Health Care Providers
FEBRUARY 6, 2025

Underlying Conditions and the Higher Risk for Severe COVID-19

AT A GLANCE

- An updated list of high-risk underlying conditions, along with their associated evidence, is provided below. The conditions are grouped by the level of evidence, with the highest level shown in the top section.
- The list of underlying medical conditions is not exhaustive and will be updated as the science evolves.
- This list should not be used to exclude people with underlying conditions from recommended measures for prevention or treatment of COVID-19.

What you need to know

This web page provides an evidence-based resource for healthcare professionals caring for patients with underlying medical conditions who are at higher risk of experiencing severe outcomes of COVID-19. Severe outcomes of COVID-19 are defined as hospitalization, admission to the intensive care unit (ICU), intubation or mechanical

ventilation, or death.

Information for the General Public

Find a list of underlying medical conditions that might cause severe COVID-19 and information on ways to prevent illness.

People with Certain Medical Conditions and COVID-19

This page summarizes data from published reports, scientific articles in press, unreviewed pre-prints, and internal data that were included in literature reviews conducted by subject matter experts. Evidence used to inform the list of underlying conditions was determined by CDC reviewers based on available literature about COVID-19 at time of review. The information reflects evidence regarding underlying medical conditions and is intended to help healthcare professionals make informed decisions about patient care and to increase the awareness of risk among their patients.

The methods used to assess the conditions have changed during the pandemic as the amount of literature and types of studies increased. For instance, preliminary versions of this list focused on providing the latest information based on descriptive data. As the literature grew, CDC investigators categorized the literature by study design.

Since May 2021, the process has been updated to include a CDC-led review process that uses rigorous systematic review methods. To learn more about the process of CDC's systematic reviews, see CDC systematic review process.

Background

Age is the strongest risk factor for severe COVID-19 outcomes. Patients with one or multiple certain underlying medical conditions are also at higher risk.[1-3]

Additionally, being unvaccinated or not being up to date on COVID-19 vaccinations also increases the risk of severe COVID-19 outcomes.

Providers should consider the patient's age, presence of underlying medical conditions and other risk factors, and vaccination status in determining the risk of severe COVID-19-associated outcomes for any patient.

Demographic Factors

Studies have shown that COVID-19 does not affect all population groups equally. Three important factors are age, race, and ethnicity.

Age

Age remains the strongest risk factor for severe COVID-19 outcomes, with risk of severe outcomes increasing

markedly with increasing age. Based on data from the National Vital Statistics System (NVSS) at NCHS (Risk for COVID-19 Infection, Hospitalization, and Death By Age Group), compared with ages 18–29 years, the risk of death is 25 times higher in those ages 50–64 years, 60 times higher in those ages 65–74 years, 140 times higher in those ages 75–84 years, and 340 times higher in those ages 85+ years. Notably, these data include all deaths in the United States that occurred throughout the pandemic, from February 2020 to July 1, 2022, including deaths among unvaccinated individuals.

Risk of severe outcomes is increased in people of all ages with certain underlying medical conditions and in people who are 50 years and older, with risk increasing substantially at ages >65 years.[4,5] Residents of long-term care facilities are also at increased risk, making up less than 1% of the U.S. population but accounting for more than 35% of all COVID-19 deaths.[6-10]

Race and Ethnicity

The COVID-19 pandemic has highlighted racial, ethnic, and socioeconomic disparities in COVID-19 illnesses, hospitalizations, and deaths.[11-13] Some racial and ethnic minority groups are also more likely to face multiple barriers to accessing health care including lack of insurance, transportation, child care, or ability to take time off from work.

Studies have identified racial and ethnic differences in at-home COVID-19 test use, vaccination coverage, and access to outpatient therapeutics.[14-16] Data has shown that compared to non-Hispanic White people, people from racial and ethnic minority groups are more likely to be infected with SARS-CoV-2 (the virus that causes COVID-19). Once infected, people from racial and ethnic minority groups are more likely to be hospitalized, be admitted to the ICU, and die from COVID-19 at younger ages.[17]

We are still learning about how the environments where people live, learn, and work can influence the risk for infection and severe COVID-19 outcomes.

Summary of Conditions with Evidence

Evidence used to inform the list of underlying medical conditions that increase a person's risk of severe illness from COVID-19 is presented in alphabetical order by study design section. Conditions are categorized as higher risk, suggestive higher risk, and mixed evidence.

Higher Risk (conclusive)

Higher risk is defined as an underlying medical condition or risk factor that has a published meta-analysis or systematic review or underwent the CDC systematic review process. The meta-analysis or systematic review demonstrates a conclusive increase in risk for at least one severe COVID-19 outcome.

Notice

* Indicates presence of evidence for pregnant and non-pregnant women

‡ Underlying conditions for which there is evidence in pediatric patients

^ Risk may be further increased for people receiving dialysis

Condition	Evidence of Impact on COVID-19 Severity [Reference number]
Asthma	CDC Systematic Review [K]
Cancer • Hematologic Malignancies	CDC Systematic Review [O] Meta-Analysis/ Systematic Review [18-22] Cohort Study [23-25] Case Series [26-28] Case Control Study [29]
Cerebrovascular disease	Meta-Analysis [30-33] Synthesis of Evidence [34] Cohort Study [35-37]
Chronic kidney disease* • People receiving dialysis [38,39] ^	Meta-Analysis [33,40] Cohort Studies [36,41-62, 63]*

Case Series [64-66]

Chronic lung diseases limited to:

- Bronchiectasis
- COPD (Chronic obstructive pulmonary disease)
- Interstitial lung disease
- Pulmonary embolism
- Pulmonary hypertension

- CDC Systematic Review [A]
- CDC Systematic Review [L]
- CDC Systematic Review [D]
- CDC Systematic Review [G]
- CDC Systematic Review [G]

Chronic liver diseases limited to:

- Cirrhosis
- Non-alcoholic fatty liver disease
- Alcoholic liver disease
- Autoimmune hepatitis

CDC Systematic Review [B] [211]

Cystic fibrosis

CDC Systematic Review [M]

Diabetes mellitus, type 1

Meta-Analysis [67]
Case Series [65]
Cohort Study [35,68-73]

Diabetes mellitus, type 2*

Meta-Analysis [74]
Systematic Review [75]*
Gestational Diabetes Systematic Review [76]*
Case Series [65]
Longitudinal Study [77]
Cohort Study [67,71,77-82]

Disabilities‡, including Down syndrome

For the list of all conditions that were part of the review, see the module below

CDC Systematic Review [C]

Heart conditions (such as heart failure, coronary artery disease, or cardiomyopathies)

Meta-Analysis [83-85]
Cohort Study [35,36]

HIV (Human immunodeficiency virus)

Meta-Analysis/ Systematic Review
Cohort Study [54,87-89]
Case Series [90-92]

Mental health conditions limited to:

- Mood disorders, including depression
- Schizophrenia spectrum disorders

Meta-Analysis/ Systematic Review [93,94]

Neurologic conditions limited to dementia‡ and Parkinson's Disease

Meta-Analysis/ Systematic Review [95-98, 208]
Cohort Study [36]

Obesity (BMI ≥30 kg/m^2 or ≥95^{th} percentile in children)

Meta-Analysis [101-103]
Systematic Review [75]*
Cohort [46,104-112,63,113-116]*

Physical inactivity

CDC Systematic Review [E]

Pregnancy and recent pregnancy

Meta-Analysis/ Systematic Review [75,117]

Case Control [118,119]
Case Series [120-122]
Cohort Study [123-126]

Primary immunodeficiencies

CDC Systematic Review [F]

Smoking, current and former

Meta-Analysis [83,127,128-135]

Solid organ or blood stem cell transplantation

Meta-Analysis [108]
Case Series [136-147]
Cohort [148-151]

Tuberculosis

CDC Systematic Review [H]

Use of corticosteroids or other immunosuppressive medications

Meta-Analysis/ Systematic Review [152]
Cohort Study [153]
Cross-Sectional [154]
Case Series [155-157]

Complete List of Disabilities from CDC's Systematic Review Process

- Attention-deficit/hyperactivity disorder (ADHD)
- Autism

Cerebral palsy

- Charcot foot
- Chromosomal disorders
- Chromosome 17 and 19 deletion
- Chromosome 18q deletion
- Cognitive impairment
- Congenital hydrocephalus
- Congenital malformations
- Deafness/hearing loss
- Disability indicated by Barthel Index
- Down syndrome
- Fahr's syndrome
- Fragile X syndrome
- Gaucher disease
- Hand and foot disorders
- Learning disabilities
- Leber's hereditary optic neuropathy (LHON) or Autosomal dominant optic atrophy (ADOA)
- Leigh syndrome
- Limitations with self-care or activities of daily living
- Maternal inherited diabetes and deafness (MIDD)
- Mitochondrial encephalopathy, lactic acidosis, and stroke-like episodes (MELAS) and risk markers
- Mobility disability
- Movement disorders
- Multiple disability (referred to in research papers as "bedridden disability")

Multisystem disease

- Myoclonic epilepsy with ragged red fibers (MERRF)
- Myotonic dystrophy
- Neurodevelopmental disorders
- Neuromuscular disorders
- Neuromyelitis optica spectrum disorder (NMOSD)
- Neuropathy, ataxia, and retinitis pigmentosa (NARP)
- Perinatal spastic hemiparesis
- Primary mitochondrial myopathy (PMM)
- Progressive supranuclear palsy
- Senior-Loken syndrome
- Severe and complex disability (referred to in research papers as "polyhandicap disability")
- Spina bifida and other nervous system anomalies
- Spinal cord injury
- Tourette syndrome
- Traumatic brain injury
- Visual impairment/blindness
- Wheelchair use

Suggestive Higher Risk

Suggestive higher risk is defined as an underlying medical condition or risk factor that did not have a published meta-analysis or systematic review or did not undergo the CDC systematic review process. The evidence is supported by mostly cohort, case-control, or cross-sectional studies. (Systematic reviews are available for some conditions for children with underlying conditions.)

Condition

Evidence of Impact on COVID-19 Severity [Reference number]

Children with certain underlying conditions

Read More: Information for Pediatric Healthcare Providers

Systematic Review [158,159]
Cross-Sectional Study [99,160,161]
Cohort Study [99,100,162-169]
Case Series [170,171]

Epilepsy

Cohort Study[209]

Hemophilia

Cohort Study[210]

Overweight (BMI ≥25 kg/m^2 but <30 kg/m^2)

Cohort Study[111]
Case Series[110]

Sickle cell disease

Cohort[170-173]
Case Series [170,173-188]

Substance use disorders

Case-Control Study [189-191]
Cohort Study [192,193]

Mixed Evidence (inconclusive: no conclusions can be drawn from the evidence)

Mixed evidence is defined as an underlying medical condition or risk factor that has a published meta-analysis or systematic review or underwent the CDC systematic review process. The meta-analysis or systematic review is inconclusive, either because the aggregated data on the association between an underlying condition and severe COVID-19 outcomes are inconsistent in direction or there are insufficient (or limited) data on the association between an underlying condition and severe COVID-19 outcomes.

- Limited: The evidence consists of one study, or several small studies with no comparison group, limiting the conclusions that can be drawn.
- Inconsistent: The evidence suggests no clear direction of association, meaning no firm conclusions can be drawn.

Notice

* Indicates presence of evidence for pregnant and non-pregnant women

‡ Underlying conditions for which there is evidence in pediatric patients

^ Risk may be further increased for people receiving dialysis

Condition	Evidence of Impact on COVID-19 Severity [Reference number]
Alpha 1 antitrypsin deficiency	Limited: CDC Systematic Review [I]
Bronchopulmonary dysplasia	Limited: CDC Systematic Review [J]
Hepatitis B	Inconsistent: CDC Systematic Review [B]

Hepatitis C

Limited: CDC Systematic Review [B]

Hypertension*

Inconsistent
Meta-Analysis [83,194-197]
Systematic Review [198, 75]*
Cohort Study [35,36,41,199-205]
Case Series [206]

Thalassemia

Limited: CDC Systematic Review [N]

Actions Healthcare Professionals Can Take

- Recommend vaccination with approved and authorized COVID-19 vaccines (updated 2024-2025 COVID-19 vaccine), which are safe and effective. Check out the Interim Clinical Considerations for Use of COVID-19 Vaccines as well as Stay Up to Date with Your Vaccines and locations for COVID-19 vaccination for patients for more information.
- Prescribe antivirals, which have been shown to significantly decrease the risk of hospitalization and death when treating patients with mild or moderate illness and risk factors for severe illness. Outcomes are improved if therapeutics are started within the first 5-7 days of symptom onset.
- Consider Pemivibart (Pemgarda™), a monoclonal antibody for COVID-19 pre-exposure prophylaxis in people who are moderately or severely immunocompromised and unlikely to mount an adequate immune response to COVID-19 vaccination and who meet the FDA-authorized conditions for use. Pemivibart is an IV-infusion monoclonal antibody that is authorized for pre-exposure prevention of COVID-19 for individuals (12 years of age and older weighing at least 40 kg). Pemivibart may provide another layer of protection against COVID-19 in addition to vaccination and can be given at least 2 weeks after receiving a COVID-19 vaccine. Healthcare providers should consult the Pemivibart EUA Fact Sheet and EUA Frequently Asked Questions for the FDA-authorized conditions under which Pemivibart may be used. CDC is monitoring variants and how commonly they occur to understand if they might affect how well Pemivibart works. The FDA will provide additional updates to the EUA materials, as appropriate, if new information emerges. This is the only preventive option available for

COVID-19 for the immunocompromised community, as described above, at the present time.

- Remind older patients and those with underlying medical conditions that wearing a mask is an additional prevention strategy they can choose to further protect themselves.
- Encourage patients to keep appointments for routine care and adhere to treatment regimens for their medical conditions.
- Consider use of telehealth when appropriate.
- Check out additional information for your patients.

Considerations for Patients Within Racial and Ethnic Minority Groups

- Ask patients about their concerns about vaccines and therapy. Consider using an evidence-based and culturally sensitive approach, such as motivational interviewing. Try to provide trusted sources of information and other resources.
- Encourage nucleic acid amplification tests (NAATs), including PCR tests, as well as early treatment for patients who are eligible.
- Facilitate access to culturally and linguistically appropriate resources.
- Reduce barriers to accessing current outpatient treatments.

CDC strongly encourages healthcare professionals, patients and their advocates, and health system administrators to regularly consult the Infectious Diseases Society of America (IDSA) COVID-19 Treatment Guidelines .

Key Findings from One Large Cross-Sectional Study

Underlying Medical Conditions and Severe Illness Among 540,667 Adults Hospitalized With COVID-19, March 2020–March 2021

This study used data from the Premier Healthcare Database, which represents approximately 20% of all inpatient admissions in the United States since 2000. This cross-sectional study of 540,667 adults hospitalized with COVID-19 included both inpatients and hospital-based outpatients with laboratory-diagnosed COVID-19 from March 1, 2020, through March 31, 2021. The database included reports from 592 acute care hospitals in the United States. The study was designed to examine risk factors associated with severe outcomes of COVID-19 including admission to an ICU or stepdown unit, invasive mechanical ventilation, and death.

Main Findings:

- Certain underlying medical conditions were associated with an increased risk for severe COVID-19 illness in adults.

- Having multiple conditions was also associated with severe COVID-19 illness.
- Obesity, diabetes with complications, and anxiety and fear-related disorders had the strongest association with death.
- The number of frequent underlying medical conditions (present in ≥10.0% of patients) increased with age.[207]

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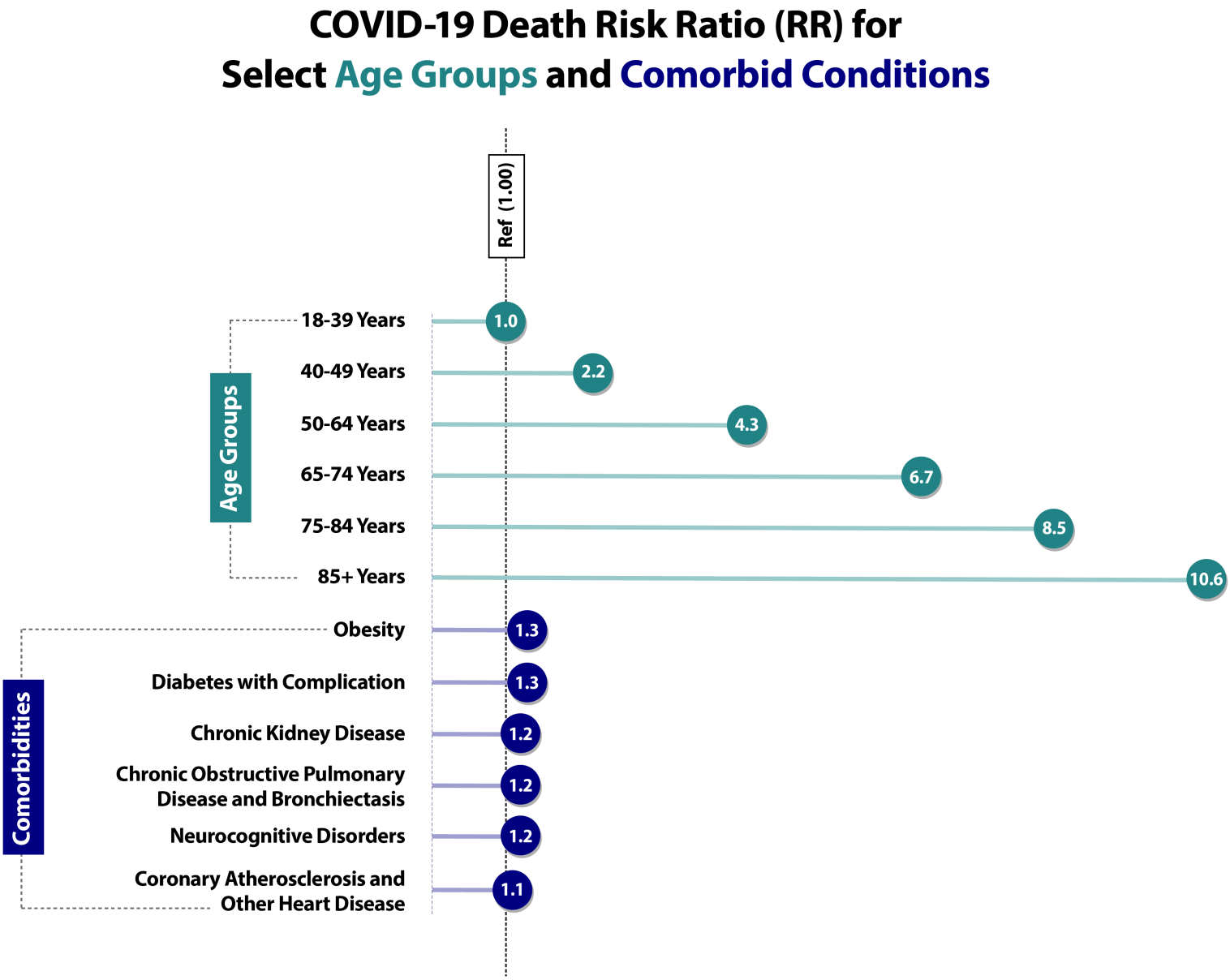

COVID-19 Death Risk Ratio (RR) for Select Age Groups and Comorbid Conditions.

Adapted from Sources:

- Kompaniyets L, Pennington AF, Goodman AB, Rosenblum HG, Belay B, Ko JY, et al. Underlying Medical Conditions and Severe Illness Among 540,667 Adults Hospitalized With COVID-19, March 2020–March 2021. To learn more, visit the *Preventing Chronic Disease* article: https://www.cdc.gov/pcd/issues/2021/21_0123.htm

- Pennington AF, Kompaniyets L, Summers AD, Danielson ML, Goodman AB, Chevinsky JR, Preston LE, Schieber LZ, Namulanda G, Courtney J, Strosnider HM, Boehmer TB, Mac Kenzie WR, Baggs J, Gundlapalli AV, Risk of Clinical Severity by Age and Race/Ethnicity Among Adults Hospitalized for COVID-19—United States, March–September 2020, *Open Forum Infectious Diseases*, Volume 8, Issue 2, February 2021. To learn more, visit: https://doi.org/10.1093/ofid/ofaa638

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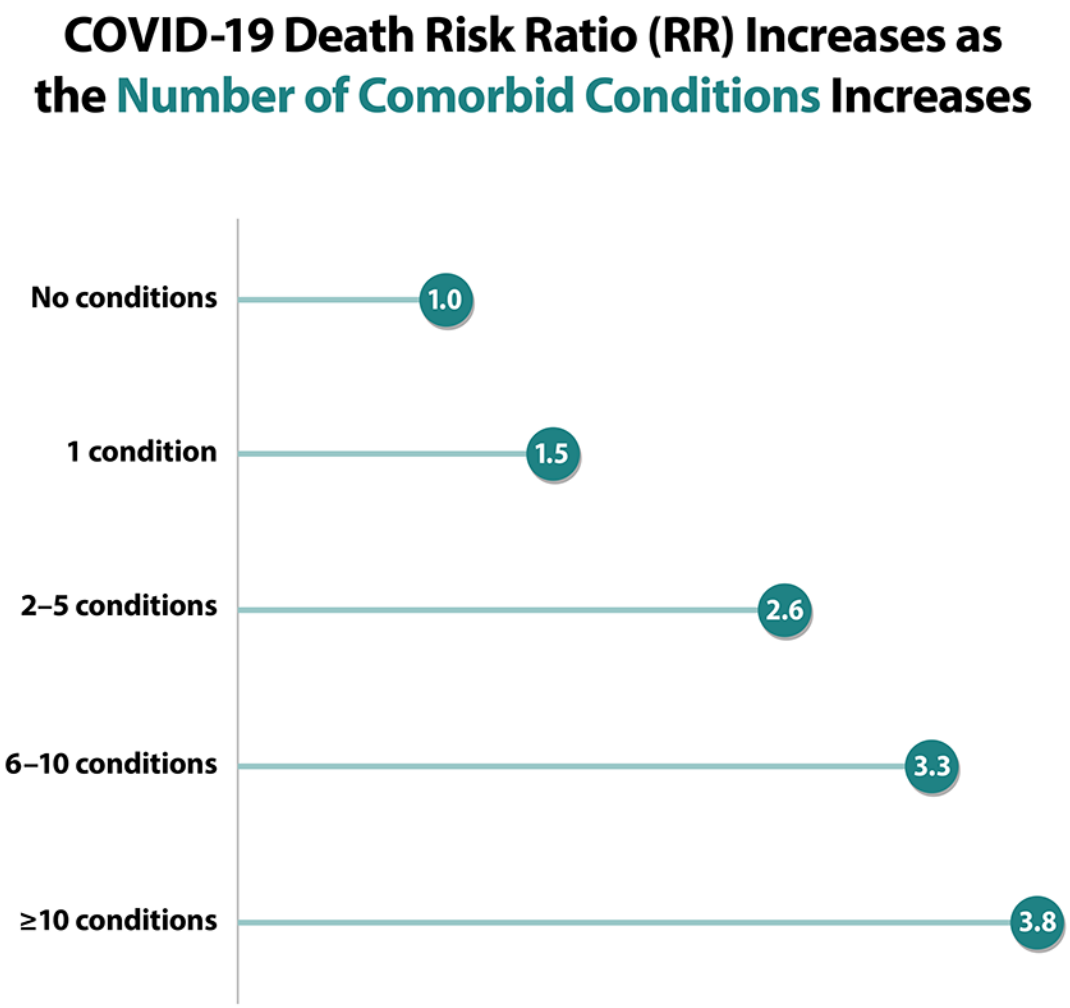

Death risk ratio (RR) increases as the number of underlying medical conditions increases among adults hospitalized with COVID-19.

Source: Kompaniyets L, Pennington AF, Goodman AB, Rosenblum HG, Belay B, Ko JY, et al. Underlying Medical Conditions and Severe Illness Among 540,667 Adults Hospitalized With COVID-19, March 2020–March 2021. To learn more, visit the *Preventing Chronic Disease* article: https://www.cdc.gov/pcd/issues/2021/21_0123.htm

More Information

- Methods for the Underlying Conditions ICD-10 List [PDF, 2 pages, 112K] PDF
- COVID-19 Therapeutics
- Clinical Presentation
- COVID-19 Treatment in Outpatients
- United States COVID-19 Deaths, Emergency Department (ED) Visits, and Test Positivity by Geographic Area
- Demographic Trends of COVID-19 Deaths in the US Reported to NVSS
- Health Equity: Promoting Fair Access to Health
- COVID-19 Vaccination Clinical & Professional Resources

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