosmia/ageusia, cough, diarrhoea, sore throat,	96.0	87.3	82
fatigue, fever, anosmia/ageusia, cough, sore throat, unusual muscle pains	95.5	84.0	79
fatigue, anosmia/ageusia, cough, dyspnoea, sore throat, unusual muscle pains	95.0	83.7	78
fatigue, anosmia/ageusia, cough, hoarse voice, sore throat, unusual muscle pains	94.8	83.5	78
fatigue, anosmia/ageusia, cough, delirium, sore throat, unusual muscle pains	94.7	83.4	77
fatigue, anosmia/ageusia, cough, sore throat, unusual muscle pains	94.5	83.0	77
fatigue, fever, anosmia/ageusia, cough, headache	93.8	82.5	76
anosmia/ageusia, cough, dyspnoea, diarrhoea, sore throat, unusual muscle pains	92.8	77.8	71
fatigue, fever, anosmia/ageusia, cough, dyspnoea, diarrhoea	92.3	75.3	68
fatigue, fever, anosmia/ageusia, cough, abdominal pain, unusual muscle pains	92.2	74.3	67
fatigue, fever, anosmia/ageusia, cough, dyspnoea, unusual muscle pains	91.7	71.1	64
fatigue, fever, anosmia/ageusia, cough, unusual muscle pains	91.0	69.8	62
fatigue, fever, anosmia/ageusia, cough, dyspnoea	90.5	69.5	62
fatigue, anosmia/ageusia, cough, dyspnoea, unusual muscle pains	90.2	69.3	61
fatigue, fever, anosmia/ageusia, persistent cough	89.7	68.2	60
fatigue, anosmia/ageusia, cough, unusual muscle pains	89.2	68.1	59
fatigue, fever, anosmia/ageusia, unusual muscle pains	88.4	67.2	58
fatigue, fever, anosmia/ageusia, skipped meals	88.2	67.1	58
fatigue, anosmia/ageusia, persistent cough	87.0	66.5	57
fatigue, fever, anosmia/ageusia	86.9	65.4	55
fever, anosmia/ageusia, cough, dyspnoea, diarrhoea, unusual muscle pains	86.0	61.5	52
anosmia/ageusia, cough, dyspnoea, diarrhoea, hoarse voice, unusual muscle pains	85.9	60.1	50
anosmia/ageusia, cough, dyspnoea, diarrhoea, skipped meals, unusual muscle pains	85.4	59.8	50
anosmia/ageusia, cough, dyspnoea, abdominal pain, hoarse voice, unusual muscle pains	85.2	59.0	49
fever, anosmia/ageusia, cough, dyspnoea, hoarse voice, unusual muscle pains	85.0	54.8	45
anosmia/ageusia, cough, dyspnoea, skipped meals, hoarse voice, unusual muscle pains	84.5	54.1	45
anosmia/ageusia, cough, dyspnoea, chest pain, hoarse voice, unusual muscle pains	84.4	51.8	43
anosmia/ageusia, cough, dyspnoea, hoarse voice, unusual muscle pains	82.7	48.6	39
anosmia/ageusia, cough, dyspnoea, chest pain, unusual muscle pains	81.2	48.3	38
fever, anosmia/ageusia, cough, unusual muscle pains	79.7	47.5	37
anosmia/ageusia, cough, dyspnoea, chest pain, hoarse voice	79.5	44.1	34
fever, anosmia/ageusia, cough, dyspnoea	78.4	44.0	33
anosmia/ageusia, cough, dyspnoea, hoarse voice	76.5	40.0	30
anosmia/ageusia, cough, unusual muscle pains	75.4	39.4	29
anosmia/ageusia, cough, dyspnoea, chest pain	75.2	39.4	29
fever, anosmia/ageusia, persistent cough	73.9	39.0	28
anosmia/ageusia, dyspnoea, unusual muscle pains	72.4	38.6	27

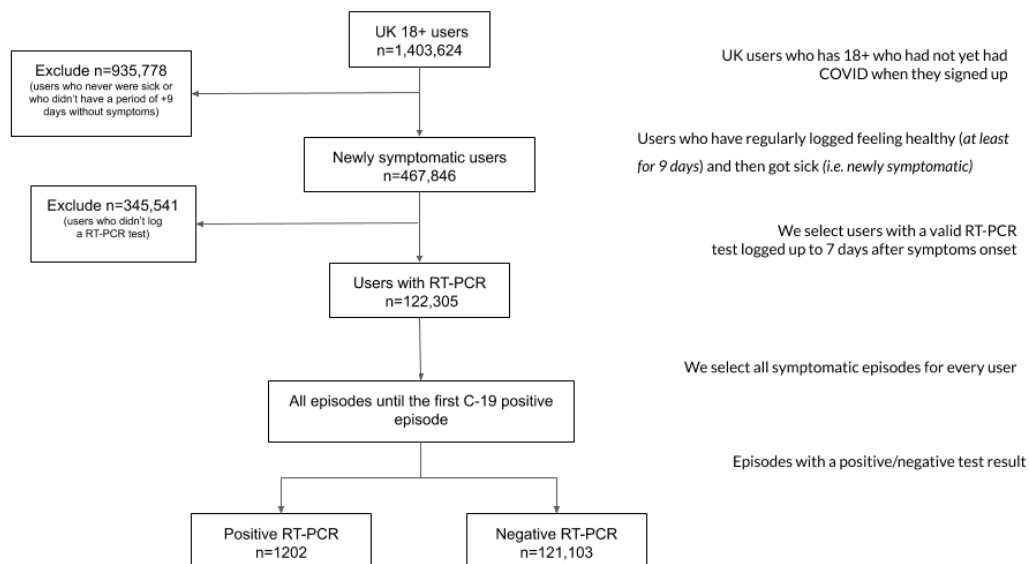
fever, anosmia/ageusia, dyspnoea	72.2	38.1	27
anosmia/ageusia, cough, dyspnoea	71.9	34.1	24
anosmia/ageusia, dyspnoea, chest pain	66.6	34.0	22
anosmia/ageusia, unusual muscle pains	65.4	30.4	19
fever, anosmia/ageusia	64.6	29.9	18
anosmia/ageusia, persistent cough	64.1	26.8	16
anosmia/ageusia, dyspnoea	60.1	26.6	15
anosmia/ageusia, delirium	50.4	25.8	12

TPC = Tests per case

## Supplementary Figures

### Supplementary Figure 1. Flow diagram of user selection for the UK-discovery cohort

CSS App users active from 24th of March to 15th of September 2020



## Supplementary Figure 2. Flow diagram of user selection for the US-replication cohort

CSS App users active from 24th of March to 15th of September 2020

