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

## Supplementary Materials

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October 2020

### Prepared for:

Department of Veterans Affairs  
Veterans Health Administration  
Health Services Research & Development Service  
Washington, DC 20420

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**U.S. Department of Veterans Affairs**

Veterans Health Administration  
Health Services Research & Development Service

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## SEARCH STRATEGIES

### SYSTEMATIC REVIEW SEARCH STRATEGIES

| Ovid MEDLINE [Ovid MEDLINE(R) ALL 1946 to July 14, 2020]<br>Date Searched: 07-15-2020 |   |         |
|---|---|---------|
| #   | Search Statement  | Results |
| 1   | ((coronavir* OR corona virus* OR betacoronavir* OR covid19 OR covid 19 OR nCoV OR CoV 2 OR CoV2 OR sarscov2 OR 2019nCoV OR 2019 novel coronavirus* OR 2019 novel CoV OR wuhan virus*) OR ((wuhan OR hubei OR huanan) AND (severe acute respiratory OR pneumonia*))).ti,ab,kw.   | 48412   |
| 2   | Coronavirus Infections/ OR Coronavirus/ OR betacoronavirus/   | 16871   |
| 3   | 1 or 2  | 48412   |
| 4   | Mental Health/ or exp Mood Disorders/ or exp Depression/ or Depressive Disorder/ or exp Anxiety/ or exp Anxiety Disorders/ or exp Stress Disorders, Traumatic/ or exp Substance-Related Disorders/ or Psychotic Disorders/ or exp Psychotic Affective Disorders/ or exp Hallucinations/ or exp Delusions/ or exp Apathy/ or exp Euphoria/ or exp Aggression/ or exp Personality Disorders/ or exp Schizophrenia/ or exp Mental Disorders/ or exp Obsessive-Compulsive Disorder/ or exp Panic Disorder/ or exp Bipolar Disorder/ or exp Suicide/ or exp Emotions/ or exp Confusion/  | 1563391 |
| 5   | ((mental adj1 health) or mood or depressed or depression or depressive or anxiety or anxieties or anxious or stress disorder or stress disorders or PTSD or post?trauma or post?traumatic or (substance adj1 (abuse or addiction or dependence)) or (drug adj1 (abuse or addiction or dependence)) or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or (obsessive adj compulsive) or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused).ti,ab,kw.  | 1230788 |
| 6   | 4 or 5  | 2145963 |
| 7   | exp Hospitalization/ or exp Intensive Care Units/ or Inpatients/ or Subacute Care/  | 324771  |
| 8   | (hospital or hospitalized or hospitalization or intensive or ICU or care or post?acute or inpatient or inpatients or admit or admitted or admitting).ti,ab,kw.  | 2428429 |
| 9   | 7 or 8  | 2499547 |
| 10  | 3 and 6 and 9   | 652     |
| 11  | (systematic review.ti. or meta-analysis.pt. or meta-analysis.ti. or systematic literature review.ti. or this systematic review.tw. or pooling project.tw. or (systematic review.ti,ab. and review.pt.) or meta synthesis.ti. or meta-analy*.ti. or integrative review.tw. or integrative research review.tw. or rapid review.tw. or umbrella review.tw. or consensus development conference.pt. or practice guideline.pt. or drug class reviews.ti. or cochrane database syst rev.jn. or acp journal club.jn. or health technol assess.jn. or evid rep technol assess summ.jn. or jbi database system rev implement rep.jn. or (clinical guideline and management).tw. or ((evidence based.ti. or evidence-based medicine/ or best practice*.ti. or evidence synthesis.ti,ab.) and (((review.pt. or diseases category/ or behavior.mp.) and behavior mechanisms/) or therapeutics/ or evaluation studies.pt. or validation studies.pt. or guideline.pt. or pmcbook.mp.)) or (((systematic or systematically).tw. or critical.ti,ab. or study selection.tw. or ((predetermined or inclusion) and criteri*).tw. or exclusion criteri*.tw. or main outcome measures.tw. or standard of care.tw. or standards of care.tw.) and ((survey or surveys).ti,ab. or overview*.tw. or review.ti,ab. or reviews.ti,ab. or search*.tw. or handsearch.tw. or analysis.ti. or critique.ti,ab. or appraisal.tw. or (reduction.tw. and (risk/ or risk.tw.) and (death or recurrence).mp.)) and ((literature or articles or publications or publication or bibliography | 404486  |

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|----|---|----|
|    | or bibliographies or published).ti,ab. or pooled data.tw. or unpublished.tw. or citation.tw. or citations.tw. or database.ti,ab. or internet.ti,ab. or textbooks.ti,ab. or references.tw. or scales.tw. or papers.tw. or datasets.tw. or trials.ti,ab. or meta-analy*.tw. or (clinical and studies).ti,ab. or treatment outcome/ or treatment outcome.tw. or pmcbook.mp.))) not (letter or newspaper article).pt. |    |
| 12 | 10 and 11   | 25 |
| 13 | limit 12 to english language  | 22 |
| 14 | limit 13 to yr="2019-Current"   | 22 |

| <b>Cochrane Database of Systematic Reviews (CDSR)</b> |  |                |
|---|--|----------------|
| <b>Date Searched: 07-15-2020</b>                      |  |                |
| <b>#</b>  | <b>Search Statement</b>  | <b>Results</b> |
| 1   | ((coronavir* OR corona virus* OR betacoronavir* OR covid19 OR covid 19 OR nCoV OR CoV 2 OR CoV2 OR sarscov2 OR 2019nCoV OR 2019 novel coronavirus* OR 2019 novel CoV OR wuhan virus*) OR ((wuhan OR hubei OR huanan) AND (severe acute respiratory OR pneumonia*)))ti,ab,kw. | 9              |
| 2   | MeSH descriptor: [Coronavirus Infections] explode all trees  | 6              |
| 3   | MeSH descriptor: [Coronavirus] explode all trees   | 4              |
| 4   | MeSH descriptor: [Coronavirus] explode all trees   | 4              |
| 5   | {OR #1-#4}   | 9              |
| 6   | MeSH descriptor: [Mental Health] explode all trees   | 21             |
| 7   | MeSH descriptor: [Mood Disorders] explode all trees  | 66             |
| 8   | MeSH descriptor: [Depression] explode all trees  | 165            |
| 9   | MeSH descriptor: [Depressive Disorder] explode all trees   | 62             |
| 10  | MeSH descriptor: [Anxiety] explode all trees   | 83             |
| 11  | MeSH descriptor: [Anxiety Disorders] explode all trees   | 42             |
| 12  | MeSH descriptor: [Stress Disorders, Post-Traumatic] explode all trees  | 22             |
| 13  | MeSH descriptor: [Substance-Related Disorders] explode all trees   | 135            |
| 14  | MeSH descriptor: [Psychotic Disorders] explode all trees   | 48             |
| 15  | MeSH descriptor: [Affective Disorders, Psychotic] explode all trees  | 1              |
| 16  | MeSH descriptor: [Hallucinations] explode all trees  | 2              |
| 17  | MeSH descriptor: [Hallucinations] explode all trees  | 1              |
| 18  | MeSH descriptor: [Apathy] explode all trees  | 1              |
| 19  | MeSH descriptor: [Euphoria] explode all trees  | 1              |
| 20  | MeSH descriptor: [Aggression] explode all trees  | 29             |
| 21  | MeSH descriptor: [Personality Disorders] explode all trees   | 11             |
| 22  | MeSH descriptor: [Schizophrenia] explode all trees   | 189            |
| 23  | MeSH descriptor: [Mental Disorders] explode all trees  | 868            |
| 24  | MeSH descriptor: [Obsessive-Compulsive Disorder] explode all trees   | 7              |
| 25  | MeSH descriptor: [Panic Disorder] explode all trees  | 8              |
| 26  | MeSH descriptor: [Bipolar Disorder] explode all trees  | 22             |
| 27  | MeSH descriptor: [Suicide] explode all trees   | 11             |
| 28  | MeSH descriptor: [Emotions] explode all trees  | 103            |
| 29  | MeSH descriptor: [Confusion] explode all trees   | 20             |
| 30  | ((mental NEXT health) or mood or depressed or depression or depressive or anxiety or   | 1663           |

|    |   |      |
|----|---|------|
|    | anxieties or anxious or stress disorder or stress disorders or PTSD or post?trauma or post?traumatic or (substance NEAR/1 (abuse or addiction or dependence)) or (drug NEAR/1 (abuse or addiction or dependence)) or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or (obsessive NEXT compulsive) or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused).ti,ab,kw |      |
| 31 | {OR #6-#30}   | 1892 |
| 32 | MeSH descriptor: [Hospitalization] in all MeSH products   | 350  |
| 33 | MeSH descriptor: [Intensive Care Units] explode all trees   | 68   |
| 34 | MeSH descriptor: [Inpatients] explode all trees   | 8    |
| 35 | MeSH descriptor: [Subacute Care] explode all trees  | 0    |
| 36 | ((hospital or hospitalized or hospitalization or intensive or ICU or care or post?acute or inpatient or inpatients or admit or admitted or admitting)):ti,ab,kw   | 3561 |
| 37 | {OR #32-#36}  | 3565 |
| 38 | #5 AND #31 AND #37  | 2    |

| Non-Bibliographic Databases<br>Date Searched: 07-16-20                  |  |                  |
|---|--|------------------|
| Database/Resource   | Search Terms/Relevant Results  | Relevant Results |
| Cochrane COVID Rapid Reviews  | <a href="https://www.cochranelibrary.com/covid-19#Rapid%20reviews">https://www.cochranelibrary.com/covid-19#Rapid%20reviews</a><br>Search terms: mental health                           | 0                |
| CEBM Oxford COVID-19 Evidence Service                                   | <a href="https://www.cebm.net/covid-19/">https://www.cebm.net/covid-19/</a><br>Search terms: mental health   | 0                |
| CADTH   | <a href="https://covid.cadth.ca/">https://covid.cadth.ca/</a><br>Search terms: mental health   | 0                |
| McMaster University National Collaborating Centre for Methods and Tools | <a href="https://www.nccmt.ca/knowledge-repositories/covid-19-evidence-reviews">https://www.nccmt.ca/knowledge-repositories/covid-19-evidence-reviews</a><br>Search terms: mental health | 0                |
| VA ESP COVID-19 Evidence Reviews  | <a href="https://www.covid19reviews.org">https://www.covid19reviews.org</a><br>Search terms: mental health   | 2                |

| <b>Systematic Reviews Under Development</b><br><b>Date Searched: 07-16-20</b> |   |                         |
|---|---|-------------------------|
| <b>Database/Resource</b>  | <b>Search Terms/Relevant Results</b>  | <b>Relevant Results</b> |
| PROSPERO (SR registry)  | <a href="http://www.crd.york.ac.uk/PROSPERO/">http://www.crd.york.ac.uk/PROSPERO/</a><br>Search terms: mental health  | 3                       |
| CEBM Oxford COVID-19 Evidence Service   | <a href="https://www.cebm.net/covid-19/current-questions-under-review/">https://www.cebm.net/covid-19/current-questions-under-review/</a><br>Search terms: mental health  | 0                       |
| Cochrane COVID Rapid Reviews  | <a href="https://covidrapidreviews.cochrane.org/search/site/">https://covidrapidreviews.cochrane.org/search/site/</a><br>Search terms: mental health  | 1                       |
| CADTH   | <a href="https://covid.cadth.ca/work-in-progress/">https://covid.cadth.ca/work-in-progress/</a><br>Search terms: mental health  | 0                       |
| McMaster University National Collaborating Centre for Methods and Tools       | <a href="https://www.nccmt.ca/knowledge-repositories/covid-19-evidence-reviews">https://www.nccmt.ca/knowledge-repositories/covid-19-evidence-reviews</a><br>Search terms: mental health  | 1                       |
| medRxiv   | <a href="https://icite.od.nih.gov/covid19/search/#search:searchId=5f10ae17bc36f669e122f7bb">https://icite.od.nih.gov/covid19/search/#search:searchId=5f10ae17bc36f669e122f7bb</a><br>Search terms: mental health (Filters: medRxiv, Systematic Reviews, title/abstract) | 0                       |

## PRIMARY LITERATURE SEARCH STRATEGIES

| <b>Ovid MEDLINE [Ovid MEDLINE(R) ALL 1946 to July 15, 2020]</b><br><b>Date searched: 07-16-20</b> |  |                |
|---|--|----------------|
| <b>#</b>  | <b>Search Statement</b>  | <b>Results</b> |
| 1   | (coronavir* OR corona virus* OR betacoronavir* OR covid19 OR covid 19 OR nCoV OR CoV 2 OR CoV2 OR sarscov2 OR 2019nCoV OR 2019 novel coronavirus* OR 2019 novel CoV OR wuhan virus*) OR ((wuhan OR hubei OR huanan) AND (severe acute respiratory OR pneumonia*)).ti,ab,kw.  | 48108          |
| 2   | Coronavirus Infections/ OR Coronavirus/ OR betacoronavirus/  | 17113          |
| 3   | 1 or 2   | 48108          |
| 4   | Mental Health/ or exp Mood Disorders/ or exp Depression/ or Depressive Disorder/ or exp Anxiety/ or exp Anxiety Disorders/ or exp Stress Disorders, Traumatic/ or exp Substance-Related Disorders/ or Psychotic Disorders/ or exp Psychotic Affective Disorders/ or exp Hallucinations/ or exp Delusions/ or exp Apathy/ or exp Euphoria/ or exp Aggression/ or exp Personality Disorders/ or exp Schizophrenia/ or exp Mental Disorders/ or exp Obsessive-Compulsive Disorder/ or exp Panic Disorder/ or exp Bipolar Disorder/ or exp Suicide/ or exp Emotions/ or exp Confusion/ | 1563659        |

|    |  |         |
|----|--|---------|
| 5  | ((mental adj1 health) or mood or depressed or depression or depressive or anxiety or anxieties or anxious or stress disorder or stress disorders or PTSD or post?trauma or post?traumatic or (substance adj1 (abuse or addiction or dependence)) or (drug adj1 (abuse or addiction or dependence)) or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or (obsessive adj compulsive) or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused).ti,ab,kw. | 1230514 |
| 6  | 4 or 5   | 2145835 |
| 7  | exp Hospitalization/ or exp Intensive Care Units/ or Inpatients/ or Subacute Care/   | 324852  |
| 8  | (hospital or hospitalized or hospitalization or intensive or ICU or care or post?acute or inpatient or inpatients or admit or admitted or admitting).ti,ab,kw.   | 2427329 |
| 9  | 7 or 8   | 2498467 |
| 10 | 3 and 6 and 9  | 667     |
| 11 | limit 10 to english language   | 621     |
| 12 | limit 11 to yr="2019-Current"  | 596     |

**WHO COVID-19 Database****Date searched: 07-17-20**

| # | Search Statement   | Results |
|---|--|---------|
| 1 | mental health or mood or depressed or depression or depressive or anxiety or anxieties or anxious or stress disorder or stress disorders or PTSD or post-trauma or post-traumatic or substance abuse or substance addiction or substance dependence or drug abuse or drug addiction or drug dependence or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or obsessive compulsive or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused (Title, abstract, subject) | 1986    |
| 2 | hospital or hospitalized or hospitalization or intensive or ICU or care or post-acute or post acute or inpatient or inpatients or admit or admitted or admitting (Title, abstract, subject)  | 21697   |
| 3 | 1 and 2  | 1299    |
| 4 | limit 3 to english language  | 1090    |

**PsycINFO (Ovid)****Date Searched: 07-16-20**

| # | Search Statement   | Results |
|---|--|---------|
| 1 | TI ( ((coronavir* OR corona virus* OR betacoronavir* OR covid19 OR covid 19 OR nCoV OR CoV 2 OR CoV2 OR sarscov2 OR 2019nCoV OR 2019 novel coronavirus* OR 2019 novel CoV OR wuhan virus*) OR ((wuhan OR hubei OR huanan) AND (severe acute respiratory OR pneumonia*))) ) OR AB ( ((coronavir* OR corona virus* OR betacoronavir* OR covid19 OR covid 19 OR nCoV OR CoV 2 OR CoV2 OR sarscov2 OR 2019nCoV OR 2019 novel coronavirus* OR 2019 novel CoV OR wuhan virus*) OR ((wuhan OR hubei OR huanan) AND (severe acute respiratory OR pneumonia*))) ) OR KW ( ((coronavir* OR corona virus* OR betacoronavir* OR covid19 OR covid 19 OR nCoV OR CoV 2 OR CoV2 OR sarscov2 OR 2019nCoV OR 2019 novel coronavirus* OR 2019 novel CoV OR wuhan virus*) OR ((wuhan OR hubei OR huanan) AND (severe acute respiratory OR pneumonia*))) ) | 437     |
| 2 | DE "Coronavirus"   | 339     |
| 3 | 1 or 2   | 587     |

|   |   |         |
|---|---|---------|
| 4 | <p>(((((DE "Mental Health" OR DE "Mental Status") OR (DE "Affective Disorders" OR DE "Disruptive Mood Dysregulation Disorder" OR DE "Major Depression")) OR (DE "Major Depression" OR DE "Anaclitic Depression" OR DE "Dysthymic Disorder" OR DE "Endogenous Depression" OR DE "Reactive Depression" OR DE "Recurrent Depression" OR DE "Treatment Resistant Depression")) AND (DE "Anxiety" OR DE "Anxiety Sensitivity" OR DE "Death Anxiety" OR DE "Health Anxiety" OR DE "Social Anxiety" OR DE "Anxiety Disorders" OR DE "Generalized Anxiety Disorder" OR DE "Obsessive Compulsive Disorder" OR DE "Panic Attack" OR DE "Panic Disorder" OR DE "Phobias" OR DE "Separation Anxiety Disorder" OR DE "Trichotillomania")) OR (DE "Posttraumatic Stress Disorder" OR DE "Complex PTSD" OR DE "DESNOS")) OR (DE "Substance Use Disorder" OR DE "Addiction" OR DE "Alcohol Use Disorder" OR DE "Cannabis Use Disorder" OR DE "Drug Abuse" OR DE "Drug Dependency" OR DE "Inhalant Abuse" OR DE "Opioid Use Disorder" OR DE "Tobacco Use Disorder")) OR (DE "Psychoticism")) AND (DE "Acute Psychosis" OR DE "Acute Schizophrenia" OR DE "Acute Schizophrenia" OR DE "Acute Stress Disorder")) OR (DE "Hallucinations" OR DE "Auditory Hallucinations" OR DE "Hypnagogic Hallucinations" OR DE "Visual Hallucinations")) OR (DE "Delusions")) OR (DE "Apathy")) OR (DE "Euphoria")) AND (DE "Aggressive Behavior" OR DE "Attack Behavior" OR DE "Coercion" OR DE "Conflict" OR DE "Microaggression" OR DE "Relational Aggression" OR DE "Threat" OR DE "Aggressiveness")) OR (DE "Personality Disorders" OR DE "Antisocial Personality Disorder" OR DE "Avoidant Personality Disorder" OR DE "Borderline Personality Disorder" OR DE "Dependent Personality Disorder" OR DE "Histrionic Personality Disorder" OR DE "Narcissistic Personality Disorder" OR DE "Obsessive Compulsive Personality Disorder" OR DE "Paranoid Personality Disorder" OR DE "Passive Aggressive Personality Disorder" OR DE "Sadomasochistic Personality" OR DE "Schizoid Personality Disorder" OR DE "Schizotypal Personality Disorder")) OR (DE "Mental Disorders" OR DE "Affective Disorders" OR DE "Anxiety Disorders" OR DE "Bipolar Disorder" OR DE "Borderline States" OR DE "Chronic Mental Illness" OR DE "Dissociative Disorders" OR DE "Eating Disorders" OR DE "Gender Dysphoria" OR DE "Mental Disorders due to General Medical Conditions" OR DE "Neurocognitive Disorders" OR DE "Neurodevelopmental Disorders" OR DE "Neurosis" OR DE "Paraphilias" OR DE "Personality Disorders" OR DE "Psychosis" OR DE "Serious Mental Illness" OR DE "Sleep Wake Disorders" OR DE "Somatoform Disorders" OR DE "Stress and Trauma Related Disorders" OR DE "Substance Related and Addictive Disorders" OR DE "Thought Disturbances")) OR (DE "Obsessive Compulsive Disorder" OR DE "Hoarding Disorder" OR DE "Koro")) OR (DE "Panic Disorder")) OR (DE "Bipolar Disorder" OR DE "Bipolar I Disorder" OR DE "Bipolar II Disorder" OR DE "Cyclothymic Disorder" OR DE "Mania")) OR (DE "Suicide" OR DE "Attempted Suicide" OR DE "Suicidality")) OR (DE "Emotions" OR DE "Contempt" OR DE "Desire" OR DE "Emotional Content" OR DE "Emotional Disturbances" OR DE "Emotional Health" OR DE "Emotional Processing" OR DE "Emotional Regulation" OR DE "Emotional States" OR DE "Emotional Style" OR DE "Expressed Emotion" OR DE "Negative Emotions" OR DE "Positive Emotions")) OR (DE "Mental Confusion")</p> | 477518  |
| 5 | <p>TI ( ((mental N1 health) or mood or depressed or depression or depressive or anxiety or anxieties or anxious or stress disorder or stress disorders or PTSD or post#trauma or post#traumatic or (substance N1 (abuse or addiction or dependence)) or (drug N1 (abuse or addiction or dependence)) or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or (obsessive N1 compulsive) or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused) ) OR AB ( ((mental N1 health) or mood or depressed or depression or depressive or anxiety or anxieties or anxious or stress disorder or stress disorders or PTSD or post#trauma or post#traumatic or (substance N1 (abuse or addiction or dependence)) or (drug N1 (abuse or addiction or dependence)) or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic</p>   | 1304130 |



|    |   |         |
|----|---|---------|
|    | or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or (obsessive N1 compulsive) or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused) ) OR KW ( ((mental N1 health) or mood or depressed or depression or depressive or anxiety or anxieties or anxious or stress disorder or stress disorders or PTSD or post#trauma or post#traumatic or (substance N1 (abuse or addiction or dependence)) or (drug N1 (abuse or addiction or dependence)) or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or (obsessive N1 compulsive) or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused) ) |         |
| 6  | 4 or 5  | 1405197 |
| 7  | (DE "Hospitalization" OR DE "Commitment (Psychiatric)" OR DE "Hospital Admission" OR DE "Hospital Discharge" OR DE "Psychiatric Hospitalization" OR DE "Hospitalized Patients") OR (DE "Intensive Care" OR DE "Neonatal Intensive Care")  | 47161   |
| 8  | TI ( (hospital or hospitalized or hospitalization or intensive or ICU or care or post#acute or inpatient or inpatients or admit or admitted or admitting) ) OR AB ( (hospital or hospitalized or hospitalization or intensive or ICU or care or post#acute or inpatient or inpatients or admit or admitted or admitting) ) OR KW ( (hospital or hospitalized or hospitalization or intensive or ICU or care or post#acute or inpatient or inpatients or admit or admitted or admitting) )   | 510929  |
| 9  | 7 or 8  | 515328  |
| 10 | 3 and 6 and 9   | 106     |
| 11 | limit 10 to english language  | 106     |
| 12 | limit 11 to yr="2019-Current"   | 104     |

| <b>CINAHL (EBSCO)</b>          |  |                |
|--------------------------------|--|----------------|
| <b>Date Searched: 07-17-20</b> |  |                |
| <b>#</b>                       | <b>Search Statement</b>  | <b>Results</b> |
| 1                              | TI ( ((coronavir* OR corona virus* OR betacoronavir* OR covid19 OR covid 19 OR nCoV OR CoV 2 OR CoV2 OR sarscov2 OR 2019nCoV OR 2019 novel coronavirus* OR 2019 novel CoV OR wuhan virus*) OR ((wuhan OR hubei OR huanan) AND (severe acute respiratory OR pneumonia*))) ) OR AB ( ((coronavir* OR corona virus* OR betacoronavir* OR covid19 OR covid 19 OR nCoV OR CoV 2 OR CoV2 OR sarscov2 OR 2019nCoV OR 2019 novel coronavirus* OR 2019 novel CoV OR wuhan virus*) OR ((wuhan OR hubei OR huanan) AND (severe acute respiratory OR pneumonia*))) ) OR MW ( ((coronavir* OR corona virus* OR betacoronavir* OR covid19 OR covid 19 OR nCoV OR CoV 2 OR CoV2 OR sarscov2 OR 2019nCoV OR 2019 novel coronavirus* OR 2019 novel CoV OR wuhan virus*) OR ((wuhan OR hubei OR huanan) AND (severe acute respiratory OR pneumonia*))) ) | 6508           |
| 2                              | (MH "Coronavirus Infections+") OR (MH "Coronavirus+")  | 5793           |
| 3                              | S1 or S2   | 8434           |
| 4                              | (MH "Mental Health") OR (MH "Affective Disorders+") OR (MH "Depression+") OR (MH "Anxiety+") OR (MH "Anxiety Disorders+") OR (MH "Stress Disorders, Post-Traumatic+") OR (MH "Substance Use Disorders+") OR (MH "Psychotic Disorders+") OR (MH "Affective Disorders, Psychotic+") OR (MH "Hallucinations+") OR (MH "Delusions+") OR (MH "Apathy") OR (MH "Aggression+") OR (MH "Personality Disorders+") OR (MH "Schizophrenia+") OR (MH "Mental Disorders+") OR (MH "Obsessive-Compulsive Disorder+") OR (MH "Panic Disorder") OR (MH "Bipolar Disorder+") OR (MH "Emotions+") OR (MH "Confusion+")   | 799259         |
| 5                              | TI ( ((mental N1 health) or mood or depressed or depression or depressive or anxiety or anxieties or anxious or stress disorder or stress disorders or PTSD or post?trauma or  | 691984         |

|    |  |         |
|----|--|---------|
|    | post?traumatic or (substance N1 (abuse or addiction or dependence)) or (drug N1 (abuse or addiction or dependence)) or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or (obsessive N1 compulsive) or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused) ) OR AB ( ((mental N1 health) or mood or depressed or depression or depressive or anxiety or anxieties or anxious or stress disorder or stress disorders or PTSD or post?trauma or post?traumatic or (substance N1 (abuse or addiction or dependence)) or (drug N1 (abuse or addiction or dependence)) or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or (obsessive N1 compulsive) or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused) ) OR MW ( ((mental N1 health) or mood or depressed or depression or depressive or anxiety or anxieties or anxious or stress disorder or stress disorders or PTSD or post?trauma or post?traumatic or (substance N1 (abuse or addiction or dependence)) or (drug N1 (abuse or addiction or dependence)) or psychotic or psychoses or psychosis or schizoaffective or hallucinating or hallucination or hallucinations hallucinated or delusion or delusions or apathy or apathetic or indifference or agitated or agitation or agitations or euphoria or euphoric or elation or elated or disinhibition or disinhibitions or disinhibited or aggression or aggressions or personality or mental or affective or (obsessive N1 compulsive) or OCD or panic or neurosis or neurotic or bipolar or mania or manic or suicide or suicidality or suicidal or emotion or tired or confusion or confused) ) |         |
| 6  | S4 or S5   | 1056831 |
| 7  | (MH "Hospitalization+") OR (MH "Inpatients") OR (MH "Intensive Care Units+") OR (MH "Subacute Care")   | 242805  |
| 8  | (hospital or hospitalized or hospitalization or intensive or ICU or care or post-acute or post acute or inpatient or inpatients or admit or admitted or admitting)   | 1841837 |
| 9  | S7 or S8   | 1885471 |
| 10 | S3 and S6 and S9   | 295     |
| 11 | limit S10 to english language  | 284     |
| 12 | limit S11 to yr="2019-Current"   | 193     |

## INCLUSION/EXCLUSION CRITERIA

|                     | Include   | Exclude   | Code |
|---------------------|---|---|------|
| <b>Population</b>   | <u>Include</u> adults who have been hospitalized with confirmed or presumed COVID-19 diagnosis.   | <u>Exclude</u> adults who have been hospitalized for SARs, MERs, or other respiratory diseases and adults with COVID-19 that have not been hospitalized. Also exclude adults staying at facilities where the primary purpose is to quarantine individuals who have COVID-19 or have been exposed to COVID-19. | E1   |
| <b>Intervention</b> | NA  | <u>Exclude</u> intervention studies that do not report relevant outcome data  | E2   |
| <b>Comparator</b>   | <u>Include</u> <ul style="list-style-type: none"> <li>• KQ1, 4 &amp; 5- no comparator</li> <li>• KQ2, 3, &amp; 4a- before vs after hospitalization</li> <li>• KQ2a, 3a &amp; 4b- patients hospitalized for COVID-19 vs patients who received outpatient treatment for COVID-19</li> <li>• KQ2b, 3b &amp; 4c- patients hospitalized for COVID-19 vs patients hospitalized for other causes</li> <li>• KQ2c, 3c, &amp; 4d- subgroups vs each other</li> </ul> | NA  | E3   |
| <b>Outcomes</b>     | <u>Include</u> prevalence or incidence of diagnosis or symptoms of mood disorders, anxiety disorders, trauma-related disorders, psychotic disorders, and substance use disorders, as well as health care utilization and self-reported mental health care resource needs  | <u>Exclude</u> prevalence or incidence of diagnosis or symptoms of delirium, cognitive disorders, and post intensive care syndrome (PICS) except when mental health symptoms of PICS are reported separately  | E4   |
| <b>Timing</b>       | <u>Include</u> during or after hospitalization  | <u>Exclude</u> before hospitalization   | E5   |
| <b>Setting</b>      | <u>Include</u> any setting  | NA  | E6   |
| <b>Study Design</b> | <u>Include</u> retrospective/prospective cohort or cross-sectional  | <u>Exclude</u> case series, case reports, and other study designs where sample is selected based on observed outcome  | E7   |

|                                  |  |   |     |
|----------------------------------|--|---|-----|
| <b>Publication type</b>          | <u>Include</u> full-text studies                                   | <u>Exclude</u> : Abstract only, protocol only, editorial, letter, narrative review.                                     | E8  |
| <b>Outdated or ineligible SR</b> | <u>Include</u> systematic reviews that meet our inclusion criteria | <u>Exclude</u> systematic reviews that include studies prior to 2019, that examine conditions other than COVID-19, etc. | E9  |
| <b>Language</b>                  | <u>Include</u> English   | <u>Exclude</u> languages other than English   | E10 |
| <b>Preprints</b>                 | NA   | <u>Exclude</u> pre-prints   | E11 |

## LIST OF EXCLUDED STUDIES

Exclude reasons: 1=Ineligible population, 2=Ineligible intervention, 3=Ineligible comparator, 4=Ineligible outcome, 5=Ineligible timing, 6= Ineligible setting, 7=Ineligible study design, 8=Ineligible publication type, 9=Outdated or ineligible systematic review, E10=language, E11=preprint

| #  | Citation   | Exclude reason |
|----|--|----------------|
| 1  | Ahmed, H., et al. (2020). "Long-term clinical outcomes in survivors of severe acute respiratory syndrome and Middle East respiratory syndrome coronavirus outbreaks after hospitalisation or ICU admission: A systematic review and meta-analysis." <i>Journal of Rehabilitation</i> | E1             |
| 2  | Bo, H. X., et al. (2020). "Posttraumatic stress symptoms and attitude toward crisis mental health services among clinically stable patients with COVID-19 in China." <i>Psychological Medicine</i> : 1-2.  | E1             |
| 3  | Castro, V. M. and R. H. Perlis (2020). "Electronic Health Record Documentation of Psychiatric Assessments in Massachusetts Emergency Department and Outpatient Settings During the Coronavirus Disease 2019 (COVID-19) Pandemic." <i>JAMA Network Open</i> 3(6): e2011346.           | E1             |
| 4  | Liu, X., et al. (2020). "Clinical characteristics of hospitalised patients with schizophrenia who were suspected to have coronavirus disease (COVID-19) in Hubei Province, China." <i>General Psychiatry</i> 33(2): e100222  | E1             |
| 5  | Marques, L., et al. (2020). "Three steps to flatten the mental health need curve amid the COVID-19 pandemic." <i>Depression &amp; Anxiety</i> 37(5): 405-406.  | E8             |
| 6  | Marsden, J., et al. (2020). "Mitigating and learning from the impact of COVID-19 infection on addictive disorders." <i>Addiction</i> 115(6): 1007-1010.  | E8             |
| 7  | Nalleballe, K., et al. (2020). "Spectrum of neuropsychiatric manifestations in COVID-19." <i>Brain Behav Immun</i>   | E4             |
| 8  | Nct (2020). "Early Care Program for the Management of Post-ICU Syndrome and Chronic Pain After COVID-19 Infection." <a href="https://clinicaltrials.gov/show/NCT04394169">https://clinicaltrials.gov/show/NCT04394169</a> .  | E8             |
| 9  | O'Connor, K., et al. (2020). "Mental Health Impacts of COVID-19 in Ireland and the Need for a Secondary Care, Mental Health Service Response." <i>Irish Journal of Psychological Medicine</i> : 1-18   | E8             |
| 10 | Paterson, R. W., et al. (2020). "The emerging spectrum of COVID-19 neurology: clinical, radiological and laboratory findings." <i>Brain</i> 08: 08.  | E7             |
| 11 | Pompeo-Fagnoli, A. and A. S. Fagnoli (2020). "The Mental Health Impact of the COVID19 Crisis: The Battle Ahead for Inpatient Survivors." <i>Psychosomatics</i> 08: 08.   | E8             |
| 12 | Renjun, G., et al. (2020). "Psychological intervention on COVID-19: A protocol for systematic review and meta-analysis." <i>Medicine</i> 99(21): e20335.   | E8             |
| 13 | Rogers, J. P., et al. (2020). "Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison to the COVID-19 pandemic." <i>The Lancet. Psychiatry</i> 7(7): 611-627.                           | E9             |
| 14 | Vindegaard, N. and M. E. Benros (2020). "COVID-19 pandemic and mental health consequences: Systematic review of the current evidence." <i>Brain Behav Immun</i> .  | E9             |
| 15 | Wei, N., et al. (2020). "Efficacy of internet-based integrated intervention on depression and anxiety symptoms in patients with COVID-19." <i>Journal of Zhejiang</i>  | E7             |

| #  | Citation  | Exclude reason |
|----|---|----------------|
|    | University. Science. B 21(5): 400-404.  |                |
| 16 | Wu, P. E., et al. (2020). "Mitigating the psychological effects of COVID-19 on health care workers." CMAJ: Canadian Medical Association Journal 192(17): E459-E460. | E8             |
| 17 | Zhang, J., et al. (2020). "The differential psychological distress of populations affected by the COVID-19 pandemic." Brain Behav Immun 87: 49-50.                  | E1             |

## EVIDENCE TABLES

### DATA ABSTRACTION OF INCLUDED STUDIES

| Author Year<br>Study design<br>Sample Size<br>Country                    | Population   | How diagnosed with<br>COVID-19   | Timing       | Comparator<br>(if applicable) | Outcomes   |
|--|--|--|--------------|-------------------------------|--|
| Yuan 2020 <sup>1</sup><br><br>Cross-sectional<br><br>n = 96<br><br>China | Hospitalized COVID-19 patients who were discharged to forced-quarantine at a separate hospital for 2 weeks.<br><br>-Age: 35.7% (NSRD) vs 53.7%(SRD) were 18-45 years old<br>-Sex: 50% (NSRD) vs 52.4% (SRD) were female<br>-Race: NR<br>-Comorbidities: 40.7% (NSRD) vs 38.1% (SRD) had at least 1 comorbidity | National Health Commission of China's Guideline for the Diagnosis and Treatment of COVID-19 (7th trial ed) | Feb-Mar 2020 | None                          | 42/96 (44%) of pts self-reported depressive symptoms on Zung self-rating depression scale (SDS).<br><br>No correlation between self-reported depression and gender, age, comorbidities, severity of initial infection, or duration of initial illness. |

| Author Year<br>Study design<br>Sample Size<br>Country                          | Population   | How diagnosed with<br>COVID-19            | Timing          | Comparator<br>(if applicable)                              | Outcomes   |
|--|--|---|-----------------|--|--|
| Zarghami<br>2020 <sup>2</sup><br><br>Cross-sectional<br><br>N = 82<br><br>Iran | All COVID-19 patients in 1 city,<br>excluding those who were intubated<br>or deceased, excluding children<br><10 years old, excluding pts<br>unwilling to participate in study<br><br>-Age: mean 40.3 (hospitalized);<br>mean 43.6 (non-hospitalized)<br>-Sex: 61% female<br>-Race: NR<br>-Comorbidities: 20% had history of<br>psychiatric illness and 5%<br>consumed psychiatric medications | By real-time<br>polymerase chain reaction | Mar-Apr<br>2020 | Hospitalized<br>vs outpatient<br>patients with<br>COVID-19 | <p>Pts hospitalized for COVID-19 had higher rates of diagnosed psychiatric disorders compared to non-hospitalized pts (60% vs 28.8%; p=.006).</p> <p>Pts hospitalized for COVID-19 had similar rates of diagnosed Generalized Anxiety Disorder (6.7% vs 5.8%) and diagnosed Major Depressive Disorder (3.3% vs 3.8%) as non-hospitalized pts. However, hospitalized pts had higher rates of diagnosed insomnia (43.3% vs 21.2%; p=.05) and higher rates of diagnosed adjustment disorders (26.7% vs 9.6%; p=.042).</p> <p>Those hospitalized had higher rates of diagnosed past psychiatry disorders (26.6% vs 17.3%).</p> <p>When assessed on screening tools (rather than through diagnosis), rates of depression (PHQ-9&gt;5) and anxiety (GAD-7&gt;5) were similar between hospitalized &amp; non-hospitalized groups.</p> |

KQ=Key Question; NA=Not applicable; NR=Not reported; NSRD=No self-reported depression; SRD=Self-reported depression



## CROSS-SECTIONAL STUDIES - QUALITY ASSESSMENT KEY

1. Were the criteria for inclusion in the sample clearly defined?

ESP Key:

Yes=Complete inclusion/exclusion criteria provided.

Unclear=Some inclusion/exclusion criteria provided but some key information is missing.

No= No inclusion/exclusion criteria provided.

NA=Not applicable

2. Were the study subjects and the setting described in detail?

ESP Key:

Yes= Pt characteristics including demographics (age, sex, race/ethnicity, comorbidities), COVID-19 severity, location, and time period provided

Unclear= Some info on patient characteristics provided but some key information is missing.

No= No meaningful description of study population provided.

NA=Not applicable

3. Was the exposure measured in a valid and reliable way?

ESP Key:

NA for all studies- exposure is the same as the condition for this report.

4. Were objective, standard criteria used for measurement of the condition?

ESP Key:

Yes= Confirmation of COVID-19 via laboratory testing

Unclear=Presumed COVID-19 based on clinical guidance or symptoms

No= No criteria provided or criteria were inappropriate for capturing COVID-19 status.

NA=Not applicable

5. Were confounding factors identified?

ESP Key:

Yes= Authors provide complete information on pre-existing MH disorders and other relevant confounders.

Unclear= Authors provide some information on MH disorders or other relevant confounders, but it's incomplete.

No= Authors do not provide any information on potential confounders.

NA= Not applicable

6. Were strategies to deal with confounding factors stated?

## ESP Key:

Yes= Appropriate matching or stratifying processes used to adjust for potential confounders.

Unclear= Authors attempted to control for confounders but information is missing on the methods used or results found.

No= No matching or stratifying process used

NA= Not applicable

## 7. Were the outcomes measured in a valid and reliable way?

## ESP Key:

Yes= Used diagnostic assessment or validated tool to measure outcomes

Unclear= Missing information on how outcomes were measured.

No= Non-validated tools used to measure outcomes.

NA=Not applicable

## 8. Was appropriate statistical analysis used?

## ESP Key:

Yes=Appropriate statistical analysis used and results of analyses were reported.

Unclear= Some missing information on either statistical analysis used or reported data.

No= No statistical analysis conducted.

NA= Not applicable

## QUALITY ASSESSMENT OF INCLUDED STUDIES

| Author<br>Year                | 1. Were the<br>criteria for<br>inclusion in the<br>sample clearly<br>defined?    | 2. Were the<br>study subjects<br>and the setting<br>described in<br>detail?  | 3. Was the<br>exposure<br>measured<br>in a valid<br>and<br>reliable<br>way? | 4. Were<br>objective,<br>standard<br>criteria used<br>for<br>measurement<br>of the<br>condition? | 5. Were<br>confounding<br>factors<br>identified?   | 6. Were<br>strategies to<br>deal with<br>confounding<br>factors stated?   | 7. Were the<br>outcomes<br>measured<br>in a valid<br>and reliable<br>way?  | 8. Was<br>appropriate<br>statistical<br>analysis<br>used?  | Overall         |
|-------------------------------|--|--|---|--|--|---|--|--|-----------------|
| Yuan<br>2020 <sup>1</sup>     | Yes; all cured<br>COVID-19 pts from<br>a single hospital in<br>forced quarantine | Yes; No<br>information on<br>race, but<br>reported<br>information on<br>age, sex,<br>comorbidities,<br>and COVID-19<br>severity                                  | NA  | Unclear;<br>diagnosis<br>based on<br>National Health<br>Commission of<br>China<br>guidelines     | No; no information<br>on pre-existing MH<br>disorders or other<br>potentially relevant<br>confounders  | No; No<br>controlling or<br>accounting for<br>pre-existing MH<br>disorders in<br>analysis (e.g., did<br>not present<br>results separately<br>for subgroups<br>with potential<br>confounding<br>factors such as<br>pre-existing MH<br>disorders) | Unclear; no<br>reference for<br>a validation<br>study of the<br>Zung<br>measure of<br>depression                 | NA (not a<br>comparative<br>study)   | Fair<br>quality |
| Zarghami<br>2020 <sup>2</sup> | Yes; complete<br>inclusion/exclusion<br>criteria provided.                       | Unclear; No<br>information on<br>race or severity<br>of COVID-19<br>illness in<br>hospitalized pts<br>other than those<br>who were<br>intubated were<br>excluded | NA  | Yes; Confirmed<br>by polymerase<br>chain reaction  | Unclear; Included<br>information on<br>comorbidities and<br>on which patients<br>had pre-existing<br>MH disorders,<br>though other<br>potential<br>confounders were<br>not assessed (e.g.,<br>severity of MH<br>symptoms, pre-<br>/post-<br>hospitalization<br>access to<br>resources) | No; No<br>controlling for<br>pre-existing MH<br>disorders in<br>analysis  | Yes;<br>outcomes<br>measured<br>through<br>diagnostic<br>interview<br>and<br>screening<br>tools PHQ-9<br>& GAD-7 | Unclear;<br>Analysis<br>appropriate for<br>differences in<br>psychiatric<br>disorders in<br>admitted vs<br>outpatient pts,<br>but no OR<br>calculated for<br>comparison<br>between male<br>& female<br>admitted pts. | Fair<br>quality |

## PEER REVIEW COMMENTS

| Comment #  | Reviewer # | Comment   | Author Response  |
|--|------------|---|--|
| <i>Are the objectives, scope, and methods for this review clearly described?</i>   |            |   |  |
| 1  | 1          | Yes   | None   |
| 2  | 3          | Yes   | None   |
| 3  | 4          | Yes   | None   |
| 4  | 7          | Yes   | None   |
| <i>Is there any indication of bias in our synthesis of the evidence?</i>   |            |   |  |
| 5  | 1          | No  | None   |
| 6  | 3          | No  | None   |
| 7  | 4          | No  | None   |
| 7  | 7          | No  | None   |
| <i>Are there any <u>published</u> or <u>unpublished</u> studies that we may have overlooked?</i>   |            |   |  |
| 9  | 1          | No  | None   |
| 10   | 3          | No  | None   |
| 11   | 4          | No  | None   |
| 12   | 7          | No  | None   |
| <i>Additional suggestions or comments can be provided below. If applicable, please indicate the page and line numbers from the draft report.</i> |            |   |  |
| 13   | 1          | This review is thorough and does a good job of reviewing the limited number of studies available on this topic. In some respects, given the limited literature, I think the review could have been substantially shorter but as a living review they have provided a good framework for adding additional studies.  | Thank you – we will keep the framework as is as we anticipate there will be more relevant, published studies soon.   |
| 14   | 1          | The one recommendation I would make is that they more clearly lay out a framework for the different ways COVID might impact mental health outcomes, which lend themselves to different questions and different comparisons and subgroup analyses. It also depends on whether the aim of the review is predicting the burden of disease in which case simple prevalence studies may suffice, or whether they are meant to explore casual hypotheses, in which case more careful selection of control groups is needed. | We aimed to both estimate the burden of disease and to explore potential causal pathways. In response to this comment, we have rephrased the Key Questions and PICO's so it's clearer which questions assess overall burden of disease and therefore have no comparator (KQ1, KQ4, & KQ5) and which questions assess potential causal pathways and therefore have a comparator (KQ2, KQ2a, KQ2b, KQ2c, KQ3, KQ3a, KQ3b, KQ3c, KQ4a, KQ4b, KQ4c, KQ4d). |

|    |   |   |  |
|----|---|---|--|
| 15 | 1 | <p>As I see it there are at least three distinct pathways:</p> <p>1) Direct neuropsychiatric effects – these may depend on severity but may not be limited to hospitalized patients. Clearly controlling for pre-existing MH condition is important, but so is exploring individual effects on different MH conditions. An important question for Veterans due to the high prevalence of pre-existing MH conditions is whether that predisposes them to effects of virus.</p>   | <p>We revised the key questions so that KQs 2-2c assess the development of new MH symptoms or disorders in those with no preexisting conditions and KQs 3-3c assess the exacerbation of MH symptoms in those with preexisting MH conditions.</p> <p>Assessing risk factors for either contracting COVID-19 or being hospitalized for COVID-19 are outside the scope of this review. However, we comment that VA Veterans have high rates of mental health disorders in the background and discussion and discuss how this might increase their risk of being hospitalized for COVID-19.</p>  |
| 16 | 1 | <p>As I see it there are at least three distinct pathways:</p> <p>2) Effects of hospitalization, especially severe illness/ICU care.</p> <p>a. Effects specific to virus – this requires a similarly sick control group. This is the one point that is omitted in the discussion and recommendations for future research. From a predictive point, it may not matter as much whether the outcomes are caused by the illness itself/treatment or something unique about COVID but it does matter from an etiologic perspective to know whether COVID is different from severe influenza. Some of this may also reflect that COVID patients are more isolated in the hospital than other ill patients – what is the impact of being in hospital with less regular interaction with nurses and all those interactions hindered by PPE?</p> <p>b. Effects of severe illness/ICU care itself – teasing this out requires closer attention to the level of care in the hospital. We already know about the effects of prolonged hospitalization and ICU care in particular. But comparing outcomes relative to the level of illness would help – i.e. an analysis that compared non-hospitalized infection, hospitalized/no ICU and hospitalized + ICU.</p> | <p>In response to item a- we have revised the KQs so that KQ2b and 3b now compare patients hospitalized for COVID-19 to patients hospitalized for other causes.</p> <p>In response to item b- we have revised the KQs so that KQ2a and 3a compare patients hospitalized for COVID-19 to patients with outpatient COVID-19. We have also specified in KQ2c and 3c that we're interested in whether development/exacerbation of MH disorders differs by "COVID-19 disease severity" or "level of care."</p> <p>In response to both items, we also added an additional bullet to the "gaps and future research needs" that recommends researchers compare patients who have been hospitalized for COVID-19 to relevant control groups, including those listed in the KQs.</p> |
| 17 | 1 | <p>Given the broad inclusion criteria, I would have liked to know more about the 17 studies included based on abstract but excluded based on full article.</p>  | <p>See Supplementary Materials, "List of excluded studies" section for the list of studies we excluded as well as the reasons why we excluded them.</p>  |

|    |   |   |   |
|----|---|---|---|
| 18 | 1 | Some acknowledgment should be made of the other effects of the pandemic response on MH. I.e. that some of the MH effects post discharge may also reflect the continuing effect of the pandemic – economic uncertainty, social isolation. This point should also be included in future studies that you cant assess MH in isolation of other social stressors on a patient.  | <p>Paragraph 4 of the Background section discusses the underlying effects of the pandemic on mental health, and the risk that patients hospitalized for COVID-19 are returning home to stressful environments.</p> <p>In the Future Research Needs section, we also comment that the development of post-COVID-19 hospitalization mental health screening tools should include items assessing “other concerns stemming from the COVID-19 pandemic that could impact mental health (e.g., loss of employment, separation from loved ones, anxiety about possible reinfection, etc.).”</p> |
| 19 | 3 | Very well done! Appropriate methods, well written and clear. As noted, the literature has not yet matured to the point of providing any real answers to the questions posed. The limitations and cautions about MH outcome assessment in this context are well laid out in the discussion.  | Thank you.  |
| 20 | 3 | A couple minor suggestions:<br>- consider putting information about timing of outcome assessment into the in-text tables. For example, with KQ1 it took me a couple reads to identify timing - it is in the narrative part of the results, but it is an important piece of information and you might consider making more visible by putting in table   | We added the missing information on outcome measurement timing to tables as appropriate.  |
| 21 | 3 | Consider more clearly defining the outcomes in the methods - in particular to distinguish between symptoms and disorders (obviously they are related, but also different as you nicely point out in the discussion). Some studies may simply not have been designed to answer the question about disorders, but they may be able to provide information about the prevalence of various symptoms. Again, the information is all there, just a matter of slight tweaks to organization/subheadings | Under “Key Questions and eligibility criteria,” under the “outcomes” column, we clarified that we were interested in both diagnoses & symptoms.   |

|    |   |  |  |
|----|---|--|--|
| 22 | 3 | Consider tweaking the wording of some of the questions to guide living review organization. There are different things people would want to know about COVID and its effects on mental health. One might be the extent to which people with known MH comorbidities are getting COVID and whether they are disproportionately represented among those with COVID. Another might be whether COVID exacerbates the severity of MH symptoms in people with and without known MH diagnoses. Another might be the incidence of MH disorders after COVID related hospitalization (which is kind of what KQ1a is, but not quite). Again, the studies are all there, but I suspect moving forward more evidence will emerge and it may be helpful to bucket them in a slightly different way. | <p>We revised the KQs so that KQ2-2c now focus on development of new MH disorders or symptoms among those without preexisting MH disorders while KQ3-3c focus on exacerbation of MH symptoms in those with preexisting MH disorders.</p> <p>Determining whether patients with mental health disorders have a higher risk of being hospitalized with COVID-19 is outside the scope of this review, although we comment that some mental health disorders such as depression may be a risk factor for COVID-19 hospitalization in the discussion section, under “limitations.”</p> |
| 23 | 4 | Thank you for the opportunity to review this timely and ongoing review of mental health outcomes of adults hospitalized for COVID-19. I appreciate that there are only 2 papers that met criteria so far, and I understand that the review will likely change as other papers become available.  | None.  |
| 24 | 4 | My major concern is that the aims are a bit trite and could have been framed in a more meaningful fashion. For example, the big questions that needs answering are: 1) Is COVID hospitalization causal with respect to new onset psychiatric disorders? If so, in what way? Is it the illness itself (or its severity) or a side effect of treatment?  | We revised KQ2, KQ2a, KQ2b, KQ2c, KQ3, KQ3a, KQ3b, and KQ3c to compare patients hospitalized for COVID-19 to specific control groups (vs before hospitalization, vs people with outpatient COVID-19, vs people hospitalized for other causes, vs subgroups that vary by COVID-19 severity and level of care). These types of comparisons will provide initial information on potential causal pathways between COVID-19 and outcomes.  |
| 25 | 4 | 2) Does COVID hospitalization exacerbate existing psychiatric disorders? Again, in what way? And I would add a third question:   | We revised KQ3-3c to assess whether hospitalization for COVID exacerbates MH symptoms among those with preexisting MH disorders.   |
| 26 | 4 | 3) Are those with psychiatric disorders (can be specific as to MDD, PTSD, GAD, SUD etc) at increased risk of COVID hospitalization? at increased risk of being COVID positive? These are more meaningful questions than the current aims, and would make for a much more meaningful introduction and discussion sections, with more clearcut implications for action. This reframing would not change the other sections markedly.   | Determining whether patients with mental health disorders have a higher risk of being hospitalized with COVID-19 is outside the scope of this review. However, we comment that some mental health disorders such as depression may be a risk factor for COVID-19 hospitalization in the discussion section, under “limitations.”   |
| 27 | 4 | More minor concerns:<br>1) Include the purpose/aims in the executive summary before key findings.  | Added a sentence on the purpose of the review to the executive summary.  |

|    |   |  |   |
|----|---|--|---|
| 28 | 4 | 2) What were the other 2 reviews conducted? Not essential, but helpful as background info.   | Added a sentence indicating the first 2 reviews will focus on major organ damage and rehabilitation needs.  |
| 29 | 4 | 3) 3/14-20 and 8/57 and following: This is a pretty sweeping statement. Please specify if this is for VA patients or veterans in general (including veterans who don't use the VA).  | Clarified that these statistics are for Veterans who receive care at the VA.  |
| 30 | 4 | 4) 3/26-31: specify if you mean pre-COVID, post-COVID, or concurrent prevalence of mental disorders. MH services use patterns and needs may be different for each of these categories.   | Clarified that we were interested in adult patients during and after hospitalization for COVID-19.  |
| 31 | 4 | 5) 5/27: Can we really call these "outcomes" since there are no comparators and no-hospital data? Outcomes connotes a time ordering as well as implied causality.  | We agree that the evidence is overall too weak to establish a causal relationship between COVID-19 hospitalization and during/post-hospitalization MH disorders. We have kept in the term "outcome" to maintain consistent language throughout the report since we use the term "outcome" in our methods to describe the type of data we were looking for (see "Eligibility criteria" section). We believe using the same term throughout the report will make it easier for readers to track what we looked for vs what we found. However, we have also clarified the type of data and made sure to refrain from causal language in this report. |
| 32 | 4 | 6) 6/7: "Long-term prevalence" is not an epidemiological term. This should be incidence.   | Changed to incidence and clarified these would be new mental health disorders diagnosed 3 and 6 months after discharge.   |
| 33 | 4 | 7) 7/1st para of background: change to past tense  | Put applicable sentences in past tense.   |
| 34 | 4 | 8) Table 2: Yuan study: provide cutpoint and interpretation for Zung SDS. Also, for Zarghani, who diagnosed psychiatric disorders? Was there an instrument?  | For Yuan 2020, we added that self-reported depressive symptoms were equivalent to SDS score >50.<br><br>For Zharghami 2020, we added a sentence that psychiatric disorders were diagnosed by a psychiatrist, but that the specific diagnostic criteria were not reported.   |
| 35 | 4 | 9) Note: I would not call the SDS or PHQ9 or GAD7 "self-report instruments." They are screening instruments as opposed to diagnostic instruments (e.g., CIDI, MINI, CAPS) -- which are also self-report. The distinguishing feature is not self-report, but rather whether they are screening/symptom counting or diagnostic in nature. And of course these methods are in contrast to pure clinical diagnoses which are notoriously unreliable. | Throughout the report, we removed the reference to "self-reported" symptoms and instead refer to these as symptoms. Elsewhere, we refer to the PHQ-9 and GAD-7 as "symptom screening tools" (p. 17, table 2; p. 18, table 3).   |



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| 36 | 4 | 10) Technically, prevalence is not a rate (see Table 2, also 16/para 1, Table 3, 19/25 and throughout the ms). Instead of rate, just say prevalence.  | Replaced “rate” with “prevalence” as appropriate.  |
| 37 | 4 | 11) Table 4: Since this is a study of patients post-hospitalization (presumably during the 2 week post-hospitalization quarantine period), the reporting in the prevalence column should be reversed. For example, of those with comorbidities, x% had SDS depression compared to y% of those with no comorbidities. Should be the same for gender (x% of males had SDS depression compared to y% of females) and all other variables.  | Revised this table so it now reports the prevalence of depression by subgroup of interest.   |
| 38 | 4 | 12) 19/Discussion: Clinicians treating COVID are not psychiatrists, so I am curious as to how diagnosed psychiatric disorders was operationalized.  | Added information to the findings section on p. 16 to clarify how psychiatric assessments were carried out in this study (a psychiatrist spoke to patients via video chat with a tablet [inpatient settings] or personal mobile phone [outpatient settings] to complete diagnostic assessments).   |
| 39 | 4 | 13) Discussion: Identification of psychiatric disorders depends on many factors, including instrumentation (screeners vs diagnostic instruments), clinician training, setting, etc. Mental disorders are typically under-diagnosed in some settings (e.g., primary care), but more accurately diagnosed in mental health specialty clinics. I would guess that COVID units don't often have mental health specialists on staff, so they likely don't have very refined psychiatric diagnostic capabilities. | In the study that reported diagnoses, psychiatrists were the ones that gave diagnoses, so it is unlikely that provider training or setting contributed to underdiagnosis. However, we agree that lack of mental health specialist involvement in inpatient care may contribute to low rates of diagnoses in clinical settings. We have added a sentence describing this to the discussion section. |
| 40 | 4 | 14) Discussion: many psychiatric symptoms likely overlap with COVID symptoms or COVID treatment side effects (e.g., fatigue, sleep disturbance, agitation).   | Added language to indicate that providers may have seen mental health symptoms as symptoms or side-effects of COVID-19 itself, which may have resulted in under-diagnosis.   |
| 41 | 4 | Typos, edits needed:<br>5/22: pre-existing<br>21/37<br>22/46  | Changed these to “preexisting.”  |
| 42 | 7 | The review gave a very clear assessment of its limitations related to the methodology (one reviewer determining inclusion) and the infancy, hence limitation, of research in this domain. Overall, well done.   | Thank you.   |

## REFERENCES

1. Yuan B, Li W, Liu H, et al. Correlation between immune response and self-reported depression during convalescence from COVID-19. *Brain, Behavior, & Immunity*. 2020;25:25.
2. Zarghami A, Farjam M, Fakhraei B, Hashemzadeh K, Yazdanpanah MH. A Report of the Telepsychiatric Evaluation of SARS-CoV-2 Patients. *Telemedicine Journal & E Health*. 2020;11:11.