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Crisis Standards of Care in the USA: A Systematic Review and Implications for Equity Amidst COVID-19

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Abstract

Background Crisis Standards of Care (CSC) provide a framework for the fair allocation of scarce resources during emergencies. The novel coronavirus disease (COVID-19) has disproportionately affected Black and Latinx populations in the USA. No literature exists comparing state-level CSC. It is unknown how equitably CSC would allocate resources.

Methods The authors identified all publicly available state-level CSC through online searches and communication with state governments. Publicly available CSC were systematically reviewed for content including ethical framework and prioritization strategy.

Results CSC were identified for 29 states. Ethical principles were explicitly stated in 23 (79.3%). Equity was listed as a guiding ethical principle in 15 (51.7%); 19 (65.5%) said decisions should not factor in race, ethnicity, disability, and other identity-based factors. Ten states (34.4%) allowed for consideration of societal value, which could lead to prioritization of health care workers and other essential personnel. Twenty-one (72.4%) CSC provided a specific strategy for prioritizing patients for critical care resources, e.g., ventilators. All incorporated Sequential Organ Failure Assessment scores; 15 (71.4%) of these specific CSC considered comorbid conditions (e.g., cardiac disease, renal failure, malignancy) in resource allocation decisions.

Conclusion There is wide variability in the existence and specificity of CSC across the USA. CSC may disproportionately impact disadvantaged populations due to inequities in comorbid condition prevalence, expected lifespan, and other effects of systemic racism.

Keywords Crisis Standards of Care · COVID-19 · Infectious disease · Pandemic · Equity

Introduction

As the novel coronavirus disease (COVID-19) spreads across the USA, many communities are facing the threat of shortages and limitations on healthcare resources, including hospital beds, staff, and critical equipment such as ventilators, hemodialysis machines, and extracorporeal membrane oxygenation (ECMO) machines. In times of crisis such as the current national state of emergency [1, 2], individual states may choose to implement uniform criteria to guide the allocation of scarce resources. These so-called Crisis Standards of Care (CSC) provide a framework for determining who is prioritized to receive scarce resources. At present, the existence of state-level CSC has not been described in the literature, nor have such guidelines been compared at a regional or national level to identify trends or discrepancies that may prove important in the overall health of the nation and that of more vulnerable segments of the population. This study sought to identify and review all publicly available state-level CSC in the USA. Secondarily, we sought to compare the ways in which CSC prioritize patients for the allocation of scarce resources such as ventilators, and to consider the ethical and equity implications of these decisions.

Background

As the H1N1 virus spread in 2009, the Department of Health and Human Services (HHS) Assistant Secretary for

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Preparedness and Response (ASPR) asked that the Institute of Medicine develop guidelines for resource allocation in times of scarcity. The resulting report [3] led to recommendations and regional workshops [4–6] for developing CSC. Key principles on which this framework suggests developing CSC include fairness, duty to care, duty to steward resources, transparency, consistency, proportionality, and accountability [7].

In 2014, the American College of Chest Physicians (CHEST) published consensus recommendations for triage [8] and surge capacity logistics [9] during pandemics and other disasters. Key recommendations include the need for preparation with local and regional stockpiles as well as surge plans across all departments within a health system. With regard to triage [8], CHEST recommends enacting a unified process across an affected geographic area (e.g., state), with appropriate oversight to ensure adherence to the same standards despite potential local differences. They also note that triage processes should rely on protocols, rather than clinical judgment, and that such protocols should be developed in advance of emergencies. Further, they recommend use of an appropriately accurate physiologic scoring system, and reevaluation over time.

As COVID-19 has spread around the world and resources in parts of even the wealthiest nations have become limited, many have again called for explicit planning for the allocation of scarce resources [7, 10, 11]. Within the USA, early data has raised concerns about stark disparities in incidence and case fatality rates among communities of color [12–16]. This has called attention to the ways in which systemic racism may be shaping the pandemic, and has subsequently brought increased scrutiny of existing CSC in states such as Massachusetts [17], where clinicians [18–21] and politicians [22, 23] alike raised concern about the racial, ethnic, and disability-related inequities that may emerge if and when existing CSC are implemented. Massachusetts' CSC have since been updated [24] in response to this advocacy, incorporating more specific language around health equity but retaining the same decision-making structure.

This review was undertaken in an effort to better understand the current status of CSC around the country, including the ways in which existing guidelines instruct physicians and healthcare systems to allocate specific resources such as ventilators, which may become scarce during a widespread respiratory illness such as the present COVID-19 pandemic.

Methods

Two authors (ECM and CS) attempted to identify CSC for each state between April 13 and April 17, 2020. Identification of state-level CSC was first attempted using a list available on the ASPR Technical Resources, Assistance Center, and Information Exchange (TRACIE) website [25]. If no document or only a nonspecific CSC was found, Google was used to search using the terms "state name" and "crisis standards of care." If the first ten search results failed to yield a specific CSC, the state's department of health (DOH) website was searched, with particular attention to Preparedness, Emergency Response, and COVID-19 pages. If this, too, failed to identify a guideline, the DOH was contacted via the website's information request form, and/or via a personalized email from ECM or CS to an individual from the DOH's Preparedness (or equivalent) team. If an email address for a relevant DOH employee was not easily identified but a telephone number was listed, the DOH was called to request information about CSC for the state.

Available CSC were read by the first two authors and categorized as "specific" if they include explicit decision-making criteria for allocation of resources including ventilators, or "nonspecific" if they lacked clear decision-making criteria. Reviewer agreement on this distinction was 100%. CSC were systematically examined for the following content: explicit ethical principles around which guidelines were created; whether equity was explicitly listed as a guiding principle (e.g., explicit discussion of equity between individuals of different identities, marginalized groups, or discussion of population-level disparities); whether CSC explicitly state that resources should be allocated in an identity-blind manner (i.e., without regard to race, ethnicity, gender); specific guidance for allocation of critical care resources, including ventilators; exclusion criteria for access to critical care; criteria used for prioritization of patients for critical care resources, i.e., use of SOFA [26] or Modified SOFA (MSOFA) [27, 28] scores; and consideration of long-term comorbidities in the prioritization framework. Reviewer agreement on each of these factors was greater than 90%; discrepancies were adjudicated by discussion. Descriptive statistics were used to summarize characteristics of identified CSC.

Results

A state-level CSC document was identified for 29 states (see Fig. 1 and Table 1). Fifteen were identified from the ASPR TRACIE website [25]. Six of the 28 state-level resources listed at that site (CA, FL, MD, MT, OH, TN) were either not available via the provided links, or were deemed to not be CSC as they did not include guidance for triage and/or resource allocation. Updated versions of several other CSC documents in that list were identified by the authors (e.g., MA and PA). An additional ten CSC were found through electronic searches either using the search terms noted above or on the state DOH website. A total of 22 state DOH were contacted by email, 14 of whom replied on or before May 3, 2020. Four additional CSC were identified after email correspondence with state DOH personnel, and six states confirmed that CSC were in development. For the three states

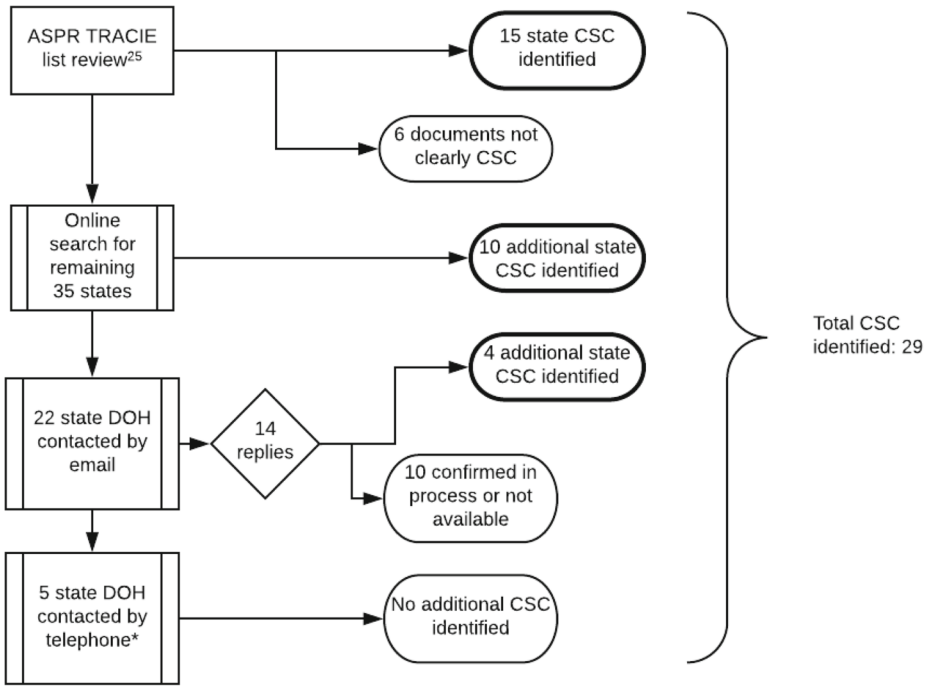

Fig. 1 Crisis Standards of Care guideline identification process

*Telephone calls were made to the three State DOH for which an appropriate email could not be identified, as well as to two states where only a generic online inquiry (not an individual email) was found.
ASPR TRACIE, Assistant Secretary for Preparedness and Response Technical Resources, Assistance Center, and Information Exchange; CSC, Crisis Standards of Care; DOH, Department of Health

without an identified email address, as well as two for which only a generic inquiry email address was available, state DOH were contacted by telephone; these calls did not yield any additional CSC documents (Fig. 2). Appendix 1 contains links to each of the reviewed CSC documents.

Wide variation was noted in the degree of detail provided in CSC regarding the process of their development and the principles on which they were created (Table 1). Fifteen CSC (51.7%) were created or updated this year; eight (27.5%) specifically addressed the COVID-19 pandemic. Twenty-four (85.7%) explicitly stated the ethical principles on which resource allocation decisions should be made. Nineteen (65.5%) explicitly articulated that resource allocation decisions should be made without regard to race, ethnicity, disability, and other identity-based factors. Health equity with respect to these identities, not including equity among hospitals, was identified as an ethical consideration in 16 of the available CSC (55.2%).

The means by which scarce resources should be allocated under each of the 29 identified CSC varied widely (Table 2). Three states (KY, MI, WY) explicitly left all triage and decision-making to local institutions. Ten CSC (34.5%) incorporated exclusion criteria which would preclude patients from access to critical care when CSC are enacted (see Tables 2 and 3). The most common exclusion criteria (Table 3) included low likelihood of immediate survival, e.g., ongoing cardiac arrest (80% of states with exclusion criteria), neurologic conditions including "severe dementia," or "advanced" and/or "irreversible" neurologic events (70% of states with exclusion criteria), and "severe" or "overwhelming" trauma or burns with very poor (e.g., < 10%) predicted survival (80% of CSC with exclusion criteria). The degree of specificity provided within each category varied widely, e.g., "CHF (NYHA Class III or IV), left ventricular dysfunction, hypotension, new ischemia; known congestive heart failure with ejection fraction less than 25% or persistent ischemia/pulmonary edema unresponsive to therapy," in one CSC (AL), compared with "severe congestive heart failure" as a criterion for transfer to palliative care rather than ICU admission during periods of resource limitation (WA).

Of the 29 identified CSC, ten (34.5%) allowed for the consideration of societal value in prioritizing health care workers; four used essential worker status as a tie-breaker for otherwise equally prioritized patients, while the remaining six did not specify exactly how essential workers might be given priority (Table 2). Five (17.9%) CSC factored pregnancy into decision making, either as a general consideration (OR), explicitly in algorithms by increasing priority for pregnant patients, particularly if at a gestational age compatible with fetal viability (MA, PA, UT), or as a tie-breaker if other factors are equal (CO) (Table 2). Specific processes for ventilator allocation were discussed in 21 CSC (72.4%). All 21 states with specific frameworks for allocation of critical care resources recommended SOFA [26] or MSOFA [27, 29] scores as a component of prioritizing patients for allocation of resources. Among the 21 specific CSC frameworks, 15 (71.4%) incorporated

Table 1 Comparison of available state-level Crisis Standards of Care (CSC)

State	Existence of CSC*	Date of identified document**	Explicit ethical framework	Health equity as a guiding principle	Explicitly identity-blind allocation of resources
Alabama	Yes	4/2010; 2/2020	Yes	Yes	Yes
Alaska	Yes	3/2020	No	No	No
Arizona	Yes	2020	Yes	No	Yes
Arkansas	None identified				
California	Yes	4/2020[++]	Yes	No	Yes
Colorado	Yes	4/2020[++]	No	No	No
Connecticut	Yes	10/2010	Yes	Yes	Yes
Delaware	None identified				
Florida	None identified				
Georgia	None identified				
Hawaii	None identified				
Idaho	No–in development				
Illinois	Yes	3/2018; 3/2020[++]	Yes	No	Yes
Indiana	None identified				
Iowa	No–in development				
Kansas	Yes	9/2013	No	No	No
Kentucky	Yes	3/2020	Yes	Yes	Yes
Louisiana	Yes	9/2011	Yes	Yes	No
Maine	Yes	6/2015	No	No	No
Maryland	None identified				
Massachusetts	Yes	4/2020[++]	Yes	Yes	Yes
Michigan	Yes	11/2012	Yes	Yes	Yes
Minnesota	Yes	12/2013; 1/2020	Yes	Yes	Yes
Mississippi	Yes	2/2017	Yes	No	No
Missouri	Yes	4/2020[++]	Yes	No	No
Montana	No–in development				
Nebraska	None identified				
Nevada	Yes	4/2020[++]	Yes	Yes	No
New Hampshire	None identified				
New Jersey	Yes	4/2020[++]	Yes	Yes	Yes
New Mexico	Yes	6/2018	Yes	Yes	Yes
New York	Yes	11/2015	Yes	Yes	Yes
North Carolina	No				
North Dakota	None identified				
Ohio	Yes[+++]	4/2020	Yes	No	No
Oklahoma	Yes	4/2020	Yes	No	Yes
Oregon	Yes	6/2018	Yes	Yes	Yes
Pennsylvania	Yes	4/2020[2]	Yes	Yes	Yes
Rhode Island	No				
South Carolina	No				
South Dakota	No				
Tennessee	Yes	7/2016	Yes	No	Yes
Texas	No				
Utah	Yes	6/2018	Yes	Yes	Yes
Vermont	Yes	5/2019	Yes	Yes	Yes
Virginia	No–in development				
Washington	Yes	3/2020	Yes	Yes	Yes
West Virginia	No–in development				

Table 1 (continued)

State	Existence of CSC*	Date of identified document**	Explicit ethical framework	Health equity as a guiding principle	Explicitly identity-blind allocation of resources
Wisconsin	No–in development				
Wyoming	Yes	6/2019	No	No	No

CSC Crisis Standards of Care

* As of May 3, 2020

**Where more than one document was identified, both were reviewed. Details presented here reflect a combination of available information from these guidelines

+ Specific guidance for critical care and ventilator allocation in 2010; 2/2020 document provides broader guidance

++ Specific guidance related to the COVID-19 pandemic

+++ Guidelines obtained from the Ohio Hospital Association through correspondence with the Ohio Department of Health's Chief of the Bureau of Health Preparedness

consideration of pre-existing chronic health conditions/comorbidities which affect long-term survival (Tables 2 and 4). Within the 15 CSC that recommended consideration of comorbid conditions in prioritizing patients for resource allocation, the most frequently cited comorbidities included heart failure or severe coronary artery disease (53.3%), chronic lung disease (60%), end-stage renal disease (46.7%), cirrhosis or other end-stage liver disease (53.3%), neurologic disorders (e.g., Alzheimer's dementia) (33.3%), and active malignancy with poor prognosis (46.7%). The specificity with which each of these comorbid conditions was described varied between states. For example, Utah listed "end-stage COPD" while other states included "home oxygen dependent" (AK, MN, VT) as descriptors of the degree of chronic lung disease that should be factored into prioritization considerations. The Modified Charlson Comorbidity Index [30–32] was used by Colorado as a means for accounting for comorbidities in prioritization of resource allocation.

Discussion

The allocation of scarce healthcare resources during times of crisis is fraught with ethical challenges. Development

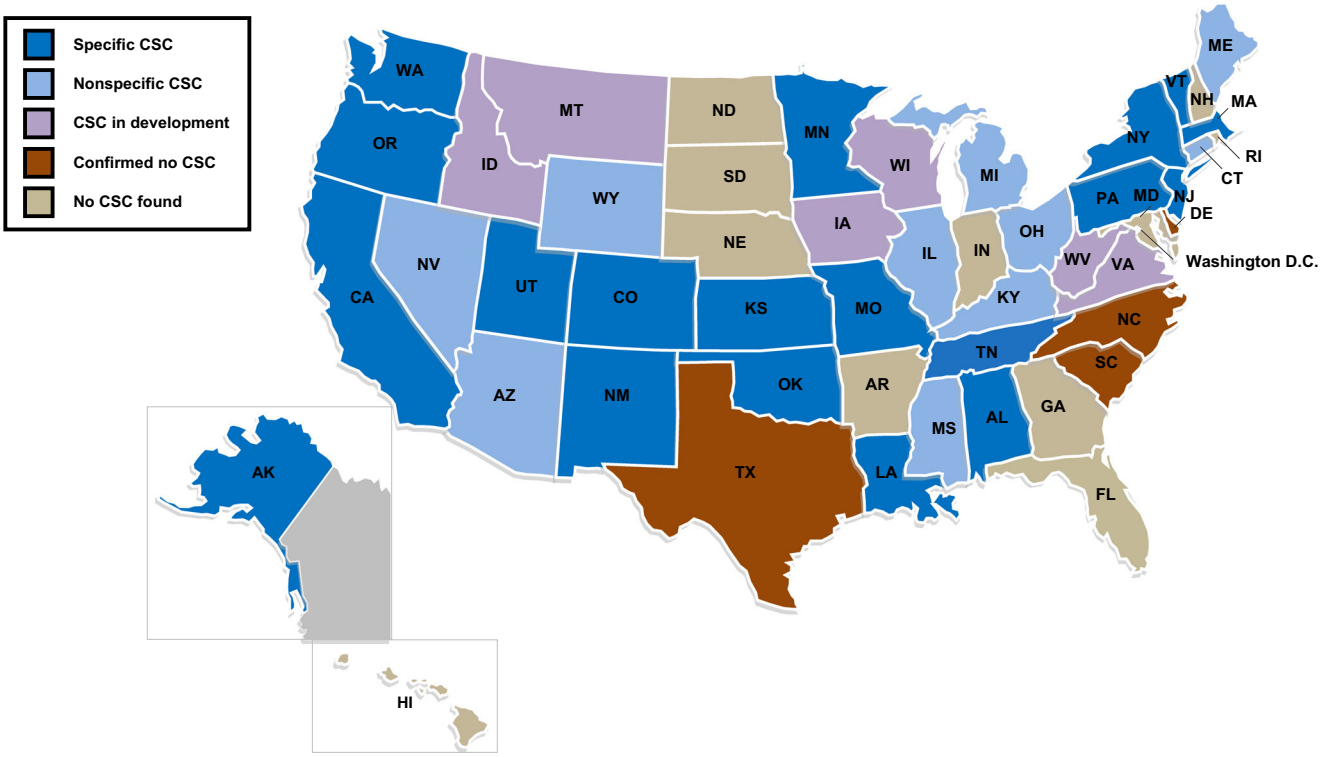

Fig. 2 Crisis Standards of Care across the USA, by status of development as of May 3, 2020

Table 2 Comparison of available state-level Crisis Standards of Care guidance for the allocation of critical care resources

State	Date of identified document[+]	Specific guidance for allocation of critical care resources, including ventilators	Factors included in specific guidance for ventilator allocation, if any				
			Exclusion criteria for access to critical care	Use of SOFA or MSOFA for determining priority	Consideration of long-term comorbidities	Consideration of pregnancy[++]	Consideration of essential worker status
Alabama	4/2010	Yes	Yes	Yes	No	No	No
Alaska	3/2020	Yes	No	Yes	Yes	No	No
Arizona	2020	Yes	No	Yes	No	No	Yes*
California	4/2020	Yes	No	Yes	Yes	No	No
Colorado	4/2020	Yes	No	Yes	Yes	Yes	Yes**
Connecticut*	10/2010	No	n/a	n/a	n/a	n/a	Yes*
Illinois*	3/2018; 3/2020	No	n/a	n/a	n/a	n/a	Yes*
Kansas	9/2013	Yes	Yes	Yes	No	No	No
Kentucky	3/2020	No	n/a	n/a	n/a	n/a	n/a
Louisiana	9/2011	Yes	Yes	Yes	No	No	No
Maine	6/2015	No	n/a	n/a	n/a	n/a	n/a
Massachusetts	4/2020	Yes	Yes	Yes	Yes	Yes	Yes**
Michigan	11/2012	No	n/a	n/a	n/a	n/a	n/a
Minnesota	12/2013	Yes	No	Yes	Yes	No	No
Mississippi	2/2017	No	n/a	n/a	n/a	n/a	n/a
Missouri	4/2020	Yes	No	Yes	Yes	No	Yes*
Nevada	4/2020	No	n/a	n/a	n/a	n/a	n/a
New Jersey	4/2020	Yes	No	Yes	Yes	No	Yes**
New Mexico	6/2018	Yes	No	Yes	No	No	Yes*
New York	11/2015	Yes	Yes	Yes	Yes	No	No
Ohio	4/2020	Yes	Yes	Yes	Yes	No	No
Oklahoma	4/2020	Yes	No	Yes	Yes	No	Yes**
Oregon	6/2018	Yes	Yes	Yes	Yes	Yes	Yes*
Pennsylvania	4/2020	Yes	No	Yes	Yes	Yes	No
Tennessee	7/2016	Yes	Yes	Yes	Yes	No	No
Utah	6/2018	Yes	Yes	Yes	Yes	Yes	No
Vermont	5/2019	Yes	No	Yes	Yes	No	No
Washington	3/2020	Yes	Yes	Yes	Yes	No	No
Wyoming	6/2019	No	n/a	n/a	n/a	n/a	n/a

SOFA Sequential Organ Failure Assessment, *MSOFA* Modified Sequential Organ Failure Assessment

[+] Where more than one document was identified, both were reviewed. Details presented here reflect a combination of available information from these guidelines

[++] Variable consideration; some CSC (MA, PA, UT) increased priority based on gestational age and fetal viability; CO incorporated pregnancy as a third-tier tie-breaker; OR stated it can be considered, although no specific guidance is given as to how

*CSC included language noting that essential workers, including healthcare personnel, could or should receive priority for scarce resources, although exactly how this should be factored into specific resource allocation frameworks was not discussed

**Essential worker status was used as a tie-breaker, if needed, after consideration of exclusion criteria, acuity of illness (SOFA/MSOFA), and/or comorbidities

of CSC has the potential to mitigate both individual and societal moral injury by establishing a clear framework for decision-making and prioritization. This is of particularly urgent concern due not only to the rapid progression of the COVID-19 pandemic in the USA and impending resource shortages, but also due to increasingly widespread concerns about racial inequities that are emerging from states and communities that are tracking demographic data for patients with COVID-19 [12–16]. This review endeavors to identify and compare all publicly available, state-level CSC as SARS-CoV-2 continues to spread throughout the USA.

Table 3 Comparison of exclusion criteria for access to critical care from available state-level Crisis Standards of Care

State	Poor short-term survival[1]	Commonly cited specific examples of exclusion criteria related to end-organ failure						
		Cardiac[2]	Pulmonary[3]	Renal[4]	Hepatic[5]	Neurologic[6]	Oncologic[7]	Trauma & burns[8]
Alabama		X	X	X	X	X	X	X
Kansas	X	X	X	X	X	X	X	X
Louisiana		X	X		X	X	X	X
Massachusetts	X	X				X		X
New York	X	X				X		X
Ohio	X	X	X		X		X	X
Oregon	X							
Tennessee		X	X	X	X	X	X	X
Utah	X							
Washington*	X	X	X		X	X	X	X

NYHA New York Heart Association, *FEV_1* forced expiratory volume in the first second of expiration, *COPD* chronic obstructive pulmonary disease, *MELD* model for endstate liver disease

[1] Variable, e.g., "severe advanced chronic disease with short life expectancy, < 6 months" (AL) or "immediate or near-immediate death despite aggressive therapy" (MA, NY)

[2] Cardiac arrest (all), heart failure classified as "severe" (WA), NYHA Class III or IV (AL, KS, OH, TN) or Class IV (LA)

[3] Wide variation in specificity, from $FEV_1 < 25\%$ (KS, TN) to "end-stage COPD" (OH) or "severe chronic lung disease" (WA)

[4] Variable, including "anyone on or requiring dialysis" (AL), or "dialysis dependent" (KS, TN)

[5] Severe cirrhosis (AL, WA); MELD score > 20 (AL, KS); Pugh score > 7 (OH, TN) or > 9 (LA)

[6] Severe dementia (AL, LA, TN); "severe," "advanced," and/or "irreversible" neurologic event or functional impairment (AL, KS, LA, MA, TN); "traumatic brain injury with no motor response to painful stimulus" (NY)

[7] "Incurable" or "metastatic" malignancy with "poor prognosis" (all)

[8] Severe burns (e.g., "> 60% body surface area" (AL), "body surface > 40%" (TN), or "where predicted survival ≤ 10%" (NY, OH)); "severe" or "overwhelming" trauma (AL, LA, MA, OH, WA)

*Washington's CSC listed conditions that should be considered as criteria for transfer to outpatient or palliative care during times of resource limitation; although not explicitly called "exclusion criteria," these were incorporated into the screening process to determine eligibility for ICU care, and were thus included here

The development of CSC was identified as a priority by the federal government, which has provided strategic guidance for how to do so [3–6, 11]. Although some have suggested that as many as 36 states have developed CSC [33], we identified only 29 states with publicly available CSC as of May 3, 2020. The degree of specificity and detail in available CSC is extremely varied, ranging from broad ethical guidance to shape the development of local- or hospital-level policy, to explicit criteria and algorithms for determining the allocation of ventilators and other specific resources. The general structure of these algorithms includes consideration of the following: (1) exclusion criteria, usually based on a low likelihood of survival despite maximal resource allocation; (2) a calculation of an objective score to reflect the severity of present illness and thus prioritization category; and (3) repeated evaluation over time to determine ongoing priority status. In some cases, additional consideration is made for factors that may predict individual or societal benefit. Most algorithms explicitly state that the physician responsible for direct patient care should not be the same individual making decisions regarding allocation of scarce resources to that patient. It is essential that the equity implications of CSC *content* at each level—exclusion criteria, use of SOFA/MSOFA as a marker of acute illness severity, and the consideration of comorbid conditions and other individual factors such as social worth—be critically examined before CSC are implemented. Similarly, the *process* by which CSC are developed must include diverse perspectives to ensure resulting documents are not inadvertently discriminatory.

Crisis Standards of Care: Content

Exclusion criteria are intended to avoid allocating scarce resources to patients who are unlikely to survive regardless of the care provided; however, when CSC include broad, non-specific exclusion criteria, their application may introduce significant bias or variability at either the clinician or institutional levels. For example, the Kansas CSC [34] had broad exclusion criteria including renal failure requiring hemodialysis, and metastatic malignancy with poor prognosis. In contrast, New York's CSC for ventilator allocation [35] explicitly did not exclude patients based on the need for dialysis or the presence of metastatic malignancy, a decision which their guidelines

Table 4 Comparison of long-term comorbidities included in prioritization framework from available state-level Crisis Standards of Care

State	Comorbidities affecting longer-term survival[1]	Commonly cited comorbid conditions noted for consideration					
		Cardiac[2]	Pulmonary[3]	Renal[4]	Hepatic[5]	Neurologic[6]	Oncologic[7]
Alaska	X		X	X			
California	X	X	X	X	X	X	X
Colorado	X	X	X	X	X	X	X
Massachusetts	X						
Minnesota	X	X	X	X	X		X
Missouri	X						
New Jersey	X						
Ohio	X						
Oklahoma	X	X	X	X	X	X	
Oregon	X						
Pennsylvania	X						
Tennessee	X	X	X	X	X	X	X
Utah	X	X	X		X		X
Vermont	X	X	X	X	X		X
Washington	X	X	X		X	X	X

[1] Most commonly a two-tiered consideration of comorbidities predicting likely death within 1 year or within 5 years (MA, MO, NJ, PA) or identification of "severe underlying disease with poor long-term prognosis and/or ongoing resource demand," or "severe underlying disease with poor short-term (< 1 year) prognosis" (AK, MN, TN, VT). Some states considered only near-term mortality, e.g., within 6–12 months (OR). CO used the Modified Charlson Comorbidity Index Score. Others were less specific, e.g., "life-limiting illnesses" (UT), or "severe medical comorbidities and advanced chronic conditions that limit near-term duration of benefit and survival" (CA)

[2] Congestive heart failure, specified as NYHA Class III or IV (CA), and NYHA Class IV with frailty (WA), with ejection fraction < 25% (TN, VT), "end-stage" or "severe" (UT, WA); severe multi-vessel CAD (CA, OK)

[3] Chronic lung disease, characterized as "home oxygen dependent" (AK, MN, TN, VT); "moderate" (CA) or "severe" (CA, WA); "severe with frailty" (OK); or "end-stage COPD" (UT)

[4] Renal disease, characterized as "dialysis dependent" (AK, MN, TN, VT); "end-stage" (CA); or "end-stage renal disease and age 75 or older" (OK)

[5] Variably characterized liver disease, including "cirrhosis with a history of decompensation" (CA), MELD score ≥ 20 and ineligible for transplant (OK); "terminal" (UT); or "severe cirrhotic liver disease with multi-organ dysfunction" (WA)

[6] Wide variability, including "moderate" (CA) or "severe Alzheimer's disease or related dementia" (CA, OK); "dementia or hemiplegia" (CO); and "baseline functional status (...physical ability, cognition)" (WA)

[7] Malignancy, with "< 10-year expected survival" (CA); metastatic disease (CO); "terminal" (UT); or "with poor prognosis for recovery" (MN, TN, VT, WA)

NYHA New York Heart Association, *CAD* coronary artery disease, *CHF* congestive heart failure, FEV_1 forced expiratory volume in the first second of expiration, *COPD* chronic obstructive pulmonary disease, *MELD* model for endstate liver disease

report was made due to wide variations in prognosis, life expectancy, and quality of life among individuals in these groups. If exclusion criteria for accessing critical care are used, it may be that very specific guidance are more useful than broad recommendations for excluding those with "poor prognosis," as interpretation at the facility or individual level may lead to inequitable exclusion of some individuals.

All 21 CSC that specifically discussed critical care and ventilator allocation relied on the SOFA/MSOFA score as an objective means of evaluating the severity of illness at the time of triage although SOFA scores were developed for use in the study of populations, and are thus not accurate for predicting individual-level mortality [36]. Some studies have raised concerns with the validity of these scoring systems as a triage tool, given that more than half of patients with the highest category of SOFA or MSOFA scores (> 11) ultimately survived [27]. Nevertheless, most CSC used SOFA scores to categorize patients into one of four priority levels. Most CSC explicitly counsel against the comparison of two individuals within the same category based on a slightly differences in the exact SOFA score, although some suggest using the numeric score as a tie-breaker. Further research is needed to better understand the ways in which this could disproportionately affect different communities.

A great deal of variation emerged when comparing the extent to which CSC incorporated consideration of factors beyond the severity of acute illness requiring ICU care. Of the 29 available specific CSC, 19 (5.5%) explicitly stated that

triage decisions should be made in an identity-blind manner (i.e., without consideration of race or ethnicity). Eleven of these CSC, however, are among the 15 states (see Tables 2 and 4) that considered comorbid conditions in resource allocation decisions. The consideration of life-limiting comorbidities in allocation of resources during times of crisis may contribute to maximizing the number of lives, and/or the number of life-years saved. However, given the well-described and profoundly unequal distribution of illness between racial and ethnic groups in the US [37–41], the consideration of comorbid conditions such as hypertension [42], diabetes [43, 44],, and chronic kidney disease [45], is likely to function as a proxy for allocation of resources by race and ethnicity. Similarly, individuals with disabilities have a greater incidence of comorbid health conditions [46], and have more limited life expectancies [47] than able-bodied individuals. Consideration of long-term prognosis in allocation decisions may prove problematic, as CSC from Pennsylvania acknowledge: "Based on consultation with experts… we have intentionally not included a list of example conditions associated with life expectancy <1 year and <5 years… [to avoid decisions] being applied as blanket judgments, rather than in the context of individualized assessments by clinicians, based on the best available objective medical evidence." [48]

Given the significant disparities in incidence, morbidity, and mortality from COVID-19 that have emerged among minority populations [12–16], the consideration of identity-based characteristics and their proxies must be carefully weighed in the development and implementation of CSC. Clarity is needed as to why specific comorbidities should lead to exclusion or lower prioritization for resources. There may be a fundamental ethical difference between excluding a patient because their condition significantly reduces long-term life expectancy, and excluding a patient because their condition significantly reduces their likelihood of surviving the acute illness that has led to their need for life support. But that distinction alone may not prove dispositive. How likely their survival is in the short term may matter as well. Giving equal priority to certain conditions that reduce short-term survival to some degree but are highly linked with race or socio-economic status, for example, may be justifiable on equity grounds. Yet as short-term survival becomes increasingly poor for certain comorbidities, arguments for equal access to scarce equipment may prove less convincing. Consensus on these challenging questions remains elusive. However, CSC that elucidate the rationale for these choices enable more meaningful equity analysis and are more conducive to widespread acceptance. In the absence of compelling reasons to include consideration of specific comorbid conditions, particularly if these are inequitably distributed between racial and ethnic groups as a result of persistent structural racism within American society, CSC would more equitably distribute resources by using a lottery system to break ties between patients who are equally acutely ill. Although none of the reviewed CSC suggested using a weighted lottery, the process recently developed for the allocation of scarce medications (e.g., novel antivirals) at the University of Pittsburg provides an interesting strategy for prioritizing more socially vulnerable individuals [49]. Further research is needed to determine the equity implications of such a strategy.

Crisis Standards of Care: Process

The development of CSC, while critically important to support clinicians and healthcare systems during times of crisis, must not be undertaken in a rushed or siloed manner. Failure to incorporate broad perspectives and public comment may lead to oversights or unintentional consequences. These may ultimately lead to CSC needing to be revised. For example, due to the equity concerns raised by clinicians, politicians, and disability activists, the Massachusetts CSC were revised 2 weeks after they were first published [17, 23]. Input from diverse individuals and stakeholders is critical to ensuring that CSC reflect the values of the populations they will affect. While ethical frameworks for allocation of scarce resources seek to provide the greatest good for the greatest number, interestingly, this may be at odds with what the general public may classify as a more equitable way of distributing in times of a pandemic [50]. Arriving at consensus with input from diverse stakeholders, with particular attention to the inclusion of historically marginalized groups, may prove crucial to ensuring the acceptance of CSC and the consequences of their implementation in the long term.

Failing to provide any guidance at the regional or state level may prove even more problematic than developing CSC with insufficient community input. Without objective and concrete guidance for resource allocation during times of scarcity, "first-come, first-served" remains the default triage process, thereby allowing patients who arrive sooner to receive care, even if they have a far lower likelihood of survival than someone who arrives shortly thereafter. Most people, including ethicists, agree that such a system is not in society's best interest [51, 52]. Not only does this method fail to maximize the number of lives saved or allocate care in a health-preserving manner, but it raises grave equity issues of its own. Socio-economic factors may increase healthcare literacy and thus awareness of the need to seek care earlier during a crisis, while lower-income workers may not be able to leave their jobs to line up first. In addition, well-resourced patients may travel farther to seek hospitals where lines for critical equipment are shorter.

The absence of state-level guidance places the burden of decision making upon hospitals and often upon individual providers. Fewer than half of the hospitals in the country appear to have developed CSC [53]. At present, the majority of hospital administrators and physicians in the USA are upper-

middle class (or wealthier) and white [54]. No matter how good their intentions, they are likely to be blind to biases built into protocols designed without external input. Clinicians in the field, forced to make rapid decisions, will inevitably bring their own biases—conscious and unconscious—into the triage process. This may affect both patient assessment and resource allocation decisions. These biases, if unchecked, may result in stark inequities in both care and survival at the population level.

In addition, leaving doctors in the field to make decisions about triage criteria is bound to take a significant emotional and psychological toll. This toll may weigh more heavily on physicians of color and those from lower socio-economic backgrounds if they consistently witness patients with identities similar to their own losing out in the triage process. Finally, it is worth noting that optics matter: Even if the allocation were to prove equitable, the long history of systemic and structural racism in the USA may lead patients and families who do not receive priority to conclude that bias by the individual hospital or physician was a factor in their assessment, a concern which can be mitigated—at least to some degree—by a region or state-wide policy.

Conclusion

There is wide variability in the existence and specificity of CSC across the USA. Although many states have recently updated or developed CSC, and others are actively working to do so, these processes should be collaborative with broad input from the affected community. Many of these decision-making criteria have implications for health equity. CSC may disproportionately impact historically disadvantaged populations due to inequities in comorbid condition prevalence, expected lifespan, and other systemic disadvantages that result from structural racism within American society. Failure to consider these factors will inevitably lead to the perpetuation of structural and historical inequities through the application of these standards.

Disclaimer This manuscript represents original material, has not been previously published, is not under consideration for publication elsewhere, and has not been previously submitted to the Journal of Racial and Ethnic Health Disparities. All of the authors have read and approved the final submitted version of the manuscript.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Appendix 1

State-level Crisis Standards of Care (CSC) as of May 3, 2020

State	Hyperlink to document or website with latest available CSC
Alabama	https://adap.ua.edu/uploads/5/7/8/9/57892141/alabamas_ventilator_rationing_plan.pdf; https://www.adph.org/CEPSecure/assets/alabamacscguidelines2020.pdf
Alaska	http://dhss.alaska.gov/dph/Epi/id/SiteAssets/Pages/HumanCoV/SOA_DHSS_CrisisStandardsOfCare.pdf
Arizona	https://www.azdhs.gov/documents/preparedness/emergency-preparedness/response-plans/azcsc-plan.pdf
California	https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/COVID-19/California%20SARS%20CoV-2%20Crisis%20Care%20Guidelines4-23.pdf. The above draft guidelines were reviewed for the purposes of this article; prior to manuscript publication this document was replaced with the following: https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/COVID-19/California%20SARS-CoV-2%20Crisis%20Care%20Guidelines%20-June%208%202020.pdf
Colorado	https://drive.google.com/file/d/1OgZXJNMr9AA9X-S1QJNBCCRif6kbdxI5/view
Connecticut	https://portal.ct.gov/-/media/Departments-and-Agencies/DPH/dph/legal/StandardsofCarefinalpdf.pdf?la=en
Georgia	https://dch.georgia.gov/documents/crisis-standards-care-overview
Illinois	http://www.dph.illinois.gov/sites/default/files/publications/catastrophic-incident-response-annex-052218.pdf; http://www.dph.illinois.gov/sites/default/files/publications/illinois-pandemic-influenza-plan-version-51march-2020.pdf
Indiana	https://www.in.gov/isdh/files/Healthcare%20Preparedness%20and%20Response%20Capabilities%20(Nov%202016).pdf
Kansas	https://www.kdheks.gov/cphp/download/Crisis_Protocols.pdf
Kentucky	https://www.documentcloud.org/documents/6835335-Kentucky-Crisis-Standards-of-Care.html
Louisiana	https://cdn.ymaws.com/www.lhaonline.org/resource/resmgr/imported/Louisiana%20CSOC%20Guidelines%20in%20Disasters.pdf

State	Hyperlink to document or website with latest available CSC
Maine	https://www.maine.gov/dhhs/mecdc/public-health-systems/phep/documents/mainecdcallhazeop.pdf
Massachusetts	https://d279m997dpfwgl.cloudfront.net/wp/2020/04/CSC_April-7_2020.pdf; https://www.mass.gov/doc/statewide-advisory-committee-recommendations-for-standards-of-care/download
Michigan	http://www.mimedicalethics.org/Documentation/Michigan%20DCH%20Ethical%20Scarce%20Resources%20Guidelines%20v.2.0%20rev.%20Nov%202012%20Guidelines%20Only.pdf
Minnesota	https://www.urmc.rochester.edu/MediaLibraries/URMCMedia/flrtc/preparedness-response-tools/documents/Minnesota-Crisis-Standards.pdf; https://www.health.state.mn.us/communities/ep/surge/crisis/framework.pdf
Mississippi	https://msdh.ms.gov/msdhsite/_static/resources/7221.pdf
Missouri	https://www.mhanet.com/mhaimages/COVID-19/A%20Framework%20for%20Managing%20the%202020%20COVID.pdf
Nevada	http://nrhp.org/wp-content/uploads/2020/04/NV-Crisis-Standards-of-Care-COVID-040220.pdf
New Jersey	https://files.constantcontact.com/6f9719de201/4effd4fe-d7ff-4b76-ab79-ac0532b95126.pdf
New Mexico	https://nmhealth.org/publication/view/plan/4877/
New York	https://www.health.ny.gov/regulations/task_force/reports_publications/docs/ventilator_guidelines.pdf
Ohio	https://www.ohiohospitals.org/OHA/media/OHA-Media/Documents/Patient%20Safety%20and%20Quality/COVID19/Ohio-Guidelines-for-Allocation-of-Scarce-Medical-Resources-CLEAN-FINAL.pdf
Oklahoma	https://www.ok.gov/health2/documents/Hospital%20Crisis%20Standards%20of%20Care.pdf
Oregon	https://www.theoma.org/CrisisCare
Pennsylvania	https://www.health.pa.gov/topics/Documents/Diseases%20and%20Conditions/COVID-19%20Interim%20Crisis%20Standards%20of%20Care.pdf
South Dakota	https://doh.sd.gov/providers/preparedness/hospital-preparedness/resources.aspx
Tennessee	https://www.timesfreepress.com/news/local/story/2020/apr/07/gov-leedisavows-controversial-medical-guidance/520110/
Utah	https://coronavirus.utah.gov/wp-content/uploads/Final_Utah_Crisis_Standards_of_Care_011719-1.pdf
Vermont	http://allclearemg.com/content/uploads/VT%20CSC%20Plan%20Draft%2005-10-2019c%20-%20numbered.pdf
Washington	https://nwhrn.org/wp-content/uploads/2020/03/Scarce_Resource_Management_and_Crisis_Standards_of_Care_Overview_and_Materials-2020-3-16.pdf
Wisconsin	https://www.dhs.wisconsin.gov/publications/p01119-17.pdf
Wyoming	https://health.wyo.gov/publichealth/infectious-disease-epidemiology-unit/disease/influenza/pandemic-influenza/

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