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# Mental health outcomes of adults hospitalized for COVID-19: A living rapid review

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**Prepared by:**

Evidence Synthesis Program (ESP)  
Coordinating Center  
Portland VA Medical Center  
Portland, OR  
Mark Helfand, MD, MPH, MS, Director

**Authors:**

Maya O'Neil, PhD  
Stephanie Veazie, MPH  
Brenda LaFavor, MD  
Kathryn Vela, MLIS  
Nina Sayer, PhD  
Kathleen Carlson, PhD



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## PREFACE

The VA Evidence Synthesis Program (ESP) was established in 2007 to provide timely and accurate syntheses of targeted healthcare topics of importance to clinicians, managers, and policymakers as they work to improve the health and healthcare of Veterans. These reports help:

- Develop clinical policies informed by evidence;
- Implement effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and
- Set the direction for future research to address gaps in clinical knowledge.

The program is comprised of three ESP Centers across the US and a Coordinating Center located in Portland, Oregon. Center Directors are VA clinicians and recognized leaders in the field of evidence synthesis with close ties to the AHRQ Evidence-based Practice Center Program and Cochrane Collaboration. The Coordinating Center was created to manage program operations, ensure methodological consistency and quality of products, and interface with stakeholders. To ensure responsiveness to the needs of decision-makers, the program is governed by a Steering Committee comprised of health system leadership and researchers. The program solicits nominations for review topics several times a year via the [program website](#).

Comments on this evidence report are welcome and can be sent to Nicole Floyd, Deputy Director, ESP Coordinating Center at [Nicole.Floyd@va.gov](mailto:Nicole.Floyd@va.gov).

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## EXECUTIVE SUMMARY

### Key Findings

- Two small (total N=178), fair-quality, cross-sectional studies among civilians in a single city in Iran and a single hospital in China provide the only published evidence on the prevalence of mental health disorders among patients hospitalized for COVID-19.
- Between 43.3-44% of people with COVID-19 reported depressive symptoms during or immediately after hospitalization in 2 studies; but the prevalence of clinician-diagnosed Major Depressive Disorder was much lower (3.3%) in 1 study. Twenty-three percent of people with COVID-19 reported anxiety symptoms during hospitalization in 1 study, but the prevalence of clinician-diagnosed Generalized Anxiety Disorder was much lower (6.7%). The prevalence of clinician-diagnosed insomnia and adjustment disorder during hospitalization was 43.3% and 26.7% respectively in 1 study.
- Patients hospitalized with COVID-19 had twice the prevalence of diagnosed insomnia (43.3% vs 21.2%;  $p=.03$ ) and nearly 3 times the prevalence of diagnosed adjustment disorders (26.7% vs 9.6%;  $p=.042$ ) compared to patients with COVID-19 who were not hospitalized in 1 study. One study reported no significant correlations between depressive symptoms and either patient characteristics or COVID-19 severity.
- No studies examined the prevalence of PTSD, substance use disorders, or psychosis among hospitalized patients with COVID-19. Additionally, no studies examined patients' mental health care utilization or resource needs. Four preprint studies and 1 RCT protocol may address some of these gaps.
- Overall, the prevalence of mental health disorders among patients hospitalized for COVID-19 is uncertain, as we only identified 2 small, cross-sectional studies conducted during or immediately after hospitalization that did not account for potential confounders. One also measured diagnoses before patients had time to meet time-related diagnostic criteria for a new mental health disorder.

### Background

The ESP Coordinating Center (ESP CC) is responding to a request from VA Central Office for an evidence brief on mental health (MH) outcomes of adults who have been hospitalized for COVID-19. Findings from this evidence brief will be used to inform national VA planning efforts to support Veterans who have been hospitalized for COVID-19 after they have been discharged from the hospital.

### Methods

To identify studies, we searched MEDLINE, the WHO COVID-19 database, PsycINFO, and CINAHL from Dec 2019 to July 2020. We used prespecified criteria for study selection, data abstraction, and rating internal validity and strength of the evidence. See our PROSPERO protocol for our full methods (Registration # CRD42020199557).

In March 2020, the World Health Organization (WHO) declared the outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19), a pandemic. Although most people with COVID-19 experience no symptoms or mild fever, cough, shortness of breath, or fatigue, approximately 1 in 5 experience severe symptoms requiring hospitalization. In-hospital mortality for patients with COVID-19 is around 17%. Many hospitalized patients experience life-threatening complications such as bacterial pneumonia, sepsis, acute respiratory distress syndrome, and multi-organ failure. As a result of the stress of being hospitalized for a serious, highly transmissible illness during a pandemic, experts warn that patients hospitalized with COVID-19 are at high risk of developing mental health symptoms and psychiatric disorders such as major depression, panic or other anxiety disorders, or post-traumatic stress disorder (PTSD), or of experiencing exacerbations of existing disorders. Veterans who receive care at the VA have high rates of comorbid medical disorders (16% report having 5 or more medical conditions) and high rates of mental health diagnoses (including depression [13.5%], PTSD [9.3%], substance use disorders [8.3%], anxiety disorders [4.8%], and serious mental illness [3.7%]) and may be at particularly high risk of developing new mental health symptoms or disorders or of experiencing exacerbations of existing mental health symptoms or disorders.

In June 2020, the Department of Veterans Affairs (VA) Central Office requested that the VA Evidence Synthesis Program (ESP) produce 3 rapid evidence reviews on post-acute care needs for adults who have had COVID-19. The first 2 reviews will focus on major organ damage and rehabilitation needs, respectively. This is the third review in the series, focused on mental health needs of adults who have been hospitalized with COVID-19. The purpose of this review is to compare the prevalence of mental health disorders among adults who have been hospitalized for COVID-19 to relevant comparison groups, assess whether mental health disorder prevalence varies by patient and disease characteristics, and ascertain patients' mental health care utilization and resource needs. Findings from this evidence brief will be used to inform national VA planning efforts to support Veterans after hospital discharge for COVID-19.

We included cross-sectional and cohort studies that examined the prevalence of mental health disorders among adults during or after hospitalization for COVID-19. From 1,461 potentially relevant citations, 2 cross-sectional studies met our inclusion criteria. One fair-quality, single-center study (N=96) from China examined the prevalence of depression symptoms among patients who were quarantined for 2 weeks following hospitalization for COVID-19. The other fair-quality study (N=82) from a single city in Iran examined the prevalence of both symptoms and diagnosed psychiatric disorders among all people with COVID-19 (both hospitalized and non-hospitalized) in a single city. See Table 1 for an overview of findings from these 2 studies.

**Table 1. Overview of Findings**

Rapid Evidence Review Question	Results & supporting evidence
<b>KQ1)</b> Among adults who have been hospitalized for COVID-19, what is the prevalence of MH disorders during or after hospitalization?	In 2 studies (1 of a sample of patients with a low prevalence of preexisting MH conditions, and 1 that did not report on patients' preexisting MH conditions), overall prevalence of MH conditions during/immediately after hospitalization were: <ul style="list-style-type: none"> <li>• Depression symptoms: 43.3%-44% (2 fair-quality studies)</li> <li>• Anxiety symptoms: 23.3% (1 fair-quality study)</li> <li>• MDD: 3.3% (1 fair-quality study)</li> <li>• GAD: 6.7% (1 fair-quality study)</li> <li>• Insomnia: 43.3% (1 fair-quality study)</li> <li>• Adjustment disorder: 26.7% (1 fair-quality study)</li> </ul>
<b>KQ2)</b> How often do adults without preexisting MH conditions who have been hospitalized for COVID-19 develop new MH symptoms or a new MH diagnosis?	No evidence.
<b>KQ2a)</b> ... compared to those with outpatient COVID-19?	In 1 study of a sample of patients with a low prevalence of preexisting MH conditions, the comparative prevalence of MH conditions during hospitalization were: <ul style="list-style-type: none"> <li>• Depression symptoms: 43.3% (H) vs 34.6% (NH) (1 fair-quality study)</li> <li>• Anxiety symptoms: 23.3% (H) 32.7% (NH) (1 fair-quality study)</li> <li>• MDD: 3.3% (H) vs 3.8% (NH) (1 fair-quality study)</li> <li>• GAD: 6.7% (H) vs 5.8% (NH) (1 fair-quality study)</li> <li>• Insomnia: 43.3% (H) vs 21.2% (NH); <math>p=.03</math> (1 fair-quality study)</li> <li>• Adjustment disorder: 26.7% (H) vs 9.6% (NH); <math>p=.042</math> (1 fair quality study)</li> </ul>
<b>KQ2b)</b> ... compared to adults hospitalized for other causes?	No evidence.
<b>KQ2c)</b> Does the probability of developing new MH symptoms or diagnosis during or after hospitalization for COVID-19 vary by patient characteristics (eg, age, sex, race/ethnicity, comorbidities), COVID-19 disease severity, or level of care?	In 1 fair-quality study of a sample of patients whose preexisting MH conditions were not reported, there was no significant correlation found between post-hospitalization depression symptoms and patient characteristics (gender, age, or comorbidities [hypertension, diabetes, CVD, malignant tumors, liver disease or lung disease]) or COVID-19 disease severity.
<b>KQ3)</b> How often do adults with preexisting MH conditions who have been hospitalized for COVID-19 experience exacerbation of MH symptoms?	No evidence.

Rapid Evidence Review Question	Results & supporting evidence
<b>KQ3a)</b> ... compared to those with outpatient COVID-19?	No evidence.
<b>KQ3b)</b> ... compared to adults hospitalized for other causes?	No evidence.
<b>KQ3c)</b> Does the probability of exacerbating MH symptoms during or after hospitalization for COVID-19 vary by patient characteristics (eg, age, sex, race/ethnicity, comorbidities), COVID-19 disease severity, or level of care?	No evidence.
<b>KQ4)</b> How often and what kinds of MH care do adults access during or after hospitalization for COVID-19?	No evidence.
<b>KQ4a)</b> Does the type or extent of MH care used by adults during or after COVID-19 hospitalization differ compared to before hospitalization?	No evidence.
<b>KQ4b)</b> Does the type or extent of MH care utilization differ for adults hospitalized for COVID-19 compared to adults receiving outpatient treatment for COVID-19?	No evidence.
<b>KQ4c)</b> Does the type or extent of MH care utilization differ for adults hospitalized for COVID-19 compared to adults hospitalized for other causes?	No evidence.
<b>KQ4d)</b> Does the type or extent of MH care utilization during or after hospitalization for COVID-19 vary by patient characteristics (eg, age, sex, race/ethnicity, comorbidities), COVID-19 disease severity, or level of care?	No evidence.
<b>KQ5)</b> What are the MH care resource needs among adults who have been hospitalized for COVID-19?	No evidence.

*Italics indicates a statistically significant difference between groups at a significance level of .05.*

MH = mental health; MDD = Major Depressive Disorder; GAD = Generalized Anxiety Disorder; (H) = hospitalized; (NH) = non-hospitalized; CVD = cardiovascular disease.



The primary limitation of this rapid review's methods is that a single reviewer rated studies for inclusion, assessed quality, and abstracted data with second reviewer verification, rather than standard dual independent assessment. This may have resulted in missing eligible studies or data. This risk was reduced by establishing explicit inclusion criteria for studies, developing and using a piloted data abstraction tool, and creating a key to rate each study according to Joanna Briggs Institute quality criteria.

There were several important limitations of the included primary studies. First, studies only examined patients from a single location in China or Iran which may limit the generalizability of findings to US Veterans. Second, both studies were small (<100 participants), which increases the risk that prevalence estimates were affected by random error. Third, studies did not account for baseline confounders, the most important of which is the prevalence of preexisting mental health disorders. Some mental health disorders such as depression may be a risk factor for being hospitalized for COVID-19. Therefore, high *pre*-hospitalization prevalence of mental health disorders could be a large contributor to high *post*-hospitalization prevalence of mental health disorders. Fourth, studies only measured outcomes during hospitalization or immediately afterward. No data are available on patients' intermediate or long-term mental health outcomes.

Future research should examine 5 primary gaps in research:

- Determine the prevalence of major psychiatric disorders among patients hospitalized for COVID-19.
- Conduct larger, longer (*eg*, 3 and 6-month follow-up), multi-center studies.
- Compare patients who have been hospitalized for COVID-19 to relevant control groups.
- Report and account for potential confounders, particularly preexisting mental health disorders, medications, and medical comorbidities.
- Determine the mental health care utilization and resource/treatment needs of patients after discharge for COVID-19.

In-progress and unpublished studies may address some gaps in research, including an ongoing RCT to evaluate the incidence of anxiety, depression, and PTSD among patients with COVID-19 6 months after ICU discharge, a preprint study to describe the prevalence of mental health disorders during hospitalization for COVID-19 among approximately 800 people from 2 hospitals, and a preprint study to present information on psychotropic medication use among hospitalized patients with COVID-19. None of these studies is based on US samples.

Overall, the prevalence of mental health disorders among patients who have been hospitalized for COVID-19 is uncertain. We only identified 2 small studies with important methodological limitations. However, preliminary evidence from these 2 studies suggests the prevalence of depression symptoms (43.3 – 44%), anxiety symptoms (23.3%), and insomnia diagnoses (43.3%) among patients with COVID-19 during or immediately after hospitalization may be similar to the prevalence seen in patients hospitalized for SARS or MERS. More research is needed on the prevalence of major psychiatric disorders and symptoms following hospitalization for COVID-19, including incidence and mental health care resource needs.

# EVIDENCE BRIEF

## INTRODUCTION

### PURPOSE

The ESP Coordinating Center (ESP CC) is responding to a request from VA Central Office for an evidence brief on mental health outcomes of adults who have been hospitalized for COVID-19. Findings from this evidence brief will be used to inform national VA planning efforts to support Veterans after hospital discharge for COVID-19.

### BACKGROUND

In March 2020, the World Health Organization (WHO) declared the outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus which causes coronavirus disease 2019 (COVID-19), as a pandemic.<sup>1</sup> As of September 2020, over 29 million people have been confirmed to have had COVID-19 and 930,000 have died worldwide.<sup>2</sup> Although most people with COVID-19 experience no symptoms or mild fever, cough, shortness of breath, or fatigue, approximately 1 in 5 experience severe symptoms that require hospitalization.<sup>3</sup> Life-threatening complications of COVID-19 include bacterial pneumonia, sepsis, acute respiratory distress syndrome, and multi-organ failure.<sup>3</sup> Those who are over 65 years old with underlying medical conditions (including but not limited to hypertension, obesity, chronic lung disease, diabetes, and cardiovascular disease) are at higher risk of hospitalization and death.<sup>4</sup> Among those hospitalized for COVID-19, 32% have been admitted to the intensive care unit (ICU), 19% required mechanical ventilation, and 17% have died in the hospital.<sup>5</sup>

Addressing complications of COVID-19 may require invasive procedures, including the administration of sedation and/or paralytic agents and intensive intravascular monitoring. These interventions interfere with a patient's ability to respond to and understand their providers, environment, and treatment. In addition, the ICU setting is stressful due to frequent alarms, flashing lights, and providers moving in and out of rooms donning personal protective equipment that can prevent patients from seeing and recognizing faces.<sup>6</sup> This environmental stress is likely compounded for patients with COVID-19 by isolation from family, friends, and other support systems that results from restrictive hospital visitation policies employed to reduce the risk of COVID-19 transmission.<sup>7</sup> Hospitalization and isolation requirements may also cause a significant disruption in work, resulting in significant financial hardship and distress. Those with COVID-19 may also worry about transmission and burden to their loved ones or caregivers.

As a result of the stress of being hospitalized for a serious, highly transmissible illness during a pandemic, experts warn that patients who are hospitalized with COVID-19 are at particularly high risk of developing mental health symptoms or experiencing exacerbation or relapse of existing or past mental health disorders.<sup>8-10</sup> A systematic review evaluating outcomes after the 2002 SARS and 2012 MERS pandemics indicates many patients with serious infections experienced anxiety (35.7%) and insomnia (41.9%) during the acute phase of their illness and some developed post-traumatic stress disorder (PTSD) (32.2%), depression (14.9%), and anxiety disorders (14.8%) after recovery.<sup>11</sup> Additionally, research on ICU patients with any illness indicates approximately one-third will develop anxiety and depression symptoms and approximately one-fifth will develop PTSD within a year of their ICU stay.<sup>6</sup> High levels of

sedation and paralysis are common among ICU patients and are required for mechanical ventilation. At the same time, sedative and paralytic medications may put hospitalized patients with COVID-19 at an increased risk for some mental health symptoms and disorders, particularly because these medications commonly have side effects such as amnesia and hallucinations.

The current social environment may also contribute to greater risk of mental health disorders for hospitalized patients with COVID-19. Many states are instituting stay-at-home or physical distancing orders, people who have been in contact with someone with COVID-19 are being quarantined, and work and school environments are inaccessible or significantly altered to reduce the likelihood of COVID-19 transmission. Recent studies on the effects of the COVID-19 pandemic show that even general populations have a high prevalence of depression, anxiety, insomnia, and acute stress, and therefore those who have been hospitalized are likely to return to home or work environments that are more stressful or significantly changed from pre-pandemic environments.<sup>12-14</sup>

In addition to stress-related development or exacerbation of mental health disorders, research on previous epidemics/pandemics with similar pathogens suggests possible biological pathways for increased prevalence of mental health disorders. For example, hospitalized patients with COVID-19 may experience neurologic symptoms such as stroke and encephalopathy during and after their hospitalization, which can impact both acute and chronic mental health.<sup>15</sup>

In May 2020, the WHO published interim guidance on the clinical management of COVID-19, including management of mental health symptoms.<sup>16</sup> For those with new anxiety or depression symptoms, the WHO recommends providing support strategies including mental health first aid, stress management, and brief psychological interventions based on cognitive behavioral therapy (CBT) as first-line therapy and benzodiazepines as second-line therapy for those with severe distress. If anxiety and depression symptoms persist, patients should consult with mental health professionals for further evaluation and treatment. Given the emergent nature of COVID-19 and the need for immediate guidance, these guidelines are based on a combination of expert opinion and rapid systematic reviews, as opposed to a more rigorous systematic review and GRADE process, which is considered the gold standard. The American Psychological Association provides clinical practice guidelines for many mental health disorders<sup>17,18</sup> but as of September 2020, has not provided guidance on caring for Patients with COVID-19 specifically. The American Psychiatric Association provides high-level guidance for identifying signs of COVID-19-related mental health issues and provide mental health care remotely.<sup>19,20</sup> Overall, the existing evidence of the impact of COVID-19 on the prevalence of mental health symptoms among patients hospitalized for COVID-19 and after they are discharged is unclear. There are also unanswered questions about psychological therapies being provided to patients and the effectiveness of those treatments, as well as long-term mental health needs these patients might have and how to best address them.

In June 2020, the Department of Veterans Affairs (VA) Central Office requested that the VA Evidence Synthesis Program (ESP) produce 3 rapid evidence reviews on post-acute care needs for adults who have had COVID-19. The first 2 reviews will focus on major organ damage and rehabilitation needs, respectively. This is the third review in the series, focused on mental health needs of adults who have been hospitalized for COVID-19. In general, Veterans who receive care at the VA are older and have more comorbidities than adults in the general population (16%

of Veterans at the VA report 5 or more conditions vs 3% of general population),<sup>21</sup> putting them at higher risk for contracting COVID-19. Veterans who receive care at the VA also have a high prevalence of existing mental health disorders including depression (13.5%), PTSD (9.3%), substance use disorders (8.3%), anxiety disorders (4.8%), and serious mental illness (3.7%),<sup>22</sup> which could be exacerbated by a COVID-19 hospitalization. The purpose of this review is therefore to evaluate the prevalence of mental health disorders and assess mental health care needs among adults hospitalized for COVID-19 to assist the VA in supporting this population of Veterans.

## **SCOPE**

This rapid review compares the prevalence of mental health disorders among adults who have been hospitalized for COVID-19 to relevant comparison groups, assesses whether the prevalence of mental health disorders varies by patient and disease characteristics, and ascertains mental health care utilization and resource needs for adults following hospitalization for COVID-19.

## **KEY QUESTIONS & ELIGIBILITY CRITERIA**

Key Questions and eligibility criteria (population, intervention, comparator, outcome, and timing) appear in Table 2. We included cross-sectional and cohort studies and excluded case series and case reports.

**Table 2. Key Questions and Eligibility Criteria**

Key Question	Population	Comparator	Outcomes	Timing
1) Among adults who have been hospitalized for COVID-19, what is the prevalence of MH disorders during or after hospitalization?	Adults who have been hospitalized for COVID-19	None	Prevalence of MH disorders, including both diagnoses and symptoms. Specific MH disorders of interest are mood disorders, anxiety disorders, trauma-related disorders, psychotic disorders, and substance use disorders; excluding cognitive disorders such as delirium and dementia.	During or after hospitalization
2) How often do adults without preexisting MH conditions who have been hospitalized for COVID-19 develop new MH symptoms or a new MH diagnosis?	Adults without preexisting MH conditions who have been hospitalized for COVID-19	vs before hospitalization	New MH symptoms or a new MH diagnosis	During or after hospitalization
2a) ...compared to those with outpatient COVID-19?		vs adults without preexisting MH conditions who received outpatient treatment for COVID-19		
2b) ...compared to adults hospitalized for other causes?		vs adults without preexisting MH conditions who have been hospitalized for other causes		
2c) Does the probability of developing new MH symptoms or diagnosis during or after hospitalization for COVID-19 vary by patient characteristics (eg, age, sex, race/ethnicity, comorbidities), COVID-19 disease severity, or level of care?		Subgroups vs each other		
3) How often do adults with preexisting MH conditions who have been hospitalized for COVID-19 experience exacerbation of MH symptoms?	Adults with preexisting MH conditions who	vs before hospitalization	Exacerbation of MH symptoms	During or after hospitalization

Key Question	Population	Comparator	Outcomes	Timing
<b>3a)</b> ...compared to those with outpatient COVID-19?	have been hospitalized for COVID-19	vs adults with preexisting MH conditions who received outpatient treatment for COVID-19	Exacerbation of MH symptoms	
<b>3b)</b> ...compared to adults hospitalized for other causes?		vs adults with preexisting MH conditions who have been hospitalized for other causes		
<b>3c)</b> Does the probability of exacerbating MH symptoms during or after hospitalization for COVID-19 vary by patient characteristics (eg, age, sex, race/ethnicity, comorbidities), COVID-19 disease severity, or level of care?		Subgroups vs each other		
<b>4)</b> How often and what kinds of MH care do adults access during or after hospitalization for COVID-19?	Adults who have been hospitalized for COVID-19	None	MH care utilization (eg, health care appointments, prescriptions filled, etc)	During or after hospitalization
<b>4a)</b> Does the type or extent of MH care used by adults during or after COVID-19 hospitalization differ compared to before hospitalization?		vs before hospitalization		
<b>4b)</b> Does the type or extent of MH care utilization differ for adults hospitalized for COVID-19 compared to adults receiving outpatient treatment for COVID-19?		vs adults who received outpatient treatment for COVID-19		
<b>4c)</b> Does the type or extent of MH care utilization differ for adults hospitalized for COVID-19 compared to adults hospitalized for other causes?		vs adults who have been hospitalized for other causes		
<b>4d)</b> Does the type or extent of MH care utilization during or after hospitalization for COVID-19 vary by patient characteristics (eg, age, sex, race/ethnicity, comorbidities), COVID-19 disease severity, or level of care?		Subgroups vs each other		
<b>5)</b> What are the MH care resource needs among adults who have been hospitalized for COVID-19?	Adults who have been hospitalized for COVID-19	None	MH care resource needs identified by patients or caregivers.	

MH = mental health



## METHODS

### SEARCHES AND STUDY SELECTION

To identify articles relevant to the key questions, a research librarian searched Ovid MEDLINE, the WHO COVID-19 database, PsycINFO, CINAHL, as well as systematic review databases using terms for *COVID-19*, *mental health*, and *hospitalization* from December 2019 to July 2020 (see Supplementary Materials for complete search strategies). Additional citations were identified from hand-searching reference lists and consultation with content experts. We limited the search to published and indexed articles involving human subjects available in the English language. Study selection was based on the eligibility criteria described above. Detailed information in inclusion/exclusion criteria are available in the Supplementary Materials. Titles, abstracts, and full-text articles were reviewed by 1 investigator and checked by another. All disagreements were resolved by consensus.

We also searched the MedRxiv database in August 2020 for preprint studies. We conducted dual abstract and full-text review of these studies, but did not conduct quality assessment, data extraction, or synthesize findings in the “Results” section as these studies have not yet been peer-reviewed. Instead, we highlight potentially relevant preprint studies in the Discussion section (page 21) and in Table 6.

### QUALITY ASSESSMENT & DATA EXTRACTION

We used predefined criteria to rate the internal validity of all included studies. We used checklists from the Joanna Briggs Institute (JBI) to assess the internal validity of cross-sectional studies.<sup>23</sup> We extracted study-level data including study characteristics, population, comparator, and outcomes. All data abstraction and internal validity ratings were first completed by 1 reviewer and then checked by another. All disagreements were resolved by consensus.

### STRENGTH OF EVIDENCE ASSESSMENT

We graded the strength of the evidence based on the AHRQ Methods Guide for Comparative Effectiveness Reviews.<sup>24</sup> Although this method is designed for intervention studies, we applied the concepts to the non-intervention studies, including risk of bias (includes study design and aggregate quality), consistency, directness, and precision of the evidence. Strength of evidence was graded for each key outcome measure and ratings ranged from high to insufficient, reflecting our confidence that the prevalence estimates reflect an unbiased and precise estimate of the true prevalence.

### SYNTHESIS OF DATA

Because of the small number of included studies and heterogeneity in outcomes and outcome measurements used by these studies, we synthesized data narratively.

### UPDATING THE LIVING REVIEW

This is a living review. We are regularly searching medical databases for new studies, and study selection and quality assessment will adhere to the same processes described above. The report will be updated when new information might change the nature or strength of the conclusions or

in accordance with a journal's editorial policies, if a manuscript based on this report is published in a peer-reviewed journal.

The complete description of our full methods can be found on the PROSPERO international prospective register of systematic reviews (<http://www.crd.york.ac.uk/PROSPERO/>; registration number CRD42020199557).



## RESULTS

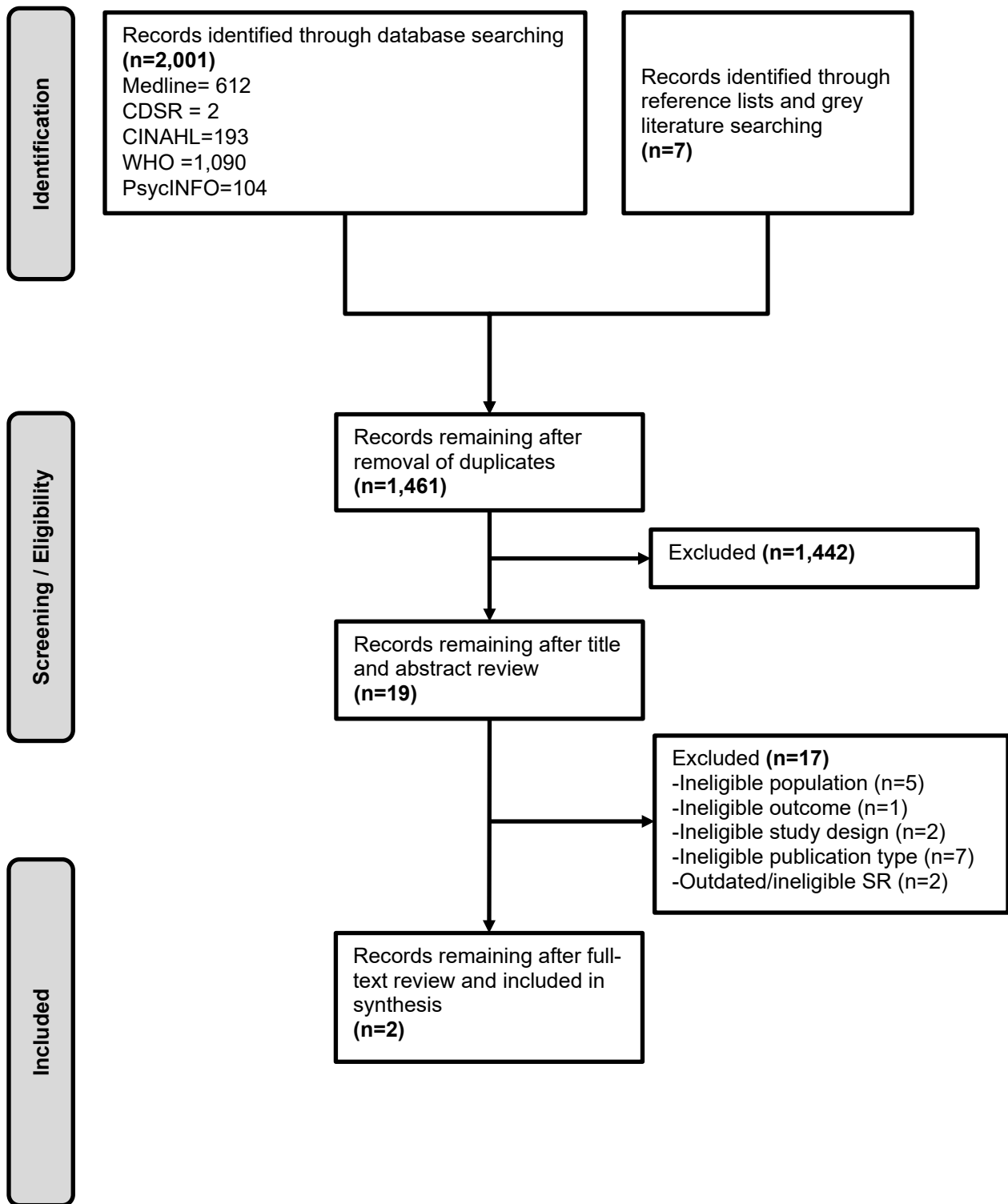
The literature flow diagram (Figure 1) summarizes the results of the search and study selection processes. Among 1,461 potentially relevant citations, we included 2 studies,<sup>25,26</sup> both cross-sectional. One small (N=96), single-center, cross-sectional study<sup>25</sup> from China examined the prevalence of depression symptoms among patients who were quarantined for 2 weeks following a hospitalization for COVID-19. The other small (N=82), cross-sectional study<sup>26</sup> from a single city in Iran described the prevalence of both symptoms and diagnosed psychiatric disorders (including Generalized Anxiety Disorder, Major Depressive Disorder, insomnia, and adjustment disorders) among all people with COVID-19 in a single city. This study compared patients with severe COVID-19 who were hospitalized to patients with mild COVID-19 who were not hospitalized.

Patient characteristics varied across the 2 studies. In 1 study,<sup>25</sup> one-third to one-half of participants were between 18-45 years old, depending on whether they were in the “self-reported depression” or “no self-reported depression” group. In the other study,<sup>26</sup> mean age was 40.3 years in hospitalized and was 43.6 years in non-hospitalized patients. 50-60% of participants were female across the 2 studies. Additionally, in 1 study one-third of patients had at least 1 comorbidity,<sup>25</sup> and in the other study one-fifth had a preexisting psychiatric comorbidity.<sup>26</sup> Neither study reported on participants’ race or ethnicity.

A list of excluded studies and study-level data abstraction and quality assessment for included studies appear in the Supplementary Materials.

## LITERATURE FLOW

Figure 1: Literature Flowchart



## KEY QUESTION 1: Among adults who have been hospitalized for COVID-19, what is the prevalence of MH disorders during or after hospitalization?

In 2 small (total N=178), fair-quality, cross-sectional studies<sup>25,26</sup> – 1 that examined patients with a low prevalence of preexisting MH conditions, and 1 that did not report on patients' preexisting mental health conditions – 43.3% to 44% patients hospitalized with COVID-19 reported depression symptoms. In 1 of these studies, 23.3% reported anxiety symptoms.<sup>26</sup> The prevalence of *diagnosed* insomnia (43.3%) and *diagnosed* adjustment disorders (26.7%) were high in 1 of these cross-sectional studies,<sup>26</sup> but the prevalence of *diagnosed* Major Depressive Disorder (3.3%) and *diagnosed* Generalized Anxiety Disorder (6.7%) were lower. Diagnoses were made by psychiatrists who assessed patients via video with a tablet (inpatient settings) or personal mobile phone (outpatient settings). The specific diagnostic criteria used in the study were not reported by study authors.

Overall, evidence is insufficient to draw conclusions on the prevalence of mental health disorders among patients who have been hospitalized for COVID-19, as we only identified 2 small studies conducted in either a single hospital or single city. Additionally, 1 of the included studies<sup>26</sup> assessed patients during hospitalization and had insufficient follow-up time for patients to meet diagnostic criteria for new-onset mental health disorders (*eg*, 2 weeks of significant symptoms required for a diagnosis of major depression). Findings of these studies are shown in Table 3.

**Table 3. Prevalence of Mental Health Disorders in Patients Hospitalized for COVID-19**

Author year Study design Sample size	Country	Population	Prevalence of MH Disorders
Yuan 2020 <sup>25</sup>  Cross-sectional  N=96	China	Hospitalized patients with COVID-19 who were discharged to forced-quarantine for 2 weeks.	In the 2 weeks after hospitalization, 42/96 (44%) of patients reported depression symptoms on Zung self-rating depression scale (score >50 on SDS).
Zarghami 2020 <sup>26</sup>  Comparative cross-sectional  N=82	Iran	All patients with COVID-19 in 1 city, excluding those who were intubated or deceased, excluding children <10 years old, excluding patients unwilling to participate in study.	The prevalence of diagnosed psychiatric disorders among patients hospitalized for COVID-19 during hospitalization was 60%. The prevalence of specific mental health disorders include diagnosed Generalized Anxiety Disorder (6.7%), Major Depressive Disorder (3.3%), insomnia (43.3%), and adjustment disorders (26.7%).  When assessed on symptom screening tools, the prevalence of depression (43.3% scored >5 on PHQ-9) and anxiety (23.3% scored >5 on GAD-7) among hospitalized patients were higher than when diagnosed through psychiatric evaluation.

## KEY QUESTION 2. How often do adults without preexisting MH conditions who have been hospitalized for COVID-19 develop new MH symptoms or a new MH diagnosis?

We identified no evidence addressing this question.

### KEY QUESTION 2A: ... compared to those with outpatient COVID-19?

In 1 small (N=82), fair-quality, cross-sectional study<sup>26</sup> in a sample with a low prevalence of preexisting mental health conditions, the percent of patients who reported depression symptoms (34.6%-43.3%) and anxiety symptoms (23.3-32.7%) were similar for those hospitalized for severe COVID-19 as those with mild COVID-19 who had not been hospitalized. The prevalence of *diagnosed* Major Depressive Disorder (3.3-3.8%) and *diagnosed* Generalized Anxiety Disorder (5.8-6.7%) were also similar between groups. However, those who were hospitalized for COVID-19 had twice the prevalence of diagnosed insomnia (43.3% vs 21.2%; p=.03) and nearly three times the prevalence of diagnosed adjustment disorders (26.7% vs 9.6%; p=.042) as those with mild COVID-19 who had not been hospitalized.

Overall, evidence is insufficient to draw conclusions on the comparative prevalence of mental health disorders in hospitalized versus non-hospitalized patients with COVID-19 because we only identified a single, small study that had insufficient follow-up time for patients to meet diagnostic criteria for new-onset mental health disorders. The study also did not control for potential confounders including prevalence of preexisting mental health disorders, which was higher in the hospitalized group than the non-hospitalized group (26.7% vs 17.3%). Findings of this study are shown in Table 4.

**Table 4. Comparative Prevalence of Mental Health Disorders in Patients Hospitalized for COVID-19 vs Patients Not Hospitalized for COVID-19**

Author year Study design Sample size	Country	Population	Comparative prevalence of MH disorders (Hospitalized vs Non-hospitalized)
Zarghami 2020 <sup>26</sup>  Comparative cross- sectional  N=82	Iran	All patients with COVID-19 in 1 city, excluding those who were intubated or deceased, excluding children <10 years old, excluding patients unwilling to participate in study.	Overall, during hospitalization patients with COVID-19 had a higher prevalence of diagnosed psychiatric disorders compared to patients with COVID-19 who were not hospitalized (60% vs 28.8%; p=.006).  Specifically, patients hospitalized for COVID-19 had a similar prevalence of diagnosed Generalized Anxiety Disorder (6.7% vs 5.8%) and diagnosed Major Depressive Disorder (3.3% vs 3.8%) as non-hospitalized patients.  However, hospitalized patients had a higher prevalence of diagnosed insomnia (43.3% vs 21.2%; p=.03) and diagnosed adjustment disorders (26.7% vs 9.6%; p=.042). When assessed on symptom screening tools, patients hospitalized for COVID-19 had a similar prevalence of depression (43.3% vs 34.6% scored >5 on PHQ-9; p=.473) and anxiety (23.3% vs 32.7% scored >5 on GAD-7; p=.370) as non-hospitalized patients.

## KEY QUESTION 2B: ... compared to adults hospitalized for other causes?

We identified no evidence addressing this question.

## KEY QUESTION 2C: Does the probability of developing new MH symptoms or diagnosis during or after hospitalization for COVID-19 vary by patient characteristics (eg, age, sex, race/ethnicity, comorbidities), COVID-19 disease severity, or level of care?

In 1 fair-quality, cross-sectional study<sup>25</sup> (N=96) among a sample for whom the prevalence of preexisting mental health conditions was not reported, authors reported that depression symptoms were not significantly correlated with gender, age, comorbidities (including hypertension, diabetes, CVD, malignant tumors, liver disease, or lung disease), severity of initial infection, or duration of initial illness.

Overall, evidence is insufficient to draw conclusions on whether certain subgroups of hospitalized patients have a higher prevalence of mental health problems as we only identified a single, small study that may have been insufficiently powered to detect subgroup differences. Findings of this study are shown in Table 5.

**Table 5. Prevalence of Mental Health Disorders Among Patients Hospitalized for COVID-19 by Patient Characteristics**

Author year Study design Sample size	Country	Population	Prevalence of MH Disorders for Hospitalized Patients by Patient Characteristics
Yuan 2020 <sup>25</sup>  Cross-sectional  N=96	China	Hospitalized patients with COVID-19 who were discharged to forced-quarantine for 2 weeks.	In the 2 weeks after hospitalization, depression symptoms were not significantly correlated with: <ul style="list-style-type: none"> <li>• Gender (42% of males reported depression vs 45% of females)</li> <li>• Age (34% of those aged 18-45 reported depression vs 52% of those aged 46+)</li> <li>• Comorbidities (42% of those with at least 1 comorbidity reported depression vs 45% who had no comorbidities)</li> <li>• Severity of illness (38% of severe patients reported depression vs 45% of non-severe patients)</li> <li>• Hospital stay (43% of those hospitalized ≤30 days reported depression vs 47% of those hospitalized &gt;30 days)</li> </ul>

**KEY QUESTION 3: How often do adults with preexisting MH conditions who have been hospitalized for COVID-19 experience exacerbation of MH symptoms?**

We identified no evidence addressing this question.

**KEY QUESTION 3A: ... compared to those with outpatient COVID-19?**

We identified no evidence addressing this question.

**KEY QUESTION 3B: ... compared to adults hospitalized for other causes?**

We identified no evidence addressing this question.

**KEY QUESTION 3C: Does the probability of exacerbating MH symptoms during or after hospitalization for COVID-19 vary by patient characteristics (eg, age, sex, race/ethnicity, comorbidities), COVID-19 disease severity, or level of care?**

We identified no evidence addressing this question.

**KEY QUESTION 4: How often and what kinds of MH care do adults access during or after hospitalization for COVID-19?**

We identified no evidence addressing this question.

**KEY QUESTION 4A: Does the type or extent of MH care used by adults during or after COVID-19 hospitalization differ compared to before hospitalization?**

We identified no evidence addressing this question.

**KEY QUESTION 4B: Does the type or extent of MH care utilization differ for adults hospitalized for COVID-19 compared to adults receiving outpatient treatment for COVID-19?**

We identified no evidence addressing this question.

**KEY QUESTION 4C: Does the type or extent of MH care utilization differ for adults hospitalized for COVID-19 compared to adults hospitalized for other causes?**

We identified no evidence addressing this question.

**KEY QUESTION 4D: Does the type or extent of MH care utilization during or after hospitalization for COVID-19 vary by patient characteristics (eg, age, sex, race/ethnicity, comorbidities), COVID-19 disease severity, or level of care?**

We identified no evidence addressing this question.

**KEY QUESTION 5: What are the MH care resource needs among adults who have been hospitalized for COVID-19?**

We identified no evidence addressing this question.

## SUMMARY AND DISCUSSION

We conducted a rapid evidence review to determine the prevalence of mental health disorders among adults hospitalized for COVID-19, to compare this to the prevalence of mental health disorders in relevant comparison groups, and to determine mental health care utilization and resource needs post-hospitalization for patients with COVID-19. Although a few systematic reviews have examined the prevalence of mental health disorders during the COVID-19 pandemic, they have either focused on the general population,<sup>27</sup> or evaluated patients with COVID-19 together with SARS and MERS patients.<sup>11</sup> To our knowledge, this is the first evidence review on the prevalence of mental health disorders *specifically* among patients who have been hospitalized for COVID-19.

We identified only 2 small, cross-sectional studies<sup>25,26</sup> from Iran and China that reported the prevalence of mental health disorders among patients hospitalized for COVID-19. These studies found that 43.3-44% of patients hospitalized for COVID-19 had depression symptoms during or immediately after hospitalization, although the prevalence of diagnosed Major Depressive Disorder was much lower (3.3%) in 1 study.<sup>26</sup> One of these studies<sup>26</sup> found that 23.3% of patients hospitalized for COVID-19 have anxiety symptoms during hospitalization; although similar to depression, the prevalence of diagnosed Generalized Anxiety Disorder was much lower (6.7%). The prevalence of mental health symptoms can be higher than the prevalence of mental health diagnoses because the presence of 1 or more symptoms may not satisfy all diagnostic criteria.

Symptom screening tools and clinician diagnosis of mental health disorders can also disagree.<sup>28</sup> The single study<sup>26</sup> we identified on diagnoses (not just symptom severity) measured outcomes during hospitalization, meaning that even if many symptoms were present, a diagnosis might not be given until a longer period of time has passed. The DSM-5<sup>29</sup> requires patients to have symptoms for 2 weeks to be diagnosed with Major Depressive Disorder and 6 months for Generalized Anxiety Disorder, so it is possible patients in this study had initial symptoms could not be formally diagnosed. Providers may also have seen mental health symptoms (*eg*, anxiety, trauma responses, insomnia, or depression) as a temporary and “normal” result of being seriously ill or as symptoms or side-effects of COVID-19 itself, and therefore did not attempt to diagnose mental health disorders. Although psychiatrists provided diagnoses in the study we identified, mental health specialists are not always involved with patients’ hospital care, which may result in underdiagnosis in clinical settings.

Authors of 1 study<sup>26</sup> plan to follow up with the same patients 1 month and 6 months after hospitalization and will publish their results in a subsequent article. This article will help clarify whether patients with COVID-19 who have anxiety and depression symptoms go on to develop mental health disorders.

In addition to our findings on anxiety and depression, we identified 1 fair-quality cross-sectional study<sup>26</sup> that reported a high prevalence of diagnosed insomnia (43.3%) and diagnosed adjustment disorder (26.7%) among patients hospitalized for COVID-19. These findings are not surprising given the frequent sleep disturbances patients with COVID-19 likely experience in hospital settings, as well as the potential stress and trauma of being acutely ill and hospitalized. Overall, findings from these 2 studies align with a recent systematic review<sup>11</sup> on the prevalence of mental health issues among patients with serious illness primarily from SARS or MERS. This review



found high prevalence of depression symptoms (43.3-44% for COVID-19 vs 32.6% for SARS/MERS), insomnia symptoms (43.3% for COVID-19 vs 41.9% for SARS/MERS) and anxiety symptoms (23.3% for COVID-19 vs 35.7% for SARS/MERS) in the acute phase of illness. Because we only identified studies evaluating mental health outcomes during or immediately after hospitalization for COVID-19, the incidence of new mental health disorders among these patients is unclear.

In terms of comparative prevalence, 1 cross-sectional study<sup>26</sup> reported that patients hospitalized for severe COVID-19 had a similar prevalence of depression symptoms, anxiety symptoms, diagnosed Major Depressive Disorder, and diagnosed Generalized Anxiety Disorder as those who had mild COVID-19 but were not hospitalized. However, those who were hospitalized for COVID-19 had twice the prevalence of diagnosed insomnia and nearly 3 times the prevalence of diagnosed adjustment disorders. Hospital settings are likely to contribute to sleep issues and serious illness requiring hospitalization may contribute to the development of adjustment disorders. Finally, 1 cross-sectional study<sup>25</sup> reported no significant correlations between depression symptoms and patient characteristics or COVID-19 severity, which is surprising given evidence that people with certain comorbidities (including cancer, diabetes, chronic obstructive pulmonary disease, and coronary heart disease) have higher than average risk of being hospitalized for COVID-19<sup>30</sup> and having a depressive disorder.<sup>31</sup> Given the study's small sample size (N=96) it is possible it was underpowered to detect subgroup differences.

## LIMITATIONS

There were limitations to both our rapid review methods and limitations of our included studies.

### Rapid Review Limitations

The primary limitation of our rapid review methods is that we had a single reviewer assess articles for inclusion, abstract data, and assess study quality, with a second reviewer verifying selection and abstraction. This could have resulted in missing eligible studies or data, although we attempted to reduce this risk by establishing explicit inclusion criteria for studies, developing and using a piloted data abstraction tool, and developing a key for determining whether a study met each of JBI's quality criteria.

### Primary Study Limitations

There were several important limitations of the 2 included studies. First, studies only examined civilians from a single hospital in China<sup>25</sup> or a single city in Iran.<sup>26</sup> It is well-established that the prevalence of mental health disorders varies by country,<sup>32</sup> and varies between civilian and Veteran populations.<sup>22</sup> Therefore, findings from these 2 studies may not reflect the prevalence of mental health disorders among US Veterans. Second, both studies were small (<100 participants), which reduces the generalizability of their prevalence estimates. Third, studies did not account for baseline confounders that could have influenced outcomes, the most important of which is pre-existing mental health disorders. Some mental health disorders such as depression may be risk factors for being hospitalized for COVID-19<sup>22</sup>; therefore, high *post*-hospitalization prevalence of mental health disorders may be due to high *pre*-hospitalization prevalence of mental health disorders, rather than because patients developed mental health disorders as a result of their COVID-19 illness. Only 1 study<sup>26</sup> in this review measured the prevalence of preexisting psychiatric diagnoses and indeed found the prevalence was higher in hospitalized

compared to non-hospitalized groups. However, study authors did not account for these differences when estimating the post-hospitalization prevalence of mental health disorders, so estimates may be influenced by these pre-hospitalization differences. No studies reported or accounted for other types of baseline confounders that could have influenced the prevalence of mental health disorders, such as homelessness or lack of social support. Fourth, studies only measured outcomes during hospitalization or immediately afterward, so no data are available on patients' intermediate or long-term mental health outcomes.

## GAPS AND FUTURE RESEARCH

We identified several important knowledge gaps that should be informed by future research.

- Researchers should assess the prevalence of psychiatric disorders including but not limited to anxiety disorders, mood disorders, PTSD, substance use disorders, sleep disorders, and psychotic disorders among patients hospitalized for COVID-19. We identified no studies evaluating the prevalence of PTSD, psychotic disorders, or substance use disorders among people hospitalized for COVID-19. Evidence from primarily SARS and MERS patients who are seriously ill indicate that almost one-third go on to develop PTSD,<sup>11</sup> and it is plausible that those hospitalized with COVID-19 might be at a similar risk. There is also a well-established link between traumatic experiences and substance use disorders,<sup>33</sup> and those who experience trauma from their COVID-19 illness could be at risk of developing substance use disorders after hospital discharge. While psychotic disorders are overall less prevalent than PTSD or substance use disorders, there have been case reports of psychosis among hospitalized patients with COVID-19.<sup>34</sup> Researchers should follow these patients to assess whether incidents of in-hospital psychosis recur or become longer-term psychotic disorders. Finally, although we identified 1-2 studies examining the prevalence of depression, anxiety, insomnia, and adjustment disorders, evidence was insufficient to draw firm conclusions.
- Researchers should conduct larger, longer, multi-center studies to provide more rigorous estimates of post-hospitalization prevalence of mental health disorders. We identified just 2 cross-sectional studies conducted in single hospitals and single cities, with only 172 participants. Additionally, studies only analyzed data during or immediately after hospitalization for COVID-19. Researchers should conduct larger studies, at multiple locations (*ie*, multiple hospitals/clinics at multiple locations), with longer periods of follow-up (*ie*, at 3 months post-discharge or 6 months post-discharge) to allow for time to meet DSM-5 criteria for a new-onset mental health disorder.
- Researchers should compare patients who have been hospitalized for COVID-19 to relevant control groups. More comparative studies are needed, as these can help to determine to what extent outcomes are driven by the COVID-19 illness itself or by other factors such as the experience of hospitalization, severity of COVID-19 symptoms, level of care needed such as ICU versus non-ICU, and other factors.
- Researchers should report and account for potential confounders, particularly preexisting mental health disorders, medications, and medical comorbidities. As discussed in the “Limitations” section, the prevalence of *post-hospitalization* mental health disorders is likely influenced by the prevalence of *pre-hospitalization* mental health disorders. For

cross-sectional studies, researchers should at minimum report the proportion of participants with specific preexisting mental health disorders. For comparative cross-sectional studies or longitudinal studies, researchers should report the proportion of participants with specific preexisting mental health disorders *for each comparison group*. Ideally, researchers would account for preexisting mental health disorders in prevalence estimates (eg, by separately reporting the proportion of participants with mental health disorders among those who had preexisting disorders and the proportion of participants with new-onset mental health disorders, and by estimating adjusted prevalence or risk ratios). Similarly, researchers should also report patients' preexisting medications and medical comorbidities. Finally, wherever possible, researchers should also report on patients' social determinants of health (such as homelessness and social support), as these factors are likely to influence the pre-hospitalization prevalence of mental health disorders.

- Researchers should assess the mental health care utilization and resource needs of patients after their discharge for COVID-19. We identified no studies assessing mental health care utilization (including use of medications) or self-reported resource needs for patients hospitalized for COVID-19. It is unclear, for example, whether these patients should be screened for mental health disorders, and if so, when. It is also unclear if traditional methods of diagnosing and treating mental health disorders are sufficient for these patients, or if additional or novel assessments, treatment strategies, or resources should be provided. Given the absence of evidence on patients' post-hospitalization needs and preferences, continuing to rely on existing, standard procedures for primary care outreach to assess patients' mental and physical health needs after hospitalization is likely appropriate. However, developing mental health screening tools tailored to the specific needs of patients who have been hospitalized for COVID-19 is also warranted. Screening items could include assessment of mental health symptoms related to hospitalization as well as other concerns stemming from the COVID-19 pandemic that could impact mental health (eg, loss of employment, separation from loved ones, anxiety about possible reinfection, *etc*).

## ONGOING AND UNPUBLISHED LITERATURE

We identified 5 ongoing or unpublished studies, including 1 RCT protocol and 4 preprint studies (Table 6). After peer-reviewed publication, 3 of these studies will likely address important gaps in research. The RCT,<sup>35</sup> which will examine the incidence of anxiety, depression, and PTSD among patients with COVID-19 six months after ICU-discharge, will provide a clearer idea of the long-term mental health impact of being critically ill with COVID-19. One preprint study<sup>36</sup> that includes 841 patients from 2 hospitals in Spain will provide a more rigorous assessment of the prevalence of mental health disorders during hospitalization, given the larger sample size and inclusion of data from more than 1 hospital. A second preprint study<sup>37</sup> will report the percent of people hospitalized for COVID-19 who are prescribed psychotropic medications, and will provide some preliminary information on mental healthcare needs. Of note, none of these studies were conducted in the US.

**Table 6. Ongoing and Unpublished Literature on Mental Health Outcomes & Utilization after COVID-19 Hospitalization**

<b>Author year Study design Expected sample size Article type Country</b>	<b>Study objective</b>	<b>Population</b>	<b>Planned Outcome Measurements</b>
Nino 2020 <sup>35</sup> RCT Expected N=102 ClinicalTrials.gov protocol Spain	Primary objective is to evaluate the impact of an early care program among ICU-admitted patients with COVID-19. Secondary objective is to evaluate incidence of mental health disorders 6 months after ICU discharge.	Patients over 18 years who have been admitted to intensive care units with the diagnosis of COVID-19 disease at risk of presenting PICS	<ul style="list-style-type: none"> <li>Incidence of anxiety, depression, and PTSD at 6 months post ICU-discharge</li> </ul>
Kong 2020 <sup>38</sup> Cross-sectional Expected N=144 Preprint study China	Explore the prevalence and factors linked to anxiety and depression among hospitalized patients with COVID-19	Patients with confirmed COVID-19 admitted to a single hospital	<ul style="list-style-type: none"> <li>Prevalence of anxiety and depression symptoms (Hospital Anxiety and Depression Scale [HADS]) during hospitalization</li> </ul>
Qi 2020 <sup>39</sup> Cross-sectional Expected N=41 Preprint study China	Examine the prevalence and risk factors for psychological issues for hospitalized patients with COVID-19	Patients with confirmed COVID-19 receiving treatment in isolation ward of a single hospital	<ul style="list-style-type: none"> <li>Prevalence of anxiety (Zung Self-Rating Anxiety Scale), depression (Zung Self-Rating Depression Scale), PTSD (PTSD Checklist Civilian Version) during hospitalization</li> <li>Association of risk factors (Chinese Social Support Rating Scale)</li> </ul>
Romero-Sanchez 2020 <sup>36</sup> Expected N=841 Cross-sectional Preprint study Spain	Determine whether neurological (including neuropsychiatric) manifestations are common in hospitalized patients with COVID-19 and to describe their main characteristics	Patients with confirmed COVID-19 admitted to 2 hospitals	<ul style="list-style-type: none"> <li>Prevalence of insomnia, anxiety, depression, and psychosis symptoms during hospitalization according to medical records</li> <li>Association of risk factors (severity of disease)</li> </ul>
Kim 2020 <sup>37</sup> Expected N=80 Retrospective cohort Preprint study South Korea	Examine the prevalence of current psychiatric disorders and psychotropic drug use in the acute phase of COVID-19 treatment, and to know their risk factors.	Patients with COVID-19 in isolation wards of 1 hospital.	<ul style="list-style-type: none"> <li>Prevalence of self-reported depression and PTSD during hospitalization</li> <li>Prevalence of current diagnoses of mental disorders (insomnia, acute stress reaction, panic disorder, depressive episodes) during hospitalization</li> <li>Percent who were prescribed psychotropic drugs during hospitalization</li> <li>Factors associated with psychiatric diagnosis</li> </ul>

## CONCLUSIONS

Overall, the prevalence of mental health disorders among patients who have been hospitalized for COVID-19 is uncertain, as this body of literature is in its infancy. At this time, we identified only 2 small studies addressing this question, and both had important methodological limitations. Preliminary evidence from these studies suggests the prevalence of depression symptoms (43.4-44%), anxiety symptoms (23.3%), and insomnia diagnoses (43.3%) among patients with COVID-19 during or immediately after hospitalization may be similar to the prevalence seen in patients hospitalized for SARS or MERS. More research is needed to determine if people hospitalized for COVID-19 develop new mental health conditions or experience exacerbation of existing mental health conditions, and what mental health care resources are needed.

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In designing the study questions and methodology at the outset of this report, the ESP consulted several technical and content experts. Broad expertise and perspectives were sought. Divergent and conflicting opinions are common and perceived as healthy scientific discourse that results in a thoughtful, relevant systematic review. Therefore, in the end, study questions, design, methodologic approaches, and/or conclusions do not necessarily represent the views of individual technical and content experts.

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### Operational Partners

Operational partners are system-level stakeholders who have requested the report to inform decision-making. They recommend Technical Expert Panel (TEP) participants; assure VA relevance; help develop and approve final project scope and timeframe for completion; provide feedback on draft report; and provide consultation on strategies for dissemination of the report to field and relevant groups.

#### **Joe Francis, MD**

Chief Improvement and Analytics Officer  
*Office of the Under Secretary for Health*

#### **Clifford Smith, MD**

Deputy Director  
*Office of Mental Health Operations*

#### **David Carroll, PhD**

Executive Director  
*Office of Mental Health & Suicide Prevention*

### Peer Reviewers

The Coordinating Center sought input from external peer reviewers to review the draft report and provide feedback on the objectives, scope, methods used, perception of bias, and omitted evidence. Peer reviewers must disclose any relevant financial or non-financial conflicts of interest. Because of their unique clinical or content expertise, individuals with potential conflicts may be retained. The Coordinating Center and the ESP Center work to balance, manage, or mitigate any potential nonfinancial conflicts of interest identified.



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