

Using a Computer Program to Find Different Types of Long COVID

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This research at a glance

Main Questions

Are there different types of Long COVID?

Are types of Long COVID more likely to happen in certain people?

Answers

Yes. The researchers found 4 main types of Long COVID based on symptoms and health problems that happen together. The 4 types of Long COVID are related to the:

- Heart and kidneys
- Breathing, sleep, and anxiety
- Muscles and nerves
- Digestive tract and breathing

Yes. Overall, people who had any of the 4 types of Long COVID had more health conditions before they got COVID. The researchers also found that certain types of Long COVID are more common in people based on their age, gender, and when they had COVID.

This research helped to learn about possible types of Long COVID. This research could help define types of Long COVID to give people more specific diagnoses and treatment plans.



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Why was this research needed?

Researchers want to learn more about different types of Long COVID. **Long COVID** is a condition in which a person is sick many months after getting COVID. The condition can cause a range of new, repeating, or ongoing symptoms and health problems, such as with the lungs, heart, and other organs.

Researchers don't yet know which types of symptoms and health problems often happen together as different types of Long COVID. Researchers also don't know if certain people are more likely to have different types of Long COVID.

The goal of this research was to answer these questions:

- Are there different types of Long COVID?
- Are types of Long COVID more likely to happen in certain people?



What happened during this research?

Researchers used data from electronic health records (EHRs) from 2 health systems in PCORnet, the National Patient-Centered Clinical Research Network:

- **INSIGHT**, which includes people in the New York City area
- **OneFlorida+**, which includes people from Florida, Georgia, and Alabama

The researchers used a computer program to look at data from EHRs for:

- Patterns in people's new symptoms and health problems that started 30 to 180 days after having COVID
- Whether any patterns were related to age, gender, and other health conditions people already had before COVID

Whose data was included in this research?

Researchers looked at data from about 35,000 people diagnosed with COVID between March 2020 to November 2021:



What were the main results?

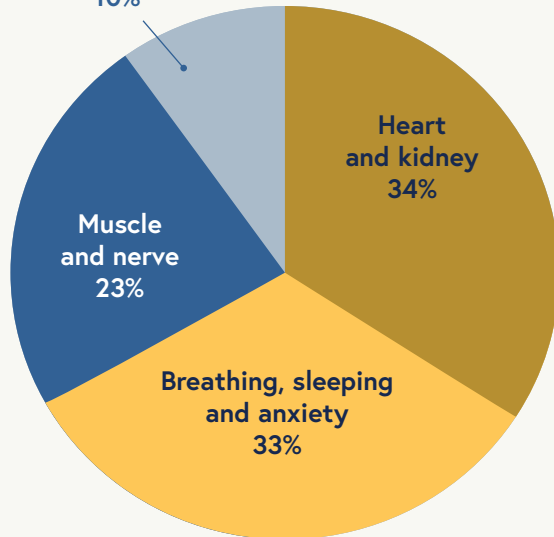
Are there different types of Long COVID?

Yes. The researchers looked for patterns in symptoms and health conditions after people had COVID. They found 4 main types of Long COVID based on symptoms and health problems that happen together:

Percent of patients who had each of the 4 types of symptoms and health conditions

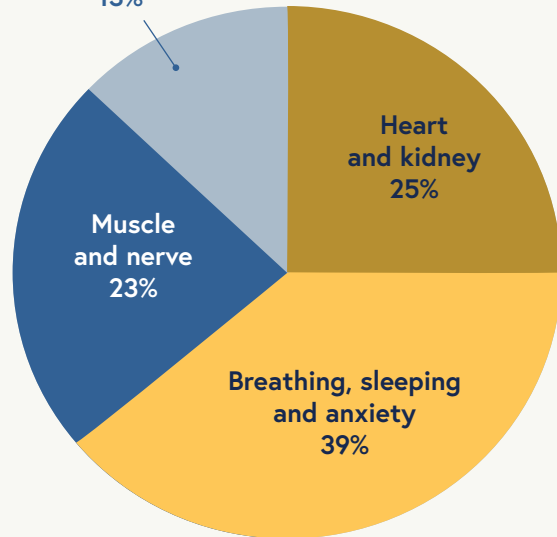
Insight⁺

Digestive tract
and breathing
10%



OneFlorida⁺
Clinical Research Network

Digestive tract
and breathing
13%



- 1 Heart and kidney symptoms and health problems (cardiac and renal) included:**
 - Heart and blood flow problems, such as heart failure (circulatory and cardiac problems)
 - Kidneys stop working (renal failure)
 - Low levels of red blood cells (anemia)
 - Fluid and electrolyte (mineral) problems
- 2 Breathing, sleep, and anxiety symptoms and health problems (respiratory, sleep and anxiety) included:**
 - Breathing (respiratory) problems
 - Sleep disorders
 - Anxiety
 - Headache and chest pain

- 3 Muscle and nerve symptoms and health problems** (musculoskeletal and nervous) included:
 - Muscle pain
 - Headaches
 - Sleep-wake problems
- 4 Digestive tract and breathing symptoms and health problems** (digestive and respiratory) included:
 - Stomach and lower belly (abdominal and pelvic) pain
 - Feeling sick to the stomach and throwing up (nausea and vomiting)

Are types of Long COVID more likely to happen in certain people?

Yes. The researchers looked at patterns in groups of people who had the 4 types of Long COVID. They found that:

- 1 Heart and kidney symptoms** happened more often in men and women who:
 - Were older
 - Had more severe COVID when first infected
 - Had COVID during the start of the pandemic when there were no standard treatments (March to June 2020)
 - Had other health conditions before they had COVID
- 2 Breathing, sleep, and anxiety symptoms** happened more often in people who:
 - Were younger
 - Were women
 - Had COVID during a later time of the pandemic (July to November 2021)
 - Had other breathing conditions before they had COVID
- 3 Muscle and nerve symptoms** happened more often in people who:
 - Were women
 - Visited a healthcare provider more often up to 3 years before they got COVID
 - Had other conditions before they had COVID, such as other:
 - Autoimmune conditions like rheumatoid arthritis and allergies
 - Muscle and nerve conditions like soft tissue or bone problems
 - Sleep conditions
- 4 Digestive tract and breathing symptoms and health problems** (digestive and respiratory) happened more often in people who:
 - Were women
 - Did not get care at an emergency room up to 3 years before they got COVID
 - Did not have many other health conditions before they had COVID
 - Had milder COVID when first infected
 - Had digestive health conditions before they had COVID



How has this research helped?

This research helped to learn about possible types of Long COVID symptoms. Researchers found 4 types of Long COVID related to:

- **Heart and kidneys**, which were more common, especially in people who were older or who had more severe COVID when first infected
- **Breathing, sleep, and anxiety**, which were more common, especially in people who were younger
- **Muscles and nerves**, which were less common and happened in people who had other conditions before they had COVID
- **Digestive tract and breathing**, which were less common and happened in people who had milder COVID when first infected

Overall, people who had any of the 4 types of Long COVID had more health conditions before they got COVID compared to people who didn't have Long COVID symptoms or health problems. This research could help define types of Long COVID to give people more specific diagnoses and treatment plans.



Where can I learn more about this research?

Read the full paper published in Nature Medicine in December 2022 at <https://www.nature.com/articles/s41591-022-02116-3>

Full paper title:

Data-driven identification of post-acute SARS-CoV-2 infection subphenotypes

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About RECOVER

RECOVER is a research project that aims to learn about the long-term health effects of COVID. We're hopeful that this project will help us better prevent and treat Long COVID in the future. RECOVER is paid for by the National Institutes of Health (NIH).

Learn more at: RECOVERcovid.org