



Royal College of  
General Practitioners

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# Identification of COVID-19 from symptoms

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Maureen Baker

\*DOI MB is CMO for Your.MD (now Healthily)



This paper looks at the nature and range of acute COVID-19 symptoms in adults. As we increase our understanding of this disease over time, the familiar triad of cardinal symptoms needs to be revisited.

The current UK case definition of COVID-19 in the community requires the following symptoms (referred to as 'cardinal symptoms' in this paper)

- a new continuous cough

or

- high temperature of 37.8 or above

or

- a loss of, or change in, normal sense of taste or smell (anosmia)

However a range of symptoms related to COVID-19 have now been published, together with the frequency of these symptoms. Several studies demonstrate a difference in symptoms between genders and there are also marked differences in reported symptoms in different countries. A number of authors point out that different symptoms appear at different stages of the illness eg loss of smell and taste appears to be an early symptom (and associated with milder disease) and shortness of breath is a later symptom, often appearing around days 8-10 and is not surprisingly associated with more severe disease. As with other acute illnesses, older people may present non-specifically with COVID, such as being reported as being 'off their legs'. Additionally, a number of studies flag up that delirium is a common symptom in the frail old.

Some studies report on symptoms recorded at hospital admission and other studies, or reports of self-noted symptoms, focus on people in the community.

Table 1 below shows symptoms that individuals report on a global symptom mapping app\* (<https://covid19.your.md/>) in comparison with several studies reported in the literature (I have listed these as studies 1-4). Note, this is not an exhaustive list of symptoms and does not include some symptoms that have become more apparent and significant over time including confusion and dermatological symptoms eg 'COVID toes'

- Study 1 is the first paper describing symptoms in hospitalised patients in Wuhan (*Clinical course and risk factors for mortality of adult in-patients with Covid-19 in Wuhan, China: a retrospective study*. Lancet. Zhou et al 395, 10229:1054-1062)
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- Study 2 reports on symptoms of over 23000 hospitalised patients in the UK (*Features of 20 133 UK patients in hospital with covid-19 using the ISARIC WHO Clinical Characterisation Protocol: prospective observational cohort study*. Doherty et al BMJ 2020;369:m1985 <http://dx.doi.org/10.1136/bmj.m1985>)
- Study 3 from a group of researchers headed up by King's College London, is the report of symptoms from over 2 million people in the UK who have used the Zoe self-reporting app and who report a positive test for COVID-19. (*Real time tracking of self-reported symptoms to predict Covid-19*. Menni et al Nature Medicine. <https://doi.org/10.1038/s41591-020-0916-2>)
- Study 4 is a report of symptoms in a cohort of healthcare workers in the Netherlands who had tested positive for COVID-19 ( *Strong associations and moderate predictive value of early symptoms for SARS-CoV-2 test positivity among healthcare workers, the Netherlands, March 2020* Euro Surveill. 2020;25(16):pii=2000508. <https://doi.org/10.2807/1560-7917>)

**Table 1**

Symptom	% Mapper	1	2	3	4
Persistent cough	41.4%	68%	69%	57%	59%
Temperature	24.6%	22%	72%	34%	57%
Fatigue / Tiredness	48.5%	38%	46%	30%	57%
Coughing up mucus (sputum)	17.5%	34%	26%	N/A	N/A
Shortness of breath	17.4%	19%	71%	15%	22%
Muscle aches	38.0%	15%	21%	N/A	63%
Sore throat	43.2%	14%	10%	N/A	40%
Headache	48.3%	14%	13%	N/A	71%

Symptom	% Mapper	1	2	3	4
Chills	18.9%	12%	N/A	N/A	N/A
Blocked nose	38.4%	5%	N/A	N/A	N/A
Vomiting	5.1%	5%	20%*	N/A	N/A
Diarrhoea	19.1%	5%	21%	26%	18%
Loss of smell and taste	28.6%	N/A	N/A	65%	47%
Loss of appetite	6.9%	N/A	N/A	42%	N/A
Sneezing	0.0%	N/A	N/A	N/A	40%
Chest pain / tightness	3.9%	N/A	15%	43%	N/A
Itchy eyes	13.3%	N/A	N/A	N/A	N/A
Joint pain / aches	4.7%	N/A	8%	N/A	N/A

\*Reported as nausea and vomiting

Using these studies, illustrated by the above table, it is clear that COVID-19 is an illness with a wide range of symptoms. Symptoms evolve over the course of the illness and possible sequelae, such as Long COVID. Temporal pattern is crucial and becomes evident on good history taking. COVID-19 often starts like other viral diseases with non-specific symptoms such as headache and myalgia, with more severe symptoms developing further into the illness. Hospital admission generally comes around days 8-10.

Symptom profiles also differ by gender, by age and by country. The message for GPs should be not to exclude COVID-19 as a possible diagnosis if none of the three 'cardinal symptoms' – as per the UK case definition are present. Additionally, large numbers of people who **do not** have COVID-19 will have symptoms – including the cardinal symptoms – caused by conditions other than COVID-19.



## Symptom domains

One useful method of considering symptoms has been set out by Yorkshire GP Dr Nick Summerton. He has suggested grouping symptoms into four different domains as follows

- **Domain 1. General viral symptoms (episodic or continuous)**
  - Fever or raised temperature
  - Chills with or without shaking
  - Loss of appetite
  - Fatigue or extreme tiredness
  - Muscle/joint aches or pains
  - Headache
  - Dizziness
- **Domain 2. Entry symptoms**
  - Alterations of smell or taste
  - Soreness or discomfort in the throat
  - Conjunctival injection or irritation
  - Nasal congestion or rhinorrhoea
- **Domain 3. Organ-specific symptoms**
  - Lungs: dry cough, mild/moderate breathlessness
  - GI tract: diarrhoea, vomiting, nausea
- **Domain 4. Organ-specific red flag symptoms**
  - Lungs - productive cough, worsening/severe breathlessness, haemoptysis, blue lips or face
  - GI tract - abdominal pain, worsening/persisting vomiting or diarrhoea
  - CNS - confusion or drowsiness, motor or sensory disturbances, loss of speech
  - Heart - chest pain/pressure, palpitations
  - Vasculature - skin rashes, discoloration of fingers or toes, cold/pale/clammy skin
  - Urinary - reduced urine output or darker urine
  - General - significantly unwell or other concerns



## Symptom clusters

The research group using data from the Zoe app have been able to take the concept of symptom grouper a stage further and have described six symptom clusters. medRxiv preprint doi: <https://doi.org/10.1101/2020.06.12.20129056>. (At time of writing, this study is not yet peer-reviewed). Clusters 1-3 are associated with a milder disease course, but participants in clusters 4-6 reported more severe COVID-19 with 8.6%, 9.9% and 19.8% of individuals within these clusters requiring respiratory support, respectively. This research has found that at five days, it appeared that headache was the symptom most consistently reported across all clusters, while severe fatigue appeared in those clusters with increased risk of requiring medical support. The duration of confusion was longer in more severe clusters while loss of smell or taste was reported over a longer duration in milder clusters. When combined with personal characteristics including BMI, age, frailty (PRISMA7 score) and presence of comorbidities, there is potential for development of a tool that could identify those individuals with the greatest risk of severe illness, in order to prioritise monitoring of these patients eg through use of pulse oximeters, or by 'admitting' to virtual wards (Pulse oximetry to detect early deterioration of patients with COVID-19 in primary and community care settings, June 2020, NHS E/I <https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/06/C0445-remote-monitoring-in-primary-care.pdf>)

## Testing

There is some concern that a number of COVID-19 cases are missed if testing is only provided to people with one or more of the three cardinal symptoms, given that no individual one of these symptoms has been recorded more than 75% of the time in people involved in any of these studies (and reports of cough and high temperature are lower in community based studies). Consequently, there could be large numbers of people affected by COVID-19 who are not tested and who therefore do not self-isolate. If there was sufficient test capacity then people with any of these symptoms (or possibly a combination of some of these symptoms) could be tested thus minimising the chances for people who have *any* symptoms of COVID-19 being missed. There is currently a move towards mass testing of populations, with a pilot being conducted in Liverpool at the time of writing. Based on this initiative, together with increasing test capacity, it is possible that the criteria for obtaining a COVID test will change over the coming weeks and months.





## PPE

Given the wide range of symptoms that have now been described in relation to COVID-19, GPs and practice staff need to consider the appropriate use of PPE in face to face consultations, as a high proportion of such consultations could deal with one or more symptoms known to be seen in COVID-19.

## Long COVID

Although most patients with COVID-19 recover fully after 2-4 weeks, a proportion report prolonged debilitating symptoms. Increasingly this pattern is being recognised as 'Long COVID'. The nature, presentation and diagnosis of Long COVID is out with the scope of this paper, but given the known range of symptoms with COVID-19, GPs should not dismiss the possibility of this based on patients not reporting one or more of the three cardinal symptoms at the onset of their illness.

## Conclusion

- A wide range of symptoms relating to COVID-19 have been described, but even those most strongly associated with a positive COVID test eg loss of taste and smell, will not be present in large numbers of people who are affected by COVID-19.
  - GPs should have an awareness of the range and nature of symptoms and that symptoms differ during the evolution of the disease.
  - Building on emerging data from the Zoe app, there is potential for a predictive tool to be developed that could identify patients most at risk of severe disease and hospitalisation.
  - Should testing capacity increase significantly, a case could be made for widening the range of symptoms (possibly in combination) that would meet the criteria for testing.
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