

# Suicide Prevention

## Evidence-Informed Interventions for the Health Care Workforce

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Literature Review 2021-2022

Development of this product was supported by Cooperative Agreement CK20-2003, funded by the U.S. Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health. The contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC or the Department of Health and Human Services.

# Methods

## Timing

The search was carried out Dec. 2021-March 2022 by a single author.

## Search Terms

Primary search terms were used in combination by combining: "suicid" OR "suicidal ideation" OR "suicidal attempt" or "suicidal behave") " AND ("physician" OR "doctor" OR "dentist" OR "nurse" OR "emt" OR "emergency medical tech" OR "paramedic"OR "pharmacist"OR "medical assist" OR "health care worker" OR "healthcare worker" OR "healthcare professional" OR "medical staff" OR " OR "dentist" OR "physician assistant" OR "nurse practitioner" OR "medical student" OR "nursing student" OR "dental student" OR "healthcare administrator")

## Databases

Databases included OVID Medline, CINAHL, Embase, PsychInfo, PubMed, Google Scholar, and Cochrane Database.

## Inclusion criteria

English language, population was humans, peer-reviewed, primary research or systematic review, and manuscript published between 2020-2022. Primary research studies were included only if the population was in high income country (as defined by the World Bank: <https://data.worldbank.org/country/XD>) as healthcare workers in LMIC may have significantly different experiences from U.S. workers. Articles on topics related to suicide (such as burnout, depression or moral injury) were included only if the study also measured suicidal thoughts, behaviors or attempts. Abstracts, study protocols or program descriptions without results, and narrative topic reviews which were not systematic were excluded.

A limited number of articles not directly related to health care populations identified in the search were included if they reviewed data on evidence-based suicide prevention interventions, theories of suicide, novel or emerging approaches to assessing risk, or information about key subgroups with less data in the health care literature (e.g. risk by race, sexual orientation, disability, etc).

For systematic reviews, total "n" listed is after removal of duplicates (if available).

# General abbreviations

APRN: Advanced Practice Registered Nurse

EMS = Emergency Medical Services

HCW = Health Care Workers

HIC = High Income Countries (per 2021 World Bank classification)

PA: Physician Assistant

STB = Suicidal thoughts and behaviors

SUD = Substance Use Disorder

URM = Underrepresented Minority

# Abbreviations for Psychological Instruments

CSS: Acquired Capability for Suicide Scale

AMI = Attitudes to Mental Illness

ASQ = Ask Suicide-Screening Questions

ATP-30 = Attitudes Toward Psychiatry

AUDIT = Alcohol Use Disorders Identification Test

BDI/BDI II = Beck Depression Inventory and Revised BDI

BSI = Brief Symptom Inventory (general psychological distress and psychiatric disorders)

CAT-DI = depression scale, Computerized Adaptive Test for MH

CAT-SS = suicide scale, Computerized Adaptive Test for MH

CES-D = Center for Epidemiologic Studies Depression Scale

CIS-R = Clinical Interview Schedule (STB)

CSM = Composite Scale of Morningness

C-SSRS = Columbia Suicide Severity Rating Scale

DASS-21 = Depression Anxiety & Stress Scale (same as C-SSRS)

DESC = Rasch-based Depression Screening

GAD7/GAD2 = Generalized Anxiety Disorder-7q or 2q

GDS = Global Distress Scale

GHQ-12/GHQ-28 = General Health Questionnaire

ICG-R = Inventory of Complicated Grief

IES-6 = Impact of Events Scale 6 (post-traumatic stress disorder)

INS = Interpersonal Needs Questionnaire

ISI = Insomnia Severity Index

Kessler-10 psychological distress scale

LEC5 = Life Events Checklist for DSM V (prior trauma)

MBI: Maslach Burnout Inventory

MBI-HSS: Maslach Burnout Inventory-Human Services Survey

MIES = Moral Injury Event Scale

MINI = Mini International Neuropsychiatric Interview

Mini-Z: burnout survey

NCS = National Comorbidity Survey (mental health conditions)

NEO-FFI: NEO Five Factor Inventory (personality characteristics)

NSMHWB: National Survey of MH and Wellbeing (Australia)

OLBI = Oldenberg Burnout Inventory

PCL5 = Brief PTSD Checklist for DSM V (post-traumatic stress disorder)

PCL6 = Another brief version of PTSD Checklist for DSM V

PC-PTSD-5 = Primary Care PTSD Screen for DSM V

PDSS = Panic Disorder Severity Scale

PFI = Stanford Professional Fulfillment Index

PHQ2 = Patient Health Questionnaire-2 (depression)

PHQ9 = Patient Health Questionnaire-9 (depression)

PRIME-MD/PRIME-MD2 = Primary Care Evaluation of Medical Disorders (26q version or 2q version)

PROMIS = Patient-Reported Outcomes Measurement Information System

PSS = Perceived Stress Scale

ProQOL = Professional Quality of Life Scale

QOL = Quality of Life

QIDS-SR-J = Quick Inventory of Depressive Symptomatology-Self Report, Japanese version

RAND-20 (physical and mental health)

RASS (suicidality)

SAPS = Short Almost Perfect Scale (to assess perfectionism)

SBQ/SBQ-R = Suicide Behaviors Questionnaire (Revised)

SCS = Suicide Capability Scale

SIQ = Suicidal Ideation Questionnaire

SITBI-R = Self-Injurious Thoughts and Behaviors Item Revised

SSEV: Suicide Ideation & Behavior Scale

STAI = State-Trait Anxiety Inventory

# Search Results

| Database  | Titles identified by search | Included for abstract/full-text review | Reasons for Exclusion |   |           |                            | Total excluded after review | Included   |
|---|-----------------------------|--|-----------------------|---|-----------|----------------------------|-----------------------------|------------|
|   |                             |  | Duplicate             | Population from low- or middle-income country | Off topic | Not peer-reviewed research |                             |            |
| Ovid Medline  | 584                         | 96                                     | 1                     | 16  | 19        | 13                         | 49                          | 47         |
| CINAHL  | 696                         | 70                                     | 15                    | 4   | 8         | 29                         | 56                          | 14         |
| EMBASE  | 481                         | 16                                     | 4                     | 4   | 1         | 0                          | 9                           | 7          |
| PsychInfo   | 1307                        | 56                                     | 30                    | 1   | 9         | 3                          | 43                          | 13         |
| PubMed  | 1738                        | 184                                    | 69                    | 11  | 38        | 43                         | 161                         | 23         |
| Cochrane Database   | 1                           | 1                                      | 0                     | 0   | 0         | 0                          | 0                           | 1          |
| Additional titles found through searching bibliographies and Google Scholar | 30                          | 27                                     | 0                     | 2   | 4         | 1                          | 7                           | 20         |
| <b>TOTAL</b>  | <b>4837</b>                 | <b>450</b>                             | <b>119</b>            | <b>38</b>                                     | <b>79</b> | <b>89</b>                  | <b>325</b>                  | <b>125</b> |

# Description of Included Studies

| Authors  | Study Aim   | Design or Intervention Type    | Population and Setting  | Country      | Key Findings  |
|--|---|--------------------------------|---|--------------|---|
| Accardi et al., (2020) <sup>1</sup><br>■           | Describe suicide prevention program (HEAR) for <b>nurses</b>  | Program description + outcomes | <ul style="list-style-type: none"> <li>n=527/9573 (5.5%) of invited nurses completed screening over 3 years</li> <li>Academic medical center</li> </ul>   | U.S.         | <ul style="list-style-type: none"> <li>Nearly half of those completing screening were "high risk" and most of the rest were "mod. risk"</li> <li>9% with SI and 10% with prior SA</li> <li>shows feasibility to link with ongoing MH care</li> </ul>  |
| Al-Humadi et al., (2021, 2021) <sup>2,3</sup><br>■ | a. Assess burnout, SI, depression among <b>physicians</b> during COVID<br>b. Compare rates by specialty | Cross-sectional survey         | <ul style="list-style-type: none"> <li>n=225/1379 (16%) residents and attendings</li> <li>Anonymous online survey at 1 academic med center, <b>May 2020</b></li> <li>2q from MBI, PHQ9</li> </ul>   | U.S.         | <ul style="list-style-type: none"> <li>57% female</li> <li>positive screens for depression (6.2%), SI (6.6%), burnout (19.6%)</li> <li>More depr/SI if younger, more call shifts, and prior MH history</li> <li>SI: higher in int.med, anesthesia, and ob/gyn but small sample size</li> </ul>            |
| Almoammar et al., (2021) <sup>4</sup>              | Assess depression, SI in dental <b>students</b>   | Cross-sectional survey         | <ul style="list-style-type: none"> <li>n=218/300 (73%)</li> <li>Anonymous, online survey at 1 dental school, Jan-Mar 2020</li> <li>PHQ9, 3 SI questions</li> </ul>  | Saudi Arabia | <ul style="list-style-type: none"> <li>67% with PHQ<sub>≥</sub>10</li> <li>31% with SI in past year</li> <li>15% ever made SA</li> </ul>  |
| Amsalem et al., (2021) <sup>5</sup>                | Assess MH and moral injury in HCW during COVID  | Repeated cohort survey         | <ul style="list-style-type: none"> <li>3 surveys, <b>Sept-Dec 2020</b></li> <li>Recruited U.S. HCW age 18-80 via MTurk (online survey)</li> <li>n=350 (survey 1), 280 (survey 2), 267 (survey 3) GAD7, PHQ9, PC-PTSD5, MIES</li> <li>73% white, 68% nurses</li> </ul> | U.S.         | <ul style="list-style-type: none"> <li>Baseline: 62% w/any anxiety (GAD 5+); 58% any depression (PHQ 5+); 19% w/ SI: 35% any PTSD symptoms</li> <li>Rates decreased by survey #3</li> <li>Higher moral injury score assoc. w/higher rates of MH symptoms</li> <li>No variation by race or role</li> </ul> |
| Andreotti et al., (2020) <sup>6</sup>              | Evaluate screeners for suicide risk   | <b>Systematic review</b>       | <ul style="list-style-type: none"> <li>2008-2018</li> <li>206 articles (English, Spanish, Portuguese) from 2008-2018</li> <li>Most common: BSI, C-SSRS</li> </ul>   | Global       | <ul style="list-style-type: none"> <li>20 instruments total</li> <li>Most common: BSI, C-SSRS</li> <li>Limitations described for both screens</li> </ul>  |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                                 | Study Aim  | Design or Intervention Type                  | Population and Setting   | Country   | Key Findings  |
|---|--|--|--|-----------|---|
| Ariapooran et al., (2021) <sup>7</sup>  | Assess Secondary Traumatic Stress (STS) in <b>nurses</b> during COVID                | Cross-sectional survey                       | <ul style="list-style-type: none"> <li>2020 <b>COVID</b> pandemic</li> <li>STSS, BDI-13, BAI, BSSI</li> <li>n=339/525 nurses, 38% male</li> </ul>  | Iran      | <ul style="list-style-type: none"> <li>1/3 of males, 2/3 of females had STS symptoms</li> <li>Higher STS scores predicted higher depression, anxiety, SI</li> </ul>   |
| Armoon et al., (2021) <sup>8</sup>      | List prevalence of MH disorders among patients w/ SUD                                | <b>Systematic review &amp; meta-analysis</b> | <ul style="list-style-type: none"> <li>English-language studies, 4 data bases, 1995-2020</li> <li>Included 48/10,810 articles</li> <li>22 studies from US</li> </ul>   | Global    | <ul style="list-style-type: none"> <li>35% SI and 20% with SA in last year from pooled numbers</li> <li>SI risks: smoking, prior sexual abuse, depression, alcohol, cannabis</li> <li>SA risks: smoking, prior physical or sexual abuse, depression, alcohol, cannabis, cocaine, and female gender</li> </ul>                             |
| Bismark et al., (2022) <sup>9</sup>     | Assess thoughts of suicide among HCW during COVID-19                                 | Cross-sectional survey                       | <ul style="list-style-type: none"> <li>Convenience sample for anonymous online survey of front line HCW</li> <li><b>Aug-Oct 2020</b></li> <li>GAD7, PHQ9, IES-6, MBI</li> <li>n=7846 (? response rate)</li> <li>81% women</li> </ul> | Australia | <ul style="list-style-type: none"> <li>10.5% w/SI in past 2 weeks</li> <li>More SI if female, younger, nurse (vs physician or allied health), in a medical specialty (vs surgical or primary care), lives alone, no kids, COVID patients, alcohol use</li> <li>SI assoc. w/2x rate anxiety, PTSD, depression, and more burnout</li> </ul> |
| Bond et al., (2021) <sup>10</sup>       | Compare first responders and controls for suicidal ideation and capacity for suicide | Cross-sectional survey                       | <ul style="list-style-type: none"> <li>Online U.S. study gun ownership</li> <li>n=405 first responders vs n=3095 controls, 59% male, 59% white, 23% Black/African-American, 11% Asian</li> <li>SCS-3, SITBI-R</li> </ul>             | U.S.      | <ul style="list-style-type: none"> <li>First responders (vs non-) with more SI in lifetime (63% vs. 37%), past year (57% vs 39%) and past month (24 vs 13%)</li> <li>First responders had more "capability" to carry out attempt</li> <li>EMTs with lower SI but similar capability vs. law enforcement</li> </ul>                        |
| Braquehais et al., (2020) <sup>11</sup> | Assess suicide risk in HCW treated at a PHP  | Cross-sectional                              | <ul style="list-style-type: none"> <li>Medical record review for n=1214 HCW (62% physicians and 38% nurses)</li> <li>MINI suicide module</li> </ul>  | Spain     | <ul style="list-style-type: none"> <li>No difference in risk by gender, by physician vs nurse, living alone, or having children</li> <li>Those with high risk twice as likely to have affective disorder, SUD, or other mental disorder (not anxiety)</li> </ul>  |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

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|--|--|-----------------------------|--|---------|---|
| Braun et al., (2021) <sup>12</sup>           | Summary of HCW violent deaths in the workplace   | Secondary data analysis     | <ul style="list-style-type: none"> <li>NVDRS data 2003-2016</li> <li>n=61 HCW deaths at work (of 278,000 deaths in data set)</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>Of 61 HCW deaths, 32 suicides, 21 homicides, 8 undetermined</li> <li>12 physicians/dentists/veterinarians; 6 nurses, APPs, patient care techs, aides</li> </ul>  |
| Brennan-Wydra et al., (2021) <sup>13</sup>   | Assess perfectionism, imposter syndrome, and SI among medical <b>students</b>            | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Anonymous online survey</li> <li>n=246/559 (41%) medical students</li> <li>SAPS, Leary Impostor Scale, SBQ-R</li> </ul>   | U.S.    | <ul style="list-style-type: none"> <li>Approx. 5% with SI overall</li> <li>Female students had higher imposter scores but not SI or perfectionism</li> <li>no difference by URM status</li> <li>Multivariable analysis: Higher impostor scores associated with SI and mediated the link between perfectionism and SI.</li> </ul>              |
| Bruffaerts et al., (2021) <sup>14</sup>      | Assess 30d STB prevalence among Belgium HCW during COVID 1st wave                        | Cross sectional survey      | <ul style="list-style-type: none"> <li>Convenience sample clinically-active HCW <b>2020</b></li> <li>STB past 30d</li> <li>GAD7, PHQ9, PCL-5, CAGE-AID, panic attacks (#), CSSRS-modified</li> <li>n=6409, 47% response overall</li> <li>51% physicians, 24% nurses</li> </ul> | Belgium | <ul style="list-style-type: none"> <li>4% with STB (above gen pop)</li> <li>Hospitalization with COVID-19 strongest predictor (aOR=11.6)</li> <li>Lifetime or current MH disorder (aOR 3-4)—depression highest risk</li> <li>Working environment mostly not significant (e.g PPE shortage, COVID exposure, lack of COVID training)</li> </ul> |
| Bryant-Genevier et al., (2021) <sup>15</sup> | Prevalence of mental health symptoms over past 2 weeks among U.S. public health workers. | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Online survey <b>March-April 2021</b></li> <li>n=26,174</li> <li>PHQ9, GAD2, IES-6</li> </ul>   | U.S.    | <ul style="list-style-type: none"> <li>Prior 2 weeks: depression (31%), anxiety (30%), PTSD (37%), SI (8%)</li> <li>Highest rates among people &lt;30 and those <b>transgender/non-binary</b></li> <li>Increased risk with greater work hours, time spent on COVID19 activities, and lack of time off (doubled risk)</li> </ul>               |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors  | Study Aim  | Design or Intervention Type | Population and Setting   | Country | Key Findings   |
|--|--|-----------------------------|--|---------|--|
| Capdevila-Gaudens et al., (2021) <sup>16</sup> | Mental health in Spanish medical <b>students</b>   | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Anonymous on-line survey</li> <li>BDI-II, MBI, STAI, Jefferson Empathy Scale</li> <li>n=5216/~42,000 (12%) across all 43 med schools</li> <li>76% female</li> <li>77% heterosexual, 19% gay/bisexual</li> </ul> | Spain   | <ul style="list-style-type: none"> <li>41% any depression, 22% trait anxiety, 11% SI</li> <li>Depression risks included being <b>gay/bisexual</b>, academic struggles, high anxiety trait, using regular substances or tobacco</li> </ul>  |
| Chen et al., (2020) <sup>17</sup>              | Deaths of despair (drugs, alcohol, suicide) among <b>nurses</b> and HCW who did and did not attend religious services. | Secondary data analysis     | <ul style="list-style-type: none"> <li>n=66,492 female nurses from Nurses Health Study (2001-2017) and 43,141 male HCW (1/2 dentists, 1/4 veterinarians, 1/4 other) from Health Professional Follow-Up Study (1988-2014)</li> </ul>                    | U.S.    | <ul style="list-style-type: none"> <li>If attending service 1+ times/wk, female nurses had 68% lower hazard ratio (HR); and male nurses had 33% lower HR.</li> <li>For suicide (vs non-suicide), lower HR for nurses (HR 0.25) and males (0.52) who attended at least once weekly.</li> </ul>  |
| Choflet et al., (2021) <sup>18</sup>           | Describe substance use and MH of <b>nurses</b> vs non-nurses who die by suicide  | Secondary data analysis     | <ul style="list-style-type: none"> <li>NVDRS data 2003-2017</li> <li>Nurses (n=2306) vs non-nurses (n=186K), 19% male nurses</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>Male and female nurses more likely than non-nurses to have MH problems, job problems</li> <li>Female nurses more likely than female non-nurses to have a physical health problem</li> <li>Nurses more likely than non-nurses to have antidepressants, antihistamines, benzodiazepines, alcohol, and opioids in their toxicology screen</li> </ul> |
| Choi D et al., (2020) <sup>19</sup>            | Develop a machine-learning model to review multiple data sources and predict suicidal deaths                           | Model development           | <ul style="list-style-type: none"> <li>Combines U.S. data from National Syndromic Surveillance Program, calls to the National Suicide Prevention Lifeline, Poison Control, and economic indices.</li> </ul>  | U.S.    | Model closely predicts actual suicide fatalities   |

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|--|--|--|---|-----------|--|
| Choi K.R. et al., (2020) <sup>20</sup> | Nursing laws and suicide/homicide rates among <b>nurses</b>            | Secondary data analysis                  | <ul style="list-style-type: none"> <li>2012-2016, CDC Web-based Injury Statistics Query and Reporting System</li> <li>Evaluated nursing scope of practice and ease of practice firearm rules, trauma centers</li> </ul> | U.S.      | <ul style="list-style-type: none"> <li>Full NP scope of practice, more NPs, and greater ease of practice via licensure compacts were assoc. with fewer suicides/homicides</li> <li>Many demographics (poverty, urbanicity, psychiatrist rates, etc also associated with lower rates)</li> </ul>  |
| Chutiyami et al., (2021) <sup>21</sup> | Assess COVID pandemic and MH of healthcare professionals               | <b>Meta-Review of Systematic Reviews</b> | <ul style="list-style-type: none"> <li>4 data sets, English language, published <b>2020-2021</b></li> <li>Included 40 systematic reviews (representing 1828 primary studies)</li> </ul>                                 | Global    | <ul style="list-style-type: none"> <li>Pooled prevalence depression (14-37%), anxiety (16-41%), PTSD/stress/distress (19-57%)</li> <li>Depression highest among nurses, front-line HCW, HCW w/pt.contact</li> <li>Only 1 systematic review evaluated SI</li> </ul>   |
| Cryer et al., (2020) <sup>22</sup>     | Suicide, mental, physical stigma among medical <b>students</b>         | Cross-sectional survey                   | <ul style="list-style-type: none"> <li>Convenience sample</li> <li>n=116 (? response), 42% men</li> <li>Stigma of Suicide Scale</li> </ul>  | Australia | <ul style="list-style-type: none"> <li>suicide more stigmatized than depression, breast cancer but similar to type 2 diabetes, HIV, lung cancer</li> <li>32% would not disclose suicidal plan to anyone (vs. 1-14% for other medical conditions)</li> </ul>  |
| David et al., (2021) <sup>23</sup>     | Describe COVID-19 initiatives to support MH and well-being of HCW      | <b>Systematic Review</b>                 | <ul style="list-style-type: none"> <li>Identified 31 studies, 15 from U.S. during <b>COVID</b></li> <li>5 qualitative, 7 quantitative, 9 both qual/quant</li> </ul>   | Global    | <ul style="list-style-type: none"> <li>U.S. studies: basic needs, rest spaces, alternative housing, peer support, town halls, MH access, online MH tools</li> <li>Other studies: mobile apps, online CBT/mindfulness, social media peer support, simulation training, video game wellness, phone hotlines</li> </ul>   |
| Davidson et al., (2020) <sup>24</sup>  | Identify incidence, methods, and risk factors for <b>nurse</b> suicide | Secondary data analysis                  | <ul style="list-style-type: none"> <li>NVDRS data 2005-2016</li> <li>Nurses vs. non-nurse, age 20+</li> <li>n=1824 nurse/152K non-nurse suicides</li> <li>Incident Rate Ratios (IRR)</li> </ul>                         | U.S.      | <ul style="list-style-type: none"> <li>c/w general population, female nurses (IRR 3.4) and male nurses (IRR 1.2) had higher risk suicide</li> <li>Nurses more job problems and MH history than gen. pop.</li> <li>Female nurses used poisoning vs male nurses (firearms)</li> <li>Nurse who died by suicide more likely to be white, non-Hispanic</li> </ul> |

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| Authors  | Study Aim  | Design or Intervention Type                | Population and Setting   | Country | Key Findings  |
|--|--|--|--|---------|---|
| Davidson, Ye, Deskins et al., (2021) <sup>25</sup> | Evaluate <b>nurse</b> suicide deaths by firearms                                       | Secondary data analysis                    | <ul style="list-style-type: none"> <li>NVDRS data 2003-2017</li> <li>Nurses (n=739) vs. non-nurses (n=95K) with firearms as method of suicide, ages 20+</li> </ul>   | U.S.    | <ul style="list-style-type: none"> <li>Female nurses died by firearms less than gen pop before 2013 (OR=0.7) but not in years after.</li> <li>33 deaths deemed "preventable" due to prior SI/SA; 27 "preventable" due to depression + gun in home</li> <li>53/705 nurse deaths mentioned job stressors</li> </ul>   |
| Davidson, Ye, Parra et al., (2021) <sup>26</sup>   | Identify job-related problems prior to <b>nurse</b> suicide                            | Secondary data analysis                    | <ul style="list-style-type: none"> <li>NVDRS data 2003-2016</li> <li>n=203/1824 nurse suicides had narratives related to job problems for review</li> <li>Thematic analysis, NLP</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>93% of these nurses out of work or losing job, most with known depression/bipolar disorder</li> <li>Nearly half had prior SA, 65% with substance misuse</li> </ul>   |
| Davis et al., (2021) <sup>27</sup>                 | Incidence of suicide among <b>nurses</b> and <b>physicians</b> vs. general population. | Secondary data analysis                    | <ul style="list-style-type: none"> <li>NVDRS data 2007-2018</li> <li>Suicides among nurses (n=2374) vs. physicians (n=857) vs. general population age 30+ (n=156,141)</li> <li>Nurses 81% female, physicians 16% female</li> </ul> | U.S.    | <ul style="list-style-type: none"> <li>Overall, nurses w/ 1.18 RR increase in suicide per 100K vs gen pop.</li> <li>Suicide incidence in SINGLE year (2017-2018): compared w/ same sex gen. pop., female nurses w/higher risk but not male nurses; no diff in physician rates. Female nurses w/ higher rate than female physicians.</li> <li>Much variation year to year</li> </ul> |
| Dong et al., (2020) <sup>28</sup>                  | Evaluate SI, plan (SP), attempt (SP) for <b>physicians</b> and residents               | <b>Systematic review and meta-analysis</b> | <ul style="list-style-type: none"> <li>English language studies, 4 databases</li> <li>n=35/4646 studies, 33 cross-sectional, from 1990-2018</li> <li>Most from Americas (40%) or Europe (49%)</li> </ul>                           | Global  | <ul style="list-style-type: none"> <li>Lifetime prevalence SI=17%; 1 yr prevalence SI=8.6%</li> <li>Lifetime prevalence SA=1.8%; 1 yr prevalence SA=0.3%</li> </ul>   |

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|--------------------------------------|---|--|--|-------------|--|
| Duarte et al., (2020) <sup>29</sup>  | Assess standardized suicide mortality ratios (SMR) for male and female <b>physicians</b> before and after 1980. | <b>Systematic review and meta-analysis</b> | <ul style="list-style-type: none"> <li>Reviewed 4 data bases</li> <li>English, Spanish, Portuguese, and French language studies</li> <li>Included 32/7877 articles for systematic review and 9/7877 for meta-analysis, 1980-present</li> </ul> | Global      | <ul style="list-style-type: none"> <li>Higher SMR (1.5) for female physicians vs. female gen pop</li> <li>Lower SMR (0.67) for male physicians vs male gen. pop.</li> <li>Overall physician suicide found to have decreased since 1980</li> </ul>  |
| Elkbuli et al., (2020) <sup>30</sup> | Assess proportion of <b>physician</b> suicides over time from NVDRS   | Secondary data analysis                    | <ul style="list-style-type: none"> <li>NVDRS data 2003-2017</li> <li>Suicides among physicians (n=679 including 71 surgeons), dentists (n=208), and the "general population" who died by suicide, any age (n=196,330)</li> </ul>               | U.S.        | <ul style="list-style-type: none"> <li>Article discusses "prevalence" of physician suicide but only measured proportion of the data set who were physicians</li> </ul>   |
| Ernst et al., (2021) <sup>31</sup>   | Network analysis of burnout, depression, anxiety in medical <b>students</b>                                     | Cross-sectional, Network analysis          | <ul style="list-style-type: none"> <li>Used data from national anonymous convenience sample survey</li> <li>n=527, (? Response rate)</li> <li>PHQ9, GAD7, 2q burnout</li> <li>67% female</li> </ul>  | Switzerland | <ul style="list-style-type: none"> <li>27% depression (PHQ 10+), 23% anxiety</li> <li>SI most strongly related to PHQ8 "Moving or speaking slowly, or being restless", GAD4 "Trouble relaxing" and GAD7 "Feeling as if something awful might happen."</li> <li>SI NOT associated with burnout</li> </ul> |
| Ey et al., (2021) <sup>32</sup><br>■ | Describe <b>residents</b> and faculty who presented to an onsite wellness program                               | Cross-sectional descriptive                | <ul style="list-style-type: none"> <li>Assessed voluntary wellness program at one academic medical center, 2013-2018 n=468 (316 trainees, 152 faculty) of 2443 individuals/ year eligible to participate</li> <li>MBI, GDS</li> </ul>          | U.S.        | <ul style="list-style-type: none"> <li>Women, residents/fellows, and PCPs more likely than others eligible to access</li> <li>9% deemed to have suicide risk</li> <li>Trainees w/ greater "distress"</li> </ul>  |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors   | Study Aim   | Design or Intervention Type                    | Population and Setting  | Country   | Key Findings  |
|---|---|--|---|-----------|---|
| <span style="color: #003366;">■</span> Intervention or program evaluation <span style="color: #003366;">—</span> Physician focus <span style="color: #006633;">—</span> Nurse focus <span style="color: #CC0000;">—</span> Student focus <span style="color: #003366;">—</span> Systematic Review, Meta-Analysis or RCT <span style="color: #CC0000;">—</span> COVID-19 focus <span style="color: #006633;">—</span> LGBTQ+ focus |   |  |   |           |   |
| Eyles et al., (2021) <sup>33</sup>  | Impact of COVID-19 on suicidal behavior in health and social workers                | Systematic review                              | <ul style="list-style-type: none"> <li>Included 10/37 citations from multiple databases during COVID</li> <li>All cross-sectional studies</li> <li>1 U.S. study, 6 from LMIC</li> <li>None studied social workers</li> </ul>        | Global    | <ul style="list-style-type: none"> <li>HCW to non-HCW: 1 study with lower risk, one with same risk; some found increased risk in frontline vs not front line</li> </ul>   |
| Fletcher et al., (2020) <sup>34</sup>   | Willingness of medical students to disclose mental illness on licensing application | Cross-sectional survey                         | <ul style="list-style-type: none"> <li>n=175/349 (50%)</li> <li>1 medical school (Univ NM)</li> </ul>   | U.S.      | <ul style="list-style-type: none"> <li>23% unlikely to seek MH treatment</li> <li>51% would not disclose to NM medical board; 93% would not disclose to ERAS (for residency application)</li> </ul>   |
| Fountoulakis et al., (2021) <sup>35</sup>   | Examine mental health, conspiracy theories, SI among HCW during COVID               | Cross-sectional survey                         | <ul style="list-style-type: none"> <li>Convenience sample during COVID, anonymous online,</li> <li>n=512 HCW (? response rate)</li> <li>54% female, 18% physicians, 15% nurses, 52% other HCW</li> <li>CES-D, STAI, RASS</li> </ul> | Greece    | <ul style="list-style-type: none"> <li>Depression: 11% female, 6% male; higher in nurses and "other" HCW</li> <li>SI in 5% females, 10% males but 0% for male nurses or doctors</li> <li>High rate of agreement with conspiracy theories about COVID</li> </ul> |
| García de la Garza et al., (2021) <sup>36</sup>   | Use machine learning to identify predictors of suicide attempts                     | Secondary data analysis using machine learning | <ul style="list-style-type: none"> <li>2 waves of National Epid. Survey on Alcohol and Related Conditions, 70% response</li> <li>Machine learning to extract risks for SA (wave 1) and predict attempts (wave 2)</li> </ul>         | U.S.      | <ul style="list-style-type: none"> <li>Evaluated risks for noncompleted suicide attempts</li> <li>Key factors: prior STB, feeling downhearted, accomplishing less due to emotional problems, younger age, less education, recent financial crisis</li> </ul>    |
| Gayed et al., (2021) <sup>37</sup><br>■   | Test feasibility of online MH training for physicians supervising trainees          | Pilot intervention study                       | <ul style="list-style-type: none"> <li>HeadCoach for Physicians</li> <li>12 five-minute modules</li> <li>n=30 (? response rate)</li> <li>73% female</li> <li>3/4 completed all modules</li> </ul>                                   | Australia | <ul style="list-style-type: none"> <li>88% found program interesting</li> <li>96% would recommend to others</li> <li>Significant increases in knowledge, confidence, and preventative behaviors</li> <li>No data yet on trainee impact</li> </ul>               |

# Description of Included Studies

| Authors                                  | Study Aim  | Design or Intervention Type | Population and Setting   | Country     | Key Findings   |
|--|--|-----------------------------|--|-------------|--|
| Gold (2020) <sup>38</sup>                | Identify risk factors in the two weeks prior to suicide for <b>physicians</b> and non-physicians | Secondary data analysis     | <ul style="list-style-type: none"> <li>NVDRS data 2010-2015</li> <li>Physicians (n=357) vs non-physicians (63K) w/identified occupation and age 28+ vs general population</li> </ul>   | U.S.        | <ul style="list-style-type: none"> <li>Physicians more likely to job problem, physical health problem, or "other legal" problem</li> <li>Males: physicians more likely to have current or past depressed mood and disclose suicidal intent to HCW. No female physician disclosed intent to a HCW.</li> </ul> |
| Gold et al., (2021) <sup>39</sup>        | Assess suicide standardized mortality ratios (SMR) for male and female <b>physicians</b>         | Secondary data analysis     | <ul style="list-style-type: none"> <li>NVDRS data 2010-2015</li> <li>Physicians vs non-physicians with identified occupation and age 28+</li> <li>n=357 physicians, 63K non-physicians</li> <li>SMR adjusted for age, gender</li> </ul>              | U.S.        | <ul style="list-style-type: none"> <li>No diff overall in SMR for physicians vs. non.</li> <li>Extrapolated data suggests 119 physician deaths by suicide per year (104 males, 15 females)</li> </ul>  |
| Gupta et al., (2020) <sup>40</sup>       | Compare PMR (proportional mortality ratios) for white <b>physicians, nurses, judges/ lawyers</b> | Secondary data analysis     | <ul style="list-style-type: none"> <li>National Occupational Mortality Surveillance data</li> <li>1993, 2003-4, 2007-14</li> <li>PMR&gt;100 indicates increased risk</li> <li>Excludes non-white race and men &gt; 65 due to small sample</li> </ul> | U.S.        | <ul style="list-style-type: none"> <li>Self-harm PMRs</li> <li>Women 18-64: physicians 212, nurses 162, lawyers/judges 202</li> <li>Women 65-90: physicians 677, nurses 145, lawyers/judges 395</li> <li>Men 18-65: physicians 205, nurses 136, lawyers/judges 182</li> </ul>                                |
| Guseva Canu et al., (2021) <sup>41</sup> | National suicide rate among working males by occupation  | Secondary data analysis     | <ul style="list-style-type: none"> <li>n=1.5 million men (4371 deaths by suicide) in the Swiss National Cohort data</li> <li>Age 18-54 in 2000</li> <li>Followed suicide mortality from 2000 to 2014</li> </ul>                                      | Switzerland | <ul style="list-style-type: none"> <li>Long hours had no impact</li> <li>Higher education, younger age, and volunteering all protective</li> <li>Health and social activities work 3<sup>rd</sup> highest risk category (of 15) but "life science and health professionals" NOT at higher risk</li> </ul>    |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                                      | Study Aim   | Design or Intervention Type | Population and Setting  | Country | Key Findings  |
|--|---|-----------------------------|---|---------|---|
| Gutin and Hummer (2020) <sup>42</sup>        | Identify the association between occupation and deaths of despair   | Secondary data analysis     | <ul style="list-style-type: none"> <li>National Health Interview Study-Linked Mortality Files</li> <li>Adults 25-64, 1997-2015</li> <li>Deaths: suicide, accidental poisoning, EtOH liver disease</li> <li>n=360,146, 3.2% health professionals, 1.6% "health service"</li> </ul>                           | U.S.    | <ul style="list-style-type: none"> <li>Suicide among health professionals: OR 0.83 (ns), health service: OR 0.12 (CI: 0.02-0.89)</li> <li>Accidental poisoning health professionals: OR 3.35 (CI: 1.18-9.47), health service: OR 2.09 (ns)</li> </ul>   |
| Heiderscheid et al., (2022) <sup>43</sup>    | Evaluate well-being and mistreatment among LGBTQ+ vs. non-LGBTQ+ residents.                                   | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Survey of clinically active general surgery residents</li> <li>n=6956 (86% response)</li> <li>305/6381 eligible residents identified as LGBTQ+</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>More discrimination for LGBTQ+ group (59% vs. 42%, sexual harassment (48% vs 29%), bullying (75% vs 67%)</li> <li><b>LGBTQ+</b> residents with twice the odds of suicidal ideation</li> </ul>  |
| Hendrickson et al., (2022) <sup>44</sup>     | Assess impact of COVID work-related stressors and mental health among HCW and First Responders (FR)           | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Anonymous convenience sample, email and Facebook</li> <li>n=510 (12% physicians, 37% nurses, 52% EMS, 11% firefighters, 4% law enforcement), 9/2020-2/2021</li> <li><b>COVID-Related</b> Occupational Measures, PHQ9, GAD7, ISI, PCL5, LEC5</li> </ul>               | U.S.    | <ul style="list-style-type: none"> <li>Nurses &gt; physicians on COVID stress scores (measures risk, pt. volume, support, efficacy) + PTSD, depression, insomnia, STB</li> <li>EMS &gt; FR for depression and COVID stressors</li> <li>Demoralization strongest predictor of PTSD, depression, anxiety (all) and STB (nurses only)</li> </ul>                               |
| Herrero-Huertas et al., (2021) <sup>45</sup> | Compare mortality rate ratios for <b>physicians</b> vs. other professionals for conditions, including suicide | Secondary data analysis     | <ul style="list-style-type: none"> <li>People 25-64 employed in 2001, died by 2011</li> <li>National census data linked with mortality data</li> <li>physicians, other professional occupations including healthcare, other occupations</li> <li>Adjusted for age, household size, dwelling size</li> </ul> | Spain   | <ul style="list-style-type: none"> <li>Males: MRR physician suicide=1. Pharmacists, nurses, other health professionals, entrepreneurs, other occupations all w/MMR &gt;1</li> <li>Females: MMR physician suicide=1. Nurses, other healthcare professionals, engineers/architects, secondary teachers, entrepreneurs, managers, other occupations all w/MMR &gt;1</li> </ul> |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                                   | Study Aim  | Design or Intervention Type       | Population and Setting  | Country | Key Findings   |
|---|--|-----------------------------------|---|---------|--|
| Hofstra et al., (2020) <sup>46</sup><br>■ | Estimate the effect size of suicide prevention interventions                       | Systematic Review & Meta-Analysis | <ul style="list-style-type: none"> <li>3 databases plus expert input, 2011-2017 timeframe</li> <li>16/447 studies in syst review</li> <li>15/447 studies in meta-analysis: 62 suicides, 1006 SA</li> <li>Any language</li> </ul>                  | Global  | <ul style="list-style-type: none"> <li>Large effect on completed suicide: esp on inpatient psych units</li> <li>Moderate effect overall for all interventions</li> <li>For SA, large effect in outpatient MH settings and mod. effect in inpatient psych. Small effect in community or ED locations.</li> <li>Multilevel interventions had larger effect sizes.</li> </ul> |
| Hogg et al., (2021) <sup>47</sup><br>■    | Psychosocial interventions for depression, anxiety, and SI in small/med workplaces | Systematic Review                 | <ul style="list-style-type: none"> <li>5 databases, English lang.</li> <li>n=7/1283 manuscripts (total of 5111 subjects)</li> <li>Most limited to &lt;250 employees</li> </ul>  | Global  | <ul style="list-style-type: none"> <li>CBT effective, esp telephone and in-person support</li> <li>No studies looked at STB</li> </ul>   |
| Höller et al., (2022) <sup>48</sup>       | Assess MH and SI in nurses during COVID-19   | Cross-sectional survey            | <ul style="list-style-type: none"> <li>Convenience sample during COVID</li> <li>n=1311 nurses (? response), ages 18-63, 97% female</li> <li>DASS-21, DESC, SSEV, +others</li> </ul>   | Germany | <ul style="list-style-type: none"> <li>42% depression, 22% current SI, 45% lifetime, 13% lifetime SA</li> <li>Resilience most protective trait</li> <li>COVID exposure not assoc w/ MH</li> <li>Depression, agitation, past SA perceived burden assoc. with SI</li> </ul>  |
| Horwitz et al., (2020) <sup>49</sup>      | Variations in suicide risk factors among sexual and minority subgroups and peers   | Cross-sectional survey            | <ul style="list-style-type: none"> <li>Wellness screen at 4 universities, 2015-2018</li> <li>n=41,412 students (9% "mostly heterosexual", 14% other sexual minorities)</li> <li>23% response rate</li> <li>PHQ2, AUDIT, SI/SA from NCS</li> </ul> | U.S.    | <ul style="list-style-type: none"> <li>Sexual and gender minority groups had 2-5x higher rates depression, STB</li> <li>SI higher if pansexual (attraction to anyone) or bisexual (OR 1 ½ to 2) vs other minorities</li> </ul>   |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors   | Study Aim  | Design or Intervention Type         | Population and Setting  | Country | Key Findings   |
|---|--|-------------------------------------|---|---------|--|
| <p>Hou et al., (2022)<sup>50</sup></p> <p>■</p> | Assess effectiveness of social support interventions for prevention of suicidal thoughts and behaviors | Systematic Review and Meta-analysis | <ul style="list-style-type: none"> <li>6 databases, English lang.</li> <li>n=577/22,656</li> <li>77 intervention studies and 10 suicide studies</li> <li>Excluded therapy-only and studies assessing self-harm only</li> <li>Meta-analysis: SA, suicide, social support outcomes</li> </ul> | Global  | <ul style="list-style-type: none"> <li>Completed suicides were significantly reduced in intervention group (RR=0.48); SA lower but not significant.</li> <li>Interventions were group (n=19), one-on-one (53), or both (5). Face-to-face appeared more effective than other methods (phone, text)</li> </ul>   |
| Hudson et al., (2021) <sup>51</sup>             | Understand HCW disclosure of mental illness in the workplace.  | Scoping Review                      | <ul style="list-style-type: none"> <li>2 databases, 2019</li> <li>Included 17/3772 articles, 6 quant/11 qual</li> <li>All from HIC (3 from US)</li> </ul>   | Global  | <ul style="list-style-type: none"> <li>Process of weighing pros (personal benefits, responsibility) versus cons (stigma, fears re: job or professional identity) of disclosure</li> <li>Fears of disclosure by others</li> <li>Negative consequences &gt;&gt; positives</li> </ul>   |
| Ishikawa (2022) <sup>52</sup>                   | Assess work hours and SI among Japanese OB/Gyns  | Cross sectional survey              | <ul style="list-style-type: none"> <li>Convenience sample at 893 hospitals</li> <li>n=919 physicians (? response) from 343 hospitals, 50% male</li> <li>QIDS-SR-J</li> </ul>  | Japan   | <ul style="list-style-type: none"> <li>Work hours/week: 60-79 (38%), 80-99 (20%), 100+ (27%)</li> <li>16% with depression, 3% SI</li> <li>Higher odds depression if male, single, working 100+ hrs/wk (OR 2)</li> <li>Higher odds SI if single, working 100+ hrs/wk (OR 7)</li> </ul>  |
| Ji et al., (2020) <sup>53</sup>                 | To compare suicide risk factors: surgeons, non-surgeon physicians, and dentists vs. non-HCW            | Secondary Data Analysis             | <ul style="list-style-type: none"> <li>NVDRS 2003-2016</li> <li>Compared surgeons (n=103), non-surgeon physicians (485), dentists (175), non-HCW (n=170K) without limiting age or occupational status</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>Higher suicide risk if Asian (n=33), if job problems, civil legal problems, physical health problems, treatment for mental illness.</li> <li>Lower risk if Black, female, single</li> <li>No association with SUD</li> <li>Surgeons vs non-surgeon HCW more likely to be receiving MH tmt and be older</li> </ul> |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus



# Description of Included Studies

| Authors                              | Study Aim   | Design or Intervention Type          | Population and Setting   | Country | Key Findings   |
|--------------------------------------|---|--------------------------------------|--|---------|--|
| Jiang et al., (2021) <sup>54</sup>   | Use machine-learning to identify sex-specific suicide risks in the first 30d after psychiatric hospital discharge | Secondary Data Analysis and modeling | <ul style="list-style-type: none"> <li>Danish National Pt. Registry</li> <li>Patients who died w/in 30 days after psych hospitalization (n=1205) vs patients who did not (n=24,559)</li> <li>1995-2015 data</li> </ul> | Denmark | <ul style="list-style-type: none"> <li>Highest 30d risk for men: those w/out antidepressants prescribed 2 yrs prior to admit, recent alcohol disorder in past 6mo, sedatives, anxiolytics, hx poisoning,</li> <li>Highest 30d risk for women: prescribed antipsychotics, hx poisoning, anxiolytics</li> </ul>  |
| Jones et al., (2021) <sup>55</sup>   | Prevalence, severity of burnout and professional QOL in pharmacists   | Cross sectional survey               | <ul style="list-style-type: none"> <li>Convenience sample, anonymous online survey, 2020</li> <li>n=484 (? response), 72% female, 86% white</li> <li>ProQOL, 1q on burnout</li> </ul>                                  | U.S.    | <ul style="list-style-type: none"> <li>51% scored in moderate range, 2% in high range for secondary traumatic stress</li> <li>65% burnout</li> </ul>   |
| Kaki and Hawkins (2021)              | Calculate mortality rates and rate ratios for HCW with "deaths of despair"  | Secondary Data Analysis              | <ul style="list-style-type: none"> <li>Death certificates in MA, 2011-15, n=504 HCW</li> <li>Deaths from poisoning, suicide, alcoholic liver disease, and cirrhosis, age 16-64</li> </ul>                              | U.S.    | <ul style="list-style-type: none"> <li>32/100K deaths of despair</li> <li>Highest rates among MAs, health care support, EMTs, paramedics</li> <li>Suicide rate ratios highest for OTs, MAs, nursing aides</li> <li>Physicians w/ significantly lower rates for all deaths of despair</li> </ul>  |
| Keefner et al., (2020) <sup>56</sup> | Describe theoretical models explaining progression from suicide ideation to attempt                               | Scoping review                       | <ul style="list-style-type: none"> <li>3 databases</li> <li>English language</li> <li>No data on number of articles reviewed or included</li> </ul>  | Global  | <ul style="list-style-type: none"> <li>Interpersonal-Psychological Theory: desire, capability, sense of burden and thwarted belonging</li> <li>Integrated Motivational-Volitional model: triggers to SI to behavior</li> <li>3-step theory: hopelessness + pain, disrupted connectedness, suicide capacity (dispositional, acquired, practical)</li> </ul> |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                             | Study Aim   | Design or Intervention Type | Population and Setting   | Country   | Key Findings  |
|-------------------------------------|---|-----------------------------|--|-----------|---|
| Kelly et al., (2021) <sup>57</sup>  | Describe rates of SI and SUD among U.S. people of different sexual identities, races, and genders | Secondary Data Analysis     | <ul style="list-style-type: none"> <li>Nat'l. Survey of Drug Use and Health, 2015-2019 (n=189K)</li> <li>Rates of SI, SUD, or both (11% of sample)</li> <li>White-70%, Black/ African-American 13%, Hispanic-17%; straight/ heterosexual-95% vs lesbian/gay/ bisexual-5%; male-49%/female-51%</li> </ul> | U.S.      | <ul style="list-style-type: none"> <li>All <b>LGB adults</b> w/higher SI (OR 2.9-4.5) and SUD (OR 1.2-3) than same race/gender heterosexual adults</li> <li>Among heterosexuals, Black and Latinex adults had lower SI than whites (OR 0.5-0.6)</li> <li>Among LGB adults, Black/ Latina <u>women</u> had lower SI (OR 0.6-0.7) (no differences for men)</li> </ul> |
| Kelsey et al., (2021) <sup>58</sup> | Evaluate prevalence of SI, burnout, and help seeking in U.S. <b>nurses</b> vs. other workers      | Cross Sectional Survey      | <ul style="list-style-type: none"> <li>Online anonymous survey</li> <li>Convenience sample, nurses vs. other workers ages 29-65</li> <li>n=7378/86,858 (8%), 2017</li> <li>Other workers from KnowledgePanel online survey, n=5198 (? response)</li> <li>MBI-HSS, PRIME-MD</li> </ul>                    | U.S.      | <ul style="list-style-type: none"> <li>Nurses with SI (vs nurses without): higher risk for males, being single, no kids, high burnout (2x risk SI) or depression scores (11x risk SI), less likely to seek help</li> <li>Significantly lower risk if Black/ AA</li> <li>Nurses with higher SI risk than other workers</li> </ul>                                    |
| Kwok (2021) <sup>59</sup>           | Depression, stress, and perceived errors in psychiatry <b>residents</b>                           | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Anonymous online survey</li> <li>n=47/72 (65%)</li> <li>PHQ9, PSS</li> </ul>  | Singapore | <ul style="list-style-type: none"> <li>Singapore aligns with ACGME</li> <li>PHQ9<math>\geq</math>10 in 38%; higher scores assoc with working &gt; 60 hrs/week</li> <li>11% had SI in past 2 wks</li> </ul>  |
| Kyron et al., (2020) <sup>60</sup>  | Reasons for non-disclosure on MH questionnaire among emergency personnel                          | Cross-sectional survey      | <ul style="list-style-type: none"> <li>n=14,536 members of police, fire, rescue, ambulance workers, 39% female</li> <li>Ambulance workers n=3473</li> <li>NSMHWB, Kessler10, +others</li> </ul>  | Australia | <ul style="list-style-type: none"> <li><b>LGBQ+ workers</b> or those with a history of MH disorders were <b>LESS</b> likely to answer suicide questions</li> <li>Those not answering suicide questions had <b>MORE</b> barriers to help-seeking than with reporting SI</li> <li>Major barriers: stigma and confidentiality concerns</li> </ul>                      |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                              | Study Aim  | Design or Intervention Type             | Population and Setting   | Country   | Key Findings   |
|--------------------------------------|--|---|--|-----------|--|
| Kyron et al., (2021) <sup>61</sup>   | Prevalence and predictors of STB among policy and emergency services personnel | Cross-sectional survey                  | <ul style="list-style-type: none"> <li>Same methods as above.</li> </ul>   | Australia | <ul style="list-style-type: none"> <li>Among ambulance workers, past year SI=7%, plans=3%, SA=0.5%</li> <li>For ambulance workers: lifetime SI=15%, plans=9%, SA=3.4%</li> <li>Ambulance workers had higher rates than police, fire, or state emergency workers</li> </ul>   |
| Laanani et al., (2020) <sup>62</sup> | Describe contacts with HCW in the year prior to suicide death in France        | Cross-sectional study                   | <ul style="list-style-type: none"> <li>French National Health Insurance System claims, 2013-2015</li> <li>Patients 15+ who died by suicide (n=19,144)</li> </ul>   | France    | <ul style="list-style-type: none"> <li>9% consulted physician or had ED visit on day of death, 34% in week before, 61% in month before</li> <li>24% hospitalized in prior month</li> <li>MH conditions 8x more common than in general population</li> </ul>  |
| LaCroix et al., (2021) <sup>63</sup> | Describe 3 DOD-funded programs to prevent military suicide                     | Program descriptions                    | <ul style="list-style-type: none"> <li>Cognitive agility training for Special Operations staff, spouses, and mental health clinicians</li> <li>Chaplains-CARE: training for chaplains as gateway to care</li> <li>Suicide Death Reviews</li> </ul> | U.S.      | <ul style="list-style-type: none"> <li>Descriptions of 3 programs and rationale. No data/evaluation yet.</li> </ul>  |
| Lall et al., (2021)                  | Workplace mistreatment and wellbeing in emergency medicine residents           | Cross-sectional survey                  | <ul style="list-style-type: none"> <li>Feb 2020, all EM residents</li> <li>n=7680/8164 (94% answered, 80% completed full survey)</li> <li>62% male, 64% white, 6% LGBTQ+</li> </ul>  | U.S.      | <ul style="list-style-type: none"> <li>Discrimination: 59% gender, 68% racial; 85% physical abuse, 69% sexual harassment</li> <li>SI in 2.5%, similar by gender, race, and ethnicity. <b>2x odds for LGBTQ+</b></li> <li>Mistreatment at least a few times/month → 6x odds of SI</li> <li>Most abuse/harassment came from patients or pt families</li> </ul> |
| Lamb et al., (2021) <sup>64</sup>    | Assess common mental disorders and wellbeing of HCW in UK during early COVID   | First wave of longitudinal cohort study | <ul style="list-style-type: none"> <li>Non-anonymous survey, early COVID</li> <li>n=4378/37870 (12% response)</li> <li>GHQ12, PHQ9, CAD7, AUDIT, PCL-6, MIES, CISR</li> <li>April 2020</li> </ul>  | UK        | <ul style="list-style-type: none"> <li>Depression: 27%, anxiety 23% with higher rates in women, younger staff, and nurses (vs physicians)</li> <li>8.5% with SI past 2 mo,</li> <li>More exposure to moral injury assoc with increased anxiety, depression, PTSD, alcohol misuse</li> </ul>  |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                                 | Study Aim  | Design or Intervention Type                | Population and Setting   | Country | Key Findings  |
|---|--|--|--|---------|---|
| Leombruni et al., (2021) <sup>65</sup>  | SI among medical <b>students</b>   | Cross-sectional survey                     | <ul style="list-style-type: none"> <li>Convenience sample in 12 medical schools, anonymous</li> <li>n=2457 completed BDI-II question on SI, 62% females, 14% non-heterosexual</li> </ul>   | Italy   | <ul style="list-style-type: none"> <li>30% with depressive symptoms</li> <li>14% of total with SI, 36% of those with depression had SI</li> <li>Highest rate SI in students who are <b>bisexual</b> (25%), asexual (53%), report hostile climate (25%), have poor economic status (24%).</li> <li>Lower rate SI in females</li> </ul> |
| Leroy et al., (2021) <sup>66</sup>      | MH in medical, healthcare and university <b>students</b> during COVID-19       | Cross-sectional survey                     | <ul style="list-style-type: none"> <li>Convenience sample, <b>April-May 2020</b>. 4193 med. students (MS), 5431 non-med. health students (HCS), 59,404 non-healthcare students (non-HCS)</li> <li>IES-R, PSS, STAI, BDI</li> </ul> | France  | <ul style="list-style-type: none"> <li>MS with lower anxiety, depression, severe stress, severe distress, or SI than other two groups.</li> <li>MS were mostly from first year of training</li> </ul>   |
| Lewis and Cardwell (2020) <sup>67</sup> | Personality traits and MH in <b>students</b> training in professional programs | Cross-sectional survey                     | <ul style="list-style-type: none"> <li>Study 5 personalities among students: medicine, vet med., medicine, dentistry, pharmacy, law. n=1744 (? response), 80% female</li> <li>GHQ12, BDI-II</li> </ul>                             | UK      | <ul style="list-style-type: none"> <li>Neuroticism and perfectionism associated with depression and SA</li> <li>Medical students with 2x OR SA vs veterinary students and highest rate of all professions; older age also predictive of SA</li> </ul>   |
| Lien et al., (2021) <sup>68</sup>       | Assess attitudes and behavior intent among HCW toward mental illness           | <b>Systematic review and meta-analysis</b> | <ul style="list-style-type: none"> <li>7 databases</li> <li>Included 18/9567 citations of intervention studies; 8 addressed stigma</li> </ul>  | Global  | <ul style="list-style-type: none"> <li>Patient-contact-based education (vs just contact or just education) most effective</li> <li>Education+ indirect contact (video) more effective than +direct contact</li> <li>Problem-based-learning most effective type of education</li> </ul>  |
| Lim et al., (2020) <sup>69</sup>        | <b>Physician</b> burnout and wellness pre-COVID                                | Cross-sectional survey                     | <ul style="list-style-type: none"> <li>2019 convenience sample of emergency med physicians</li> <li>MBI, PHQ9, during <b>COVID</b></li> <li>n=384 (? response), 56% male</li> </ul>  | Canada  | <ul style="list-style-type: none"> <li>14% SI during career, 6% in past year</li> <li>18% with PHQ<sub>≥</sub>10</li> </ul>   |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                                     | Study Aim   | Design or Intervention Type     | Population and Setting  | Country      | Key Findings  |
|---|---|---------------------------------|---|--------------|---|
| Madadin et al., (2021) <sup>70</sup>        | SI among medical <b>students</b>                                    | Cross-sectional survey          | <ul style="list-style-type: none"> <li>1 medical school, anonymous survey, GHQ-28</li> <li>n=265 (? response), 60% female</li> </ul>  | Saudi Arabia | <ul style="list-style-type: none"> <li>42% lifetime SI, 35% past year SI</li> <li>Gender and year of study not associated with SI</li> </ul>  |
| Malakouti et al., (2020) <sup>71</sup><br>■ | Effectiveness of self-help mobile apps for suicide prevention       | <b>Systematic Review</b>        | <ul style="list-style-type: none"> <li>5 databases, 2019</li> <li>n=7/286, 3 U.S., all HIC</li> </ul>   | Global       | <ul style="list-style-type: none"> <li>Pre/post-test showed reduction in SI/self-harm but RCTs did not.</li> <li>Encourages high-quality evaluations</li> </ul>   |
| Malone et al., (2021) <sup>72</sup>         | Identify risk factors for SI among <b>medical interns</b>           | Prospective, longitudinal study | <ul style="list-style-type: none"> <li>Intern Health Study, 2012-2016</li> <li>PHQ9, GAD7, NEO-FFI</li> <li>n=6816/11478 (59% response)</li> <li>49% male, 65% white</li> </ul>   | U.S.         | <ul style="list-style-type: none"> <li>45% with personal hx depression, SI at baseline, 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> quarters was 3%, 6%, 8%, 7%, 7%</li> <li>#1 predictor: baseline or last quarter SI</li> <li>Other major predictors: male gender, neuroticism, medical error, history of depression, current depression or anxiety</li> </ul> |
| Mann et al., (2021) <sup>73</sup><br>■      | Identify scalable evidence-based suicide prevention strategies      | <b>Systematic review</b>        | <ul style="list-style-type: none"> <li>2 databases</li> <li>Outcomes: SI, SA, death by suicide</li> <li>English, 2005-2019, RCTs</li> <li>Included 97/20,234 citations</li> </ul> | Global       | <ul style="list-style-type: none"> <li>Most effective: PCP education, youth education, contact/outreach, collaborative care, gun restrictions</li> <li>Screening and referral showed mixed evidence (more positive)</li> <li>CBT, DBT, individual psychotherapy all reduced SA</li> </ul>   |
| Marchalik et al., (2020) <sup>74</sup>      | Identify risks for depression and SI among <b>urology residents</b> | Cross-sectional survey          | <ul style="list-style-type: none"> <li>Anonymous online survey, 2018</li> <li>PHQ9, MBI, QoL</li> <li>n=210/1001 (21%)</li> </ul>   | U.S.         | <ul style="list-style-type: none"> <li>18% depression, 11% SI</li> <li>Depression associated w/ working &gt;80 hr/wk, female gender, fatigue, burnout, no residency mentorship program, poor MH access</li> <li>38% of depressed residents had SI</li> </ul>  |
| Marlow et al., (2021) <sup>75</sup>         | Assess disability and suicide-related outcomes among adults         | Secondary data analysis         | <ul style="list-style-type: none"> <li>Natl. Survey Drug Use &amp; Health, 2015-2019</li> <li>n=34,681/198,640 (20%) report a disability</li> </ul>                               | U.S.         | <ul style="list-style-type: none"> <li>Disability associated with 4x risk of depression</li> <li>People w/disability 2x more likely to have SI and 2.5x more likely to have suicide planning/SA</li> <li>More disability-related limitations assoc with increased STB</li> </ul>  |

# Description of Included Studies

| Authors                                  | Study Aim  | Design or Intervention Type        | Population and Setting   | Country | Key Findings   |
|--|--|------------------------------------|--|---------|--|
| Mars et al., (2020) <sup>76</sup>        | Evaluate suicide among ambulance staff                                   | Cross-sectional analysis           | <ul style="list-style-type: none"> <li>Analysis of n=15 suicides, 2014-2015</li> <li>73% male, all white</li> </ul>  | U.K.    | <ul style="list-style-type: none"> <li>4/11 had work disciplinary issues and 3/11 lost driving license</li> <li>75% had MH disorder</li> </ul>   |
| Martin et al., (2020) <sup>77</sup>      | Intervention description + outcomes for med <b>students</b>              | <b>Randomized controlled trial</b> | <ul style="list-style-type: none"> <li>3 hour program during pre-clinical psychiatry rotation: a) senior physician self-disclosure of mental illness b) small group c) exposure to MH resources</li> <li>n=43/47 (91%) med students</li> <li>ATP-30, AMI (stigma)</li> </ul> | U.S.    | <ul style="list-style-type: none"> <li>Well-received/rated by students</li> <li>Scores on both measures improved in intervention group, not controls</li> </ul>  |
| Mediavilla et al., (2021a) <sup>78</sup> | Assess impact of PPE access and job variables on HCW MH during COVID     | Cross-sectional survey             | <ul style="list-style-type: none"> <li>Anonymous online survey, <b>April-June 2020</b></li> <li>n=2370, (? Response)</li> <li>C-SSRS, PHQ9, GHQ-12</li> </ul>  | Spain   | <ul style="list-style-type: none"> <li>74% had psychological distress on GHQ-12; 27% positive on PHQ9</li> <li>7% w/"death wishes", 17% w/SI</li> <li>None of the job factors impacted depression or SI</li> </ul>   |
| Mediavilla et al., (2021b) <sup>79</sup> | Evaluate perceived discrimination and MH in HCW during pandemic          | Cross-sectional survey             | <ul style="list-style-type: none"> <li>Same <b>methods</b> as above</li> <li>n=2053</li> </ul>   | Spain   | <ul style="list-style-type: none"> <li>1/3 HCW reported perceived discrimination/stigma</li> <li>Perceived discrimination as HCW assoc. w/depression and 2x odds SI</li> </ul>   |
| Melnyk et al., (2022) <sup>80</sup>      | Evaluate health behaviors, work issues with <b>nurse</b> MH during COVID | Cross-sectional survey             | <ul style="list-style-type: none"> <li><b>Aug-Oct 2020</b></li> <li>Convenience sample of RNs who had signed up with travel nurse company</li> <li>PHQ2, GAD2, PSS4, Pro-QOL, self-reported MH/phys health</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>Higher workplace support assoc with improved self-reported MH</li> <li>Working 12+ hr shifts assoc with less healthy behaviors and more depression and stress</li> </ul>  |
| Menon et al., (2020) <sup>81</sup>       | Assess association between burnout and SI among <b>physicians</b>        | Cross-sectional survey             | <ul style="list-style-type: none"> <li>2018-2019</li> <li>n=1354/11,884 (11%), 56% male, 66% white</li> <li>MBI-HSS, MINI-Z, PFI, PROMIS depression short form</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>SI 5.5% overall, higher in attendings (vs trainees) and whites</li> <li>Depression, but NOT burnout, predicted more SI in adjusted models</li> <li>Burnout, NOT depression assoc. with more self-reported errors</li> </ul> |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                              | Study Aim  | Design or Intervention Type | Population and Setting  | Country   | Key Findings  |
|--------------------------------------|--|-----------------------------|---|-----------|---|
| Mokros et al., (2021) <sup>82</sup>  | Evaluate link between chronotype and SI among <b>students</b>              | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Medical (57%) and psychology students, 2018</li> <li>n=289/293 (99%)</li> <li>64% of MS were female</li> <li>SBO-R, CSM, GHQ=28</li> </ul>   | Poland    | <ul style="list-style-type: none"> <li>Psychology students with &gt; SI than medical students</li> <li>Evening preference associated with SI but this mediated by anxiety, depressive, somatic symptoms.</li> </ul>   |
| Mortier et al., (2021) <sup>83</sup> | Evaluate STB among hospital HCW during COVID                               | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Anonymous online survey, <b>May-July 2020</b></li> <li>n=5450 (? Response)</li> <li>C-SSRS</li> </ul>  | Spain     | <ul style="list-style-type: none"> <li>30d STB was 8.4%</li> <li>Higher STB OR if younger, male, unmarried, no kids, prior mood/ anxiety disorders, perceived lack of work coordination, communication, personnel, or financial stress</li> </ul>   |
| Murata et al., (2021) <sup>84</sup>  | MH symptoms in adolescents, adults and HCW during COVID-19                 | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Anonymous online survey, <b>April-July 2020</b></li> <li>n=4909, (? Response)</li> <li>1672 HCW vs 2007 non-HCW</li> <li>HCW: 88% female, 89% White</li> <li>PHQ9, GAD7, PC-PTSD-5, SITBI, ICG-R</li> </ul>                | U.S.      | <ul style="list-style-type: none"> <li>Adults: lifetime SI, stress, loneliness predicts current STB.</li> <li>No COVID-exposure variables predicted STB for HCW</li> <li>HCW vs non-HCW—all sig differences: depression (24% vs 34%); anxiety: 24% vs 33%, PTSD 30% vs 36%, SI (10% vs 19%), SI or behavior (10% vs 20%)</li> </ul> |
| Neary et al., (2021) <sup>85</sup>   | Assess Physician Assistant depression, SI, and help-seeking <b>student</b> | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Convenience sample of 1<sup>st</sup> year PA students @ 7 programs, 77% female</li> <li>Orientation survey n=287/347 (83%) and mid-year survey 6 months later, n=217/350 (62%)</li> <li>PHQ 9, anonymous survey</li> </ul> | U.S.      | <ul style="list-style-type: none"> <li>No differences in PHQ by race, ethnicity, gender, or age</li> <li>PHQ9 score ≥10 increased from 5% to 19% by mid-year</li> <li>SI increased from 3% to 7% midyear. Less likely to reach out for help by midyear.</li> </ul>  |
| Ng et al., (2021) <sup>86</sup>      | Assess depression and SI in <b>doctors</b>                                 | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Convenience sample, 20 years of med school grads</li> <li>2016 survey</li> <li>PHQ9, AUDIT-C</li> <li>n=393/1607 (24%), 55% male</li> </ul>  | Hong Kong | <ul style="list-style-type: none"> <li>PHQ9 score ≥10: 16%</li> <li>SI in past 2 weeks: 15%</li> <li>Less sleep predicted of high PHQ</li> <li>Single people had 2x odds of SI vs married.</li> </ul>   |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                                   | Study Aim   | Design or Intervention Type                | Population and Setting  | Country | Key Findings   |
|---|---|--|---|---------|--|
| Ofei-Dodoo et al., (2020) <sup>87</sup>   | Assess loneliness, burnout, depression, SI among <b>physicians</b>                    | Cross-sectional survey                     | <ul style="list-style-type: none"> <li>Email survey in Wichita, KS</li> <li>n=197/442 (44%), 54% male</li> <li>UCLA Loneliness scale, abbreviated MBI, PRIME-MD 2, 1 suicide question</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>Loneliness (noted in 43%) associated with increased age, higher burnout, or depression.</li> <li>Greater loneliness associated with + depression screen and SI in bivariable analysis. SI not significant in multivariable analysis.</li> </ul>   |
| Ortiz-Calvo et al., (2021) <sup>88</sup>  | Evaluate role of social support and resilience in HCW MH during COVID-19              | Cross-sectional survey                     | <ul style="list-style-type: none"> <li>Online convenience sample</li> <li>Self-reported resilience, social support, &amp; MH during <b>COVID</b></li> <li>PHQ9, GHQ-12, C-SSRS</li> <li>n=2372, 78% female, 35% physicians, 34% nurses</li> </ul>   | Spain   | <ul style="list-style-type: none"> <li>Depression highest in physicians and nurses vs other HCW</li> <li>Resilience and social support both protective against depression &amp; SI</li> <li>SI highest in health technicians</li> </ul>  |
| Patrician et al., (2020) <sup>89</sup>    | Estimate suicide rate among <b>nurses</b>   | Secondary data analysis                    | <ul style="list-style-type: none"> <li>NVDRS, 2015, 17 states</li> <li>Working nurses (RNs, nurse anesthetists, CNMs, NPs) vs non-nurses, ages 16-64</li> <li>n=128, 80% female</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>RN suicide rate 13 per 100,000.</li> <li>Females: 11.4/100K; Males: 29.3/100K</li> <li>Both a few points higher than general population</li> <li>Limited detail on how nurses were identified</li> </ul>  |
| Pelissier et al., (2021) <sup>90</sup>    | Psychological distress in medical <b>students</b> during COVID-19                     | Cross-sectional study                      | <ul style="list-style-type: none"> <li>All medical students at 1 school, <b>March 2021</b></li> <li>n=832/1814 (46%), 66% female</li> </ul>   | France  | <ul style="list-style-type: none"> <li>SI: 15%; History of SA: 4%</li> <li>Trauma during COVID, history of anxiety, female gender, difficulty with online learning assoc. with more distress; support with less.</li> </ul>  |
| Pellicane and Ciesla (2022) <sup>91</sup> | Assess minority stress, depression, STB in transgender and gender-diverse individuals | <b>Systematic review and meta-analysis</b> | <ul style="list-style-type: none"> <li>Transgender/gender diverse= people w/ gender identity not fully aligned with sex at birth</li> <li>Not focused on HCW</li> <li>Minority stress: e.g. internal stigma, concealment, rejection) Included n=85/1335 studies from 3 databases</li> <li>59% of studies: US/ Canada</li> </ul> | Global  | <ul style="list-style-type: none"> <li><b>Gender minority stress</b> assoc. w/ depression; SI assoc. w/distal stress, internalized transphobia, expected rejection, concealment.</li> <li>SA associated with distal stress and expectations of rejection.</li> <li>Distal stress (harassment, violence) and SI more correlated in studies with more racial/ethnic minorities.</li> </ul> |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus



# Description of Included Studies

| Authors                               | Study Aim  | Design or Intervention Type | Population and Setting  | Country   | Key Findings   |
|---------------------------------------|--|-----------------------------|---|-----------|--|
| Petrie et al., (2020) <sup>92</sup>   | Assess work hours, MH, and SI among junior <b>doctors</b>              | Cross-sectional study       | <ul style="list-style-type: none"> <li>2013 convenience sample of physicians, 27% response rate</li> <li>Focused on 2n=706 full-time junior doctors (trainees)</li> <li>GHQ-28 and SI</li> </ul>  | Australia | <ul style="list-style-type: none"> <li>For junior doctors, strong positive relationship in #hours worked/wk and mental disorders/SI, even when adjusted for demographics. Risk for both doubled over 55 hrs/wk.</li> </ul>   |
| Platt et al., (2020) <sup>93</sup>    | Assess effectiveness of suicide prevention strategies                  | <b>Systematic review</b>    | <ul style="list-style-type: none"> <li>Summarized 6 systematic reviews</li> <li>Initial reviews published: 2004, 2005, 2012, 2015 (n=2), 2016</li> <li>Those with minimal evidence may be effective but just not adequately assessed by high-quality trials.</li> </ul> | Global    | <ul style="list-style-type: none"> <li><b>Strong evidence:</b> Restrictions (gun access, tall buildings/bridges, meds.)</li> <li><b>Weak evidence:</b> PCP training, in-person and digital therapies, enhanced f/u, programs in schools, community, workplaces, prisons, military, lithium, CBT, DBT</li> <li><b>Minimal/conflicting evidence:</b> other meds., online programs, screening and referrals, public awareness campaigns, gatekeeper programs, hotlines, post-vention, media reporting guidelines</li> </ul> |
| Plunkett et al., (2021) <sup>94</sup> | Suicide in <b>anesthetists</b>   | <b>Systematic review</b>    | <ul style="list-style-type: none"> <li>5 databases searched</li> <li>n=54/1385 articles</li> <li>Review finished 2020, pre-COVID</li> </ul>   | Global    | <ul style="list-style-type: none"> <li>SMRs in female anesthesiologists in pre-1995 studies were higher</li> <li>After 1995, limited data for SMR. Anesthesiologists do have higher proportion of suicide deaths than other groups.</li> <li>Anesthesiologists more likely to die by overdose than other docs.</li> <li>SI likely similar to other docs.</li> </ul>  |
| Rathod et al., (2020) <sup>95</sup>   | Psychological impact of early COVID-19 among Health Care Professionals | Cross-sectional study       | <ul style="list-style-type: none"> <li>Part of a global study during <b>COVID</b></li> <li>Convenience sample, ages 16+ n=7917, 49% HCW</li> <li>HCW: 89% white, 88% female</li> <li>92% of this sample from UK</li> <li>PHQ9, GAD7, IES-R</li> </ul>                   | UK        | <ul style="list-style-type: none"> <li>HCW (vs non-HCW) had less severe depression/anxiety, larger bump in MH support</li> <li>HCW had similar substance use, greater increase in alcohol use.</li> <li>No sig difference in change in SI for HCW/non-HCW</li> </ul>   |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                                  | Study Aim  | Design or Intervention Type                | Population and Setting   | Country | Key Findings   |
|--|--|--|--|---------|--|
| Rayhall and Hawkins (2021) <sup>96</sup> | Evaluate occupational differences in deaths of despair                               | Secondary data analysis                    | <ul style="list-style-type: none"> <li>National Occupational Mortality Surveillance System</li> <li>Proportional Mortality Ratios (PMR)</li> <li>Assessed risk for suicide, alcoholic liver disease, drug overdose</li> <li>1985-1998 vs 1999</li> </ul> | U.S.    | <ul style="list-style-type: none"> <li>Highest risk occupations for deaths of despair: construction, architects, food prep/service.</li> <li>HCW showed 56% drop in PMR for drug overdose, 8% drop for suicide, 3% increase in alcoholic liver dz.</li> </ul>  |
| Rodrigues et al., (2021) <sup>97</sup>   | Compare deaths from substance use: <b>anesthesiologists</b> vs non-anesthesiologists | <b>Systematic review and meta-analysis</b> | <ul style="list-style-type: none"> <li>7 databases thru Mar 2020</li> <li>Observational studies</li> <li>n=39/4715 studies, 1983-2019, but could only use 14 for meta-analysis.</li> <li>20 studies from U.S.</li> </ul>                                 | Global  | <ul style="list-style-type: none"> <li>Meta-analysis of 4 cohort studies: anesthesiologists had higher OR (2.7) for drug-related mortality</li> <li>Pooled suicide risk 6% (n=3) with 2x odds of drug-related suicide (n=2)</li> <li>Alcohol, opioids most misused</li> <li>High risk bias, limited number of studies for each sub-analysis</li> </ul> |
| Rubanovich et al., (2022) <sup>98</sup>  | Evaluate the link between privacy and suicide risk/ SI in HCW                        | Cross-sectional                            | <ul style="list-style-type: none"> <li>Screening tool for HCW wellness program @UCSD</li> <li>n=1224/25,198 (5% response), 2018-2019</li> <li>PHQ9, 4 other suicide items</li> <li>77% female, 32% nurses, 23% physicians, 11% students</li> </ul>       | U.S.    | <ul style="list-style-type: none"> <li>42% with <math>\geq</math> moderate depression</li> <li>16% suicide risk</li> <li>10% risk of SI, 4% plans, 1.5% suicide behaviors</li> <li>Having a positive stigma screen or non-response to any non-demographic questions associated w/sig. higher depression, suicide risk and STB</li> </ul>               |
| Sampogna et al., (2020) <sup>99</sup>    | Assess prevalence of common mental health conditions in medical <b>students</b>      | <b>Systematic review</b>                   | <ul style="list-style-type: none"> <li>6 databases, English or Italian journals</li> <li>Included 16/873 articles</li> </ul>   | Italy   | <ul style="list-style-type: none"> <li>Depressive symptoms in 3-21%</li> <li>Severe SI in 17%</li> <li>Prevalence alcohol: 13-86%</li> </ul>   |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                                    | Study Aim  | Design or Intervention Type         | Population and Setting  | Country | Key Findings  |
|--|--|-------------------------------------|---|---------|---|
| Sampson et al., (2020) <sup>100</sup><br>■ | Assess 6 mo outcomes for a cognitive behavioral skill-building program for new <b>nurses</b> | <b>Randomized controlled trial</b>  | <ul style="list-style-type: none"> <li>• RCT of INDBODYSTRONG program vs. control group</li> <li>• n=89/112 (79% response)</li> <li>• PSS, GAD7, PHQ9 plus measures of stress, job satisfaction, healthy lifestyle beliefs</li> </ul>   | U.S.    | <ul style="list-style-type: none"> <li>• Intervention group with lower MH scores at 6mo.</li> <li>• Large effect size for stress, anxiety, depression, job satisfaction</li> </ul>  |
| Sciolla et al., (2021) <sup>101</sup><br>■ | Assess a <b>physician</b> depression and suicide screening and treatment referral program    | Intervention description + outcomes | <ul style="list-style-type: none"> <li>• UC-Davis Health, 2013-2019</li> <li>• n=539/3748 (14% response)</li> <li>• Confidential or anonymous</li> <li>• PHQ9, questions on SI, SA</li> <li>• High risk categories sent emergency contact info and list of therapists/psychiatrists</li> <li>• Can also message counselor anonymously or by name</li> </ul> | U.S.    | <ul style="list-style-type: none"> <li>• 62% mod risk, 36% high</li> <li>• Past SA ion 1% of mod, 5% of high</li> <li>• 33% messaged w/counselor, 9% of those had in-person eval., 32% referred to MH professional (n=83)</li> <li>• 41% of trainees + 31% faculty were in highest risk category (of three)</li> <li>• Only 28% in highest risk category were already in treatment</li> </ul> |
| Sekhar et al., (2021) <sup>102</sup><br>■  | Mindfulness-based psychological interventions for well-being                                 | <b>Systematic review (Cochrane)</b> | <ul style="list-style-type: none"> <li>• Limited to RCTs for medical students and junior doctors</li> <li>• 10/639 studies, mostly small, no long-term outcomes</li> </ul>  | Global  | <ul style="list-style-type: none"> <li>• No clinically sig. improvements in depression or anxiety or stress.</li> <li>• No data on STB</li> <li>• Review showed limited data and no effect on anxiety/depression</li> </ul>   |
| Seo et al., (2021) <sup>103</sup>          | Risks for SI, SA among medical <b>students</b>   | <b>Meta-analysis</b>                | <ul style="list-style-type: none"> <li>• 6 databases thru March 2021</li> <li>• n=25/2026, 6 from U.S.</li> </ul>   | Global  | <ul style="list-style-type: none"> <li>• Top risk factors for SI: depression (OR 6.9), burnout (OR 6.3), comorbid mental illness (OR 5.1).</li> <li>• Other risks with OR 3+:trouble sleeping, stress, fatigue, hx physical assault, poor social support, anxiety, thoughts of dropping out</li> <li>• Top risks for SA: depression (OR=10.3), being female (OR=3.2)</li> </ul>               |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors   | Study Aim   | Design or Intervention Type | Population and Setting   | Country | Key Findings   |
|---|---|-----------------------------|--|---------|--|
| <span style="color: #003366;">■</span> Intervention or program evaluation <span style="color: #0070C0;">—</span> Physician focus <span style="color: #70AD47;">—</span> Nurse focus <span style="color: #C00000;">—</span> Student focus <span style="color: #666666;">—</span> Systematic Review, Meta-Analysis or RCT <span style="color: #C00000;">—</span> COVID-19 focus <span style="color: #0070C0;">—</span> LGBTQ+ focus |   |                             |  |         |  |
| Shanafelt et al., (2021) <sup>104</sup>   | Assess SI prevalence and willingness to seek help among <b>physicians</b> vs non- <b>physicians</b> | Cross-sectional survey      | <ul style="list-style-type: none"> <li>n=5197/30,456 (17%)</li> <li>Physicians from AMA Masterfile (62% male)</li> <li>Non-physicians 29-65 recruited on KnowledgePanel</li> <li>PRIME-MD, 2q MBI, SI in last year, help-seeking from NCS</li> </ul> | U.S.    | <ul style="list-style-type: none"> <li>Physicians w/more SI (6%) than non-physicians (4.3%). Female physicians w/more SI than males.</li> <li>Physicians: w/ SI less likely to say they'd seek help (64% vs 74%)</li> <li>Physicians: more likely than non-physicians to say they'd seek help</li> </ul> |
| Shepherd et al., (2020) <sup>105</sup>  | Evaluate race, age, gender for suicides among <b>physician</b> vs non-physicians                    | Secondary data analysis     | <ul style="list-style-type: none"> <li>National Occupational Mortality Surveillance (NOMS)</li> <li>1999, 2003-4, 2007-14</li> </ul>   | U.S.    | <ul style="list-style-type: none"> <li>PMR nurses =100. PMR physicians=251, PMR PAs =192 (higher than nurses for both)</li> <li>Among physicians, black women and white males aged 65-90 had highest PMRs (500s-600s) but small sample sizes</li> </ul>  |
| Soh et al., (2022) <sup>106</sup>   | Evaluate medical malpractice involvement and wellness among <b>surgeons</b>                         | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Survey of Society of Vascular Surgery Members</li> <li>n=871/2905 (30%), 84% male</li> <li>MBI (2/3 scales), does not list scales used for depression, SI</li> </ul>  | U.S.    | <ul style="list-style-type: none"> <li>19% named in lawsuit, past 2 yrs</li> <li>37% w/depression, 8% w/SI</li> <li>Lawsuits associated w/burnout but not depression or SI.</li> </ul>   |
| Solibieda et al., (2021) <sup>107</sup>   | Compare medical <b>students</b> with SI or suicide planning vs no suicidality                       | Cross-sectional survey      | <ul style="list-style-type: none"> <li>n=178/611 (29%), age 18+</li> <li>3% with prior SA excluded</li> <li>BDI=II, BDI, INS, ACSS</li> <li>Measured TB (thwarted belongingness) and PB (perceived burdensomeness)</li> </ul>                        | Belgium | <ul style="list-style-type: none"> <li>53% had no suicidality, 13% lifetime SI, 15% planners</li> <li>Higher TB scores in recent SI or planners</li> <li>Higher PB scores in planners</li> </ul>   |

# Description of Included Studies

| Authors                                  | Study Aim  | Design or Intervention Type        | Population and Setting  | Country       | Key Findings   |
|--|--|------------------------------------|---|---------------|--|
| Stelnicki et al., (2020) <sup>108</sup>  | Evaluate suicide behaviors among <b>nurses</b>   | Cross-sectional survey             | <ul style="list-style-type: none"> <li>Convenience online survey</li> <li>n=3969 (? Response), 2019</li> <li>PTSD-C, LEC5, PHQ9, GAD7, PDSS, AUDIT</li> </ul>   | Canada        | <ul style="list-style-type: none"> <li>Past year and lifetime distress</li> <li>SI: 11%; 33%, SA: 1%, 8%</li> <li>Suicide planning: 5%, 17%</li> <li>Younger age risk for SI/planning</li> <li>For STB: association with all MH disorders increased as severity of suicide behaviors increased</li> <li>Alcohol associated with SI only</li> </ul>   |
| Stovall and Hansen (2021) <sup>109</sup> | Examine relationship between <b>nurse</b> demographics, patient safety incidents, and suicidal behaviors | <b>Randomized controlled trial</b> | <ul style="list-style-type: none"> <li>Anonymous online survey</li> <li>n=216/~11,000 (3% response)</li> <li>SBQ-R, involved in patient safety incident (PSI), 5+ years clinical experience</li> <li>94% female</li> <li>Intervention given early to target group, delayed for control group</li> </ul> | U.S.          | <ul style="list-style-type: none"> <li>51% Involved with team safety PSI in last year, 95% in career</li> <li>19% had personal actions leading to PSI in last year, 62% in career</li> <li>PSIs causing death associated w/ leaving job (OR 7) leaving nursing (OR 3) or suicide behaviors (OR 3)</li> <li>Nurses with past year SI and future suicidal thinking more likely to intend to leave nursing after PSI</li> </ul> |
| Summers et al., (2020) <sup>110</sup>    | Assess burnout and depression among <b>psychiatrists</b>   | Cross sectional survey             | <ul style="list-style-type: none"> <li>Anonymous online survey of America Psychiatric Association members</li> <li>n=2084, (? Response)</li> <li>OLBI, PHQ9</li> <li>16% residents, 1% students</li> </ul>  | North America | <ul style="list-style-type: none"> <li>16% with mod/ severe depression</li> <li>Higher aOR of burnout: female, +depression, no schedule control, community or gov't work, age≤60.</li> <li>Higher aOR for depression: female, +burnout, resident/early career, non-academic workplace; non-Asian</li> <li>SI not associated with burnout after controlling for other variables</li> </ul>                                    |
| Tarchi et al., (2021) <sup>111</sup>     | Suicide in medical <b>students</b> versus general population   | Secondary data analysis            | <ul style="list-style-type: none"> <li>Suicides at 1 medical school (n=5) vs rates in the whole city 2014-19</li> </ul>   | Italy         | <ul style="list-style-type: none"> <li>OR 14.6 for med students vs gen population with higher odds for medical students from abroad at this school</li> </ul>  |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

# Description of Included Studies

| Authors                                | Study Aim  | Design or Intervention Type         | Population and Setting  | Country | Key Findings  |
|--|--|-------------------------------------|---|---------|---|
| Thom et al., (2020) <sup>112</sup>     | Review of validated tools for suicide risk screening in the hospital | Systematic review                   | <ul style="list-style-type: none"> <li>Review of 6 common inpatient screeners</li> <li>SBQ, C-SSRS, ASQ, suicide affect-behavior-cognitions scale (SABCS), Patient Safety Screener-3, PHQ9</li> </ul> | Global  | <ul style="list-style-type: none"> <li>Recommend screeners with high sensitivity, easy to take, accessible</li> <li>PSS validated in gen. med. Settings; ASQ validated in ED only, SBQ, SABCS lack validation. C-SSRS validated but long, PHQ9 validated but vague, PHQ2 recommended by Joint Commission but inadequate</li> <li>Recommendation for initial shorter screen with f/u assessment</li> </ul> |
| Tsegay et al., (2020) <sup>113</sup>   | Suicide attempts among medical students                              | Systematic review and meta-analysis | <ul style="list-style-type: none"> <li>Databases, English language</li> <li>n=14/1275 studies, 26K students</li> <li>2 from US, 5 Europe</li> </ul>   | Global  | <ul style="list-style-type: none"> <li>Pooled lifetime SA: 2.19% (n=13); pooled 1-year SA: 1.64 (n=4)</li> <li>Lower risk in HIC vs LMIC</li> <li>Twice prevalence lifetime SA in females but half prevalence past-year SA vs. males</li> </ul>   |
| Uphoff et al., (2021) <sup>114</sup>   | MH among HCW and other vulnerable groups during COVID-19             | Systematic review                   | <ul style="list-style-type: none"> <li>Review of 25 existing systematic reviews in 4 databases during COVID</li> <li>19 included HCW</li> </ul>   | Global  | <ul style="list-style-type: none"> <li>Worse MH in HCW</li> <li>Increased risks for females, nurses, high COVID exposure, younger</li> </ul>  |
| Veronese et al., (2021) <sup>115</sup> | Risk of suicide among HCW in nursing homes                           | Cross-sectional survey              | <ul style="list-style-type: none"> <li>Survey @2 nursing homes in Italy during COVID</li> <li>n=40/141 (29%)</li> <li>SBQ-R</li> </ul>  | Italy   | <ul style="list-style-type: none"> <li>25% high risk for suicide</li> <li>Higher risk HCW had 3x the risk of previous COVID + results</li> </ul>  |
| Vigil et al., (2021) <sup>116</sup>    | Suicide among EMS workers  | Secondary data analysis             | <ul style="list-style-type: none"> <li>National Occupational Mortality Surveillance database</li> <li>1999, 2003-4, 2007-13</li> <li>298 firefighter and 84 EMT suicides</li> </ul>                   | U.S.    | <ul style="list-style-type: none"> <li>Firefighters at 2x proportionate mortality ratio (PMR)</li> <li>EMTs trended to higher PMRs but not significant</li> </ul>   |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

| Authors   | Study Aim   | Design or Intervention Type | Population and Setting   | Country   | Key Findings  |
|---|---|-----------------------------|--|-----------|---|
| Waqas et al., (2020) <sup>117</sup><br>■        | Interventions to reduce MH stigma in educational settings                                   | Systematic Review           | <ul style="list-style-type: none"> <li>8 databases, searched 2018</li> <li>n=44/978 studies, 16 from U.S./Canada, most from HIC</li> <li>Most (n=25) used 1 session</li> <li>Psychoeducation most common approach (25 studies)</li> </ul>  | Global    | <ul style="list-style-type: none"> <li>19/25 stigma studies showed improvement</li> <li>Improved beliefs and attitudes in 8/11 studies, help seeking (8/11), knowledge (11/14)</li> </ul>   |
| Wijeratne et al., (2021) <sup>118</sup>         | Psychological distress, burnout, alcohol use, and work stress among older <b>physicians</b> | Cross-sectional survey      | <ul style="list-style-type: none"> <li>National Mental Health Survey of Doctors &amp; Medical Students</li> <li>Compared age &lt;41, 41-60, 61+</li> <li>n=13,063/49,596 (27%)</li> <li>Kessler-10, MBI, AUDIT</li> <li>Older group (18% female), youngest group 37%.</li> </ul> | Australia | <ul style="list-style-type: none"> <li>Older physicians (61+) with lower scores on SI, depression, anxiety, alcohol misuse</li> <li>Younger physicians with more moderate risk drinking</li> </ul>  |
| Wilks et al., (2021) <sup>119</sup><br>■        | Usability and user engagement of suicide prevention apps                                    | Systematic review           | <ul style="list-style-type: none"> <li>Reviewed all apps related to STB on Google Play &amp; iOS store thru Oct. 2020</li> <li>English language, purchased in U.S.</li> <li>Included 66/1492 apps</li> </ul>   | U.S.      | <ul style="list-style-type: none"> <li>42/66 (64%) designed for SI</li> <li>59 had at least 1 of 5 "best practice" feature for suicide prevention. No apps had all 5; only 4 had 4/5.</li> <li>Most common best practice was access to crisis line (56%)</li> </ul>         |
| Williams et al., (2020) <sup>120</sup>          | Personal and professional consequences of <b>physician</b> burnout                          | Systematic review           | <ul style="list-style-type: none"> <li>3 databases, 2018, English</li> <li>n=43/2020 studies</li> <li>All cross-sectional but 2 had longer time frame</li> <li>MBI used in 38/43</li> </ul>  | Global    | <ul style="list-style-type: none"> <li>5 address SI,</li> <li>16 addressed depression/anxiety; showed burnout strongly associated</li> <li>12 studies studied alcohol use; noted association</li> <li>Emotional Exhaustion seems particularly associated with SI</li> </ul> |
| Wolford-Clevenger et al., (2020) <sup>121</sup> | Validation of Suicide Behavior Exposure Scale in first responders                           | Cross-sectional survey      | <ul style="list-style-type: none"> <li>Convenience sample of n=862 first responders</li> <li>81% male, 94% white, 87% EMT/paramedic</li> <li>SBQ-R</li> </ul>  | U.S.      | <ul style="list-style-type: none"> <li>Lifetime SI: 37 and SA: 1.4%</li> <li>18% met criteria for suicide risk</li> <li>Scale likely needs more modification for this population</li> </ul>   |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus

| Authors                                  | Study Aim   | Design or Intervention Type         | Population and Setting   | Country      | Key Findings   |
|--|---|-------------------------------------|--|--------------|--|
| Wyman et al., (2020) <sup>122</sup><br>■ | Test suicide prevention intervention for Air Force members        | Cluster Randomized controlled trial | <ul style="list-style-type: none"> <li>Intervention group: skill building (3d) –focus on kinship, purpose, guidance, balance Control group: 2-hour stress management course</li> <li>Both: 2hr booster session and optional text messages throughout the intervention</li> <li>CAT-SS (suicide), CAT-DI (depression), job performance</li> </ul> | U.S.         | <ul style="list-style-type: none"> <li>748 intervention; 737 control, 86% response rate</li> <li>At 1 mo, intervention group w/ lower SI severity, less depression</li> <li>(-24%), and less job impairment</li> <li>At 6mo, intervention group w/ less depression (-16%); other outcomes improved but not significantly so</li> </ul> |
| Yagmour et al., (2021) <sup>123</sup>    | Discrimination, stress, depression, harassment in female trainees | Cross-sectional survey              | <ul style="list-style-type: none"> <li>All female residents in 1 city.</li> <li>n=133, (? Response), 2018</li> </ul>   | Saudi Arabia | <ul style="list-style-type: none"> <li>+ gender discrimination (52%), mostly from supervisory physicians</li> <li>13% SI, 17% "better off dead", 47% depression</li> </ul>   |
| Ye et al., (2021) <sup>124</sup>         | Physician death by suicide  | Secondary data analysis             | <ul style="list-style-type: none"> <li>NVDRS, 2012, 2014, 2016</li> <li>n=302 physicians, 20% female vs gen pop matched by age group and gender</li> </ul>   | U.S.         | <ul style="list-style-type: none"> <li>Women physicians had higher age-adjusted suicide rates than gen pop; male physicians did not</li> <li>Firearms most common cause of death for male physicians, pharmacologics for women physicians</li> <li>No differences by race/ethnicity</li> </ul>   |
| Young et al., (2021) <sup>125</sup>      | HCW MH and QOL during COVID-19                                    | Cross-sectional survey              | <ul style="list-style-type: none"> <li>Online convenience sample, April 2020</li> <li>U.S. HCW, English language</li> <li>PHQ9, GAD7, PC-PTSD, AUDIT-C</li> <li>n=1685 (? Response); % white (88), female (76); nurses (14), MD/DO (19), PhD/PsyD/ social work (45)</li> </ul>   | U.S.         | <ul style="list-style-type: none"> <li>63% ≥5 on GAD7, 17% ≥10 PHQ9, 14% with positive PTSD screen</li> <li>5% SI (on PHQ9), less MH probs for MH workers</li> <li>Alcohol associated w/ + screens on all MH measures; perceived COVID risk +/- associated w/MH, PPE access not sig.</li> </ul>  |

■ Intervention or program evaluation —Physician focus —Nurse focus —Student focus —Systematic Review, Meta-Analysis or RCT —COVID-19 focus —LGBTQ+ focus



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