

# A FRAMEWORK FOR MANAGING THE 2020 COVID-19 PANDEMIC RESPONSE

AND IMPLEMENTING CRISIS STANDARDS OF CARE

APRIL 6, 2020, VERSION 1.0

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# A Framework for Managing the 2020 COVID-19 Pandemic Response and Implementing Crisis Standards of Care Missouri Hospital Association

APRIL 6, 2020 | VERSION 1.0

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## OVERVIEW

This document has been developed to support Missouri hospitals and clinicians during the 2020 COVID-19 pandemic. Current national COVID-19 disease modeling includes variables such as percent of infection attack rate ranging from 20% to 60% and duration of surge extending between 6 and 18 months. A best-case scenario of a low infection attack rate of 20% extending over 18 months likely can be managed within the current health care system. Current models suggest the health care system has 91.4% of hospital beds needed and 74.8% of intensive care beds needed if Missouri experiences a 20% infection attack rate over six months. This model does not account for the increased capacity hospitals have undertaken by canceling elective procedures and converted space and beds for additional patients.

However modifying national models using more specific [Missouri data](#) suggests increasing the infection attack rate to 40% with a surge duration of six months will overwhelm the Missouri health care system providing only a 45.7% supply of hospital beds and 37.4% supply of intensive care beds needed. (Appendix A). It is for this reason planning for the worst-case scenarios is of utmost priority.

Ideally, this document would have been developed through a deliberative process involving many stakeholders and reviews. However, the need for established guidance at this critical time necessitated the expedited development of a framework for Missouri hospitals. This guidance is based on other well-established plans such as the Utah Crisis Standards of Care (2019) to provide an ethical foundation for system-level and regional decisions to determine most appropriate settings for care and allocation of scarce resources.<sup>i</sup>

Existing models describe a continuum during emergency events in which hospitals move from conventional to contingent to crisis operations. During the latter phase, also known as Crisis Standards of Care (CSC), this guidance only should be used when medical care must shift from a solely patient-centric approach to allocating scarce resources to promote achieving the greater societal good of survival, safety and security for the population as a whole. This is not intended to be an exact or mandated decision support algorithm.

Research, emerging practices and other surge management resources have been utilized and are referenced throughout the document. This guidance is based on the Crisis Standards of Care: A Systems Framework for Catastrophic Disaster Response.<sup>ii</sup>

## Purpose

The Institute of Medicine defines Crisis Standards of Care as existing when a public health event or natural disaster substantially impacts normal health care operations, and the normal standard of care cannot be maintained. This guidance only should be used during the current COVID-19 pandemic to maximize survival for the overall patient population and minimize adverse outcomes.

During crisis, the following circumstances are likely to exist:

- Capacity, even that expanded during surge (also referred to as “contingency”), will not be sufficient to meet ongoing care demands.
- Critical resources are unavailable and must be re-allocated to help as many patients as possible.
- Staffing levels are critically low, and staff present may be operating outside the normal scope of practice.
- Diagnostic tools may be inaccessible, leaving treatment decisions to best clinical judgment.

The decision to employ CSC involves recognizing that conventional and contingency standards cannot be maintained to ensure the survival, safety and security of the population at large.

## KEY DEFINITIONS

**Conventional Capacity:** The spaces, staff, and supplies used are consistent with daily practices within the institution. These spaces and practices are used during a major mass casualty incident that triggers activation of the facility emergency operations plan. <sup>ii</sup> <sup>iii</sup>

**Contingency Capacity:** The spaces, staff and supplies used are not consistent with daily practices but provide care that is functionally equivalent to usual patient care. These spaces or practices may be used temporally during a major mass casualty incident or on a more substantive basis during a disaster (when the demands of the incident exceed community resources). <sup>ii</sup> <sup>iii</sup>

**Crisis Capacity:** Adaptive spaces, staff and supplies are not consistent with usual standards of care but provide sufficient care in the context of a catastrophic disaster (i.e. provide the best possible care to patients given the circumstances and resources available). Crisis capacity activation constitutes a significant adjustment to standards of care. <sup>ii</sup> <sup>iii</sup>

**Surge:** ability to provide adequate medical evaluation and care during events that exceed the limits of the normal medical infrastructure of an affected community.<sup>iv</sup> <sup>iii</sup>

**Reverse Triage:** Reverse triage is a way to rapidly create inpatient surge capacity by identifying hospitalized patients who do not require major medical assistance for at least 96 hours and who only have a small risk for serious complications resulting from early discharge. <sup>v</sup>

**Trigger Point:** The juncture where a decision must be made based on resource availability, requiring adaptations to how health care is delivered along the capacity continuum. <sup>ii</sup> <sup>iii</sup>

**CSC Trigger Point:** The point at which scarce resources require a transition from contingency care to CSC. This is the point at which resource allocation focuses on the public at large, emphasizing population health rather than individual outcomes. <sup>vi</sup>

## THE CRISIS STANDARDS OF CARE FRAMEWORK

Hospital Continuum of Care Model SITUATION	Conventional	Contingency	Crisis
<b>SURGE STATUS</b>	Hospitals utilize normal bed capacity. Occasional and temporary surges of demand may occur that are temporary and may incur longer wait times for non-critical care as hospitals, ICUs, and emergency departments temporarily reach capacity.	Hospitals have surged beyond maximum bed capacity. Emergency Operations Plans are in effect. Elective procedures delayed. Hospitals may be adding patients to occupied hospital rooms and non-patient care areas. Community health care facilities may be requested to surge. Alternate care sites may be opened.	Expanded capacity is still not sufficient to meet ongoing demand for care. Some patients needing care cannot be admitted to hospitals and instead will be sent home or to alternate care sites. Hospitals are adding patients to occupied hospital rooms and non-patient care areas. Community health care facilities are operating beyond normal scope of practice.
<b>RESOURCE LEVEL</b>	Occasional, limited resource shortages may occur, typically of non-critical supplies or medications with substitution as the most common resource sparing strategy.	Some resources are becoming scarce. Attempts at conservation, reuse, adaptation, and substitution may be performed.	Some or even many critical resources are unavailable, potentially including hospital beds, ventilators, and medications. Critical resources are re-allocated to help as many patients as possible.
<b>STAFF</b>	Usual staffing. Hospital staff absenteeism is not a large problem.	Staff extension (increased patient/provider ratios, expanded scope of practice). Hospital staff absenteeism may be a problem.	Staffing levels at critical shortage. Staff are operating outside normal scope of practice and greatly increased patient/ provider ratios. Hospital staff absenteeism may be greater than 30%.

*Source: Utah Crisis Standards of Care Guidelines, Version 2 June 2018; based on the IOM Crisis Standards of Care Framework, 2012*

### Principles for Ethical Decision Making

CSC does not imply a lower standard of care or patient abandonment. To the contrary, it assumes plans for palliative or comfort care are in place. CSC strives to preserve equity and fairness and is intended to minimize adverse outcomes that would otherwise occur due to the crisis situation. CSC ensures that decisions are made in accordance with the following ethical principles:<sup>vii viii</sup>

**Fairness** – processes are equitable for all patients

**Respect** – information is shared truthfully and candidly; honors patient’s autonomy, dignity and privacy

**Stewardship** – preserving the effectiveness and impact of available resources

**Transparency** – providing open access to available information and the decision-making process

**Justice** – decisions are made without regard for social positions or relationships

**Proportionality** – decisions are proportional to the scope and severity of the circumstances

**Accountability** – health care workers act responsibly, in accordance with professional standards

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## DUTY TO PLAN

Hospitals must develop plans for moving from Conventional to Contingency to Crisis Capacity. During a disaster or declared emergency, the goal is to remain in Contingency status to the extent possible and avoid moving to CSC. Strategies for remaining in Contingency Capacity may include:

- [Canceling](#) elective procedures and surgeries to increase capacity.<sup>ix</sup>
- Early discharge or transfer of appropriate patients to home or less acute levels of care.
- Transferring less acute patients from medical surgical units to alternate care sites, with the assistance of case managers and discharge planners.
- [Transferring](#) post-acute and [behavioral health](#) patients from acute settings into other appropriate settings.
- Expanding critical care capacity into areas such as post-anesthesia care units, surgical suites, outpatient care units.
- Expanding patient care areas to include hallways and private rooms.
- Expediting admissions to move patients from the emergency department to patient care units.
- EMTALA compliant screening of individuals seeking care, in coordination with EMS or other medical direction, to determine the most appropriate setting for care including an established alternate care site for less acute patients.
- 

## Planning Assumptions

Various models depicting the spread and timing of COVID-19 estimate significant resource shortages, specifically hospital beds for acutely and critically ill patients.

Because of the anticipated severe shortage of space, staff and supplies, the following planning assumptions are established.

- Decision-making is based on the ethical principles outlined above.
- Decisions need to be made, based on surge, capacity and capability, at the institutional, system and regional levels.
- Public health, emergency management, emergency medical services, health care systems and clinicians must coordinate plans and implementation to assure maximum benefit to patient populations during a public health crisis.
- Clinical efficiency, such as tele-services, is important but will not provide sufficient relief of surge demand.
- Patient movement and locations must be planned and implemented at the beginning of a surge in patients that threaten conventional or contingency levels of care.
- Smaller hospitals should retain their critical resources such as inventoried ventilators as patients may require intensive care in smaller facilities.
- Patients from or requiring post-acute services must be provided sufficient care in settings outside of the acute care systems to maximize capacity for acute and critically ill patients.
- Critical resources, such as stockpiled ventilators, should be distributed among facilities caring for the most critically ill in acute care and long-term acute care facilities with intensive care capabilities and capacity.
- Surge and crisis activities must accommodate all patients with life-threatening illnesses or injuries – it is not a response for allocating resources among only COVID-19 patients.
- The necessary legal authority for CSC is required to be ethically and optimally implemented with public transparency.
- Clearly developed, transparent indicators, processes and lines of authority must be used.
- Evidence-based clinical processes and operations are to be employed.

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## Planning assumptions specific for the COVID-19 pandemic include the following.

- Staffing ratios and roles will be needed to extend and maximize care.
- Staff availability will be reduced due to COVID-19 exposure and illness, quarantine, exhaustion and personal decisions to not report.
- There will be insufficient beds for all patients needing inpatient and especially critical care.
- There is at any given time insufficient personal protective equipment for health care workers.
- There will not be enough ventilators to treat all patients suffering from respiratory failure.
- The majority of infected patients can be treated at less acute levels of care or at home.

## The Sequential Organ Failure Assessment

The [SOFA](#) or [Modified SOFA](#) are validated and accepted tools used to determine prioritization and allocation of donated organs. Several established plans incorporate the MSOFA into the decision-making matrix but do not rely on it alone. The tools have been studied as a guide for making critical patient-level decisions during a public health crisis. Based on limited research two themes have emerged.<sup>x</sup>

- In the 2009 Swine flu pandemic, the SOFA tool was found to have far less predictive value for viral pneumonias than assumed and therefore is not recommended as a tool to exclude patients from receiving specific resources, such as ventilators.<sup>vii</sup>
- The MSOFA was determined to be helpful in placing patients in the most appropriate setting of care such as critical care or medical surgical units during CSC.<sup>xi</sup>



# MISSOURI COVID-19 PLAN FOR PATIENT CARE SETTINGS

Under the direction of the Governor's office and in partnership with the Missouri Departments of Economic Development, Health and Senior Services, Public Safety, Social Services and the State Emergency Management Agency, Missouri National Guard and the U.S. Army Corps of Engineers, the concept of operations for patient care settings includes the health care system and the addition of alternate care sites. Planning is underway beginning with 20% surge modeling and prioritizing regions based on current case counts and health care capacity strain.

## Situational Awareness and Regional Activation

Models based on limited data and assumptions are the current tool to estimate attack rate, effect of policies such as social distancing, onset and duration of peak and hospitalizations. As more data are available, models will become more precise and real-time data will be used for decision making. In Missouri the EMResource™ tool has been used for nearly 20 years to coordinate and communicate capacity, resources and incident activations by hospitals, emergency medical services, health care coalitions, the Missouri-1-Disaster Medical Assistance Team and Missouri partners such as the Missouri Department of Health and Senior Services and the Missouri Hospital Association. This tool currently is and will be the tool used to communicate, coordinate, monitor and manage patient surge. Daily queries provide the closest source of truth for operational decision making. The federal request for National Health Surveillance Network data is being incorporated into the EMResource. As alternate care sites are established, they also will be added to EMResource to monitor patient census and other vital information.

Decisions to transition from conventional to crisis care will be regional decisions among health care providers and health care coalitions, with guidance and support from state-level leaders.

## Guidance for Activating Trigger Points

The transition from Conventional to Contingency to Crisis Standards of Care is based on limitations of space, staff or supplies. The CSC trigger point occurs when the hospital's essential functions are compromised despite implementation of capacity optimization measures. Likely scenarios are: the number of patients exceed the number of available beds, critical resources are in dangerously low supply or unavailable, and staffing levels are critically low. All possible means to extend resources within the traditional health care system have been exhausted. The following provide examples of capacity triggers anticipated for COVID-19 surge that will necessitate redirection of patients to other settings for care and monitoring.

- Sustained community spread and case counts indicate a regional health care system is reaching the onset of a peak period of transmission.
- Critical and intensive care beds have been expanded and are nearing 100 percent use within a service area or region.
- Established or alternate systems for negative air flow rooms are nearing 100 percent use within a service area or region.
- Staffing shortages are such that sufficient standards of care cannot be maintained.
- Clinic and emergency department volumes are exhausting space, supplies and staff needed for critical patients.

## Hospitals

Hospitals already must be preparing now for the rapidly approaching COVID-19 patient surge. The [CDC Hospital Preparedness Assessment Tool](#) is a first important step. Strategies to maximize capacity for patients requiring hospitalization for high acuity and critical care services are differentiated by metropolitan and rural geography.

- Missouri hospitals and health systems in metropolitan areas will convert and expand capacity to the extent possible to staff and provide care for acutely and critically ill patients within their existing hospitals and campuses. All understand this may not be adequate and allocation of scarce resources may become a reality.
  - Conversion of specialty units such as post-anesthesia units, outpatient and surgical areas into critical care areas.
  - Conversion of medical-surgical units to high-acuity step-down units.
  - Expansion into non-patient care areas based on supplies, staff and functionality.
- Missouri hospitals in rural areas, including critical access hospitals, will convert and expand to the extent possible to staff and provide care for acutely, critically ill and less acute patients within their existing hospitals and campuses. Rural facilities with additional capacity should be considered, when feasible, a setting for caring for lower-acuity and post-acute patients from metropolitan areas.
  - Rural hospitals without negative air flow capability should consider accepting and expanding capacity for non-COVID-19 patients.
  - In critical situations, COVID-19 patients should be segregated by space and staff from non-COVID-19 patients.
- Hospitals throughout Missouri are encouraged to plan regionally and make available collective resources to further expand hospital capacity. For example,
  - Pediatric hospitals may have lower census and the ability to accept pediatric and young adult patients from general acute care hospitals to create more capacity in those hospitals caring for acuity and critically ill.
  - Psychiatric and free-standing hospitals serving specific populations also may have capacity and ability to accept lower acuity patients.

## Hospital Staffing

Staffing during the COVID-19 pandemic will require adaptation as crisis levels of care are realized.

Researchers outline [surge priority planning and critical care staffing options](#), and include the following:<sup>xii</sup>

- Internal resource optimization including advance practice nurses, nurses with prior critical care experience, procedural nurses.
- Internal staff to provide support to front line workers including psychiatric counselors and social workers.
- Staff in ambulatory settings with recent critical care experience.
- Staff in medical practices and urgent care settings not currently seeing patients.
- Telemedicine
- Changed staffing models such as team-based care.

One of the greatest challenges in managing the COVID-19 response will likely be the supply of staff and the competency level of the staff available. The hospital will see the acuity of patients rise dramatically with the increased number of patients requiring ventilatory assistance and other specialized care.

Leaders in preparedness offer these key [considerations](#) in the provision of staffing:<sup>vii</sup>

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- **Childcare, Adultcare, Petcare** – in-home day care or small group care may have to be arranged. School closures are widespread leaving young children unattended. Hospitals may consider flexibilities like staffing opposite shifts for staff who agree to alternate providing care for each other’s parents, pets and children; however, plans must consider the risk of transmission attendant to such arrangements.
- **Staff safety** – address competency with just in time training of the PPE provided and the care techniques practiced.
- **Housing** – providers at risk of acquiring infection may request alternate housing to avoid exposing family members – on and off-campus options may be needed.
- **Communication** – staff must be informed about contingency and crisis practices being implemented and the reasons for these decisions. It is important to consider providing the same information in a variety of ways and multiple times as health care staff are in a fight or flight situation. When guidelines and processes change daily, overcommunication is a good practice.
- **Shift type/length** – shifts should be varied to avoid fatigue and burnout.
- **Support, information, and training** – Medical assistants, environmental services, transporters, and others may have equal or greater need compared to physicians, advanced practice providers, and nursing staff.

Clinical staff in administrative positions should return to clinical care as much as possible. Staff should practice “at the top of their license” (i.e., respiratory therapy should focus on managing ventilators and eliminate most other responsibilities). Nursing staff should concentrate on IV medication administration and assessment, deferring basic personal care, feeding, etc., to health care assistants, vetted volunteers, family members, and other personnel. Flexible staffing and patient assignment models may be needed to allocate key personnel to the most pressing patient needs.<sup>xii</sup> **Error! Bookmark not defined.**

### Tele-Services

CMS and MO HealthNet, along with most third-party payors, have relaxed and/or waived many restrictions around provision of telemedicine services for the COVID-19 pandemic. Telemedicine services are highly recommended in cases where patients are medically stable and able to quarantine in their home setting. Telemedicine services also are recommended for all other patients to promote decreased exposure, particularly for those in the at-risk category. Telemedicine may be provided through tele-monitoring, virtual visit, e-visit or phone call all with varying options for the type of medical care allowed. Patients must consent verbally to telemedicine services and this must be documented in the patient’s medical record. Patients and family members should receive guidance and education on telemedicine options and how to use the chosen option. Telemedicine resources include the following.

- [MHA’s FAQ: COVID-19 and Use of Telemedicine Services](#) (March 27, 2020)
- [CMS: FAQs on Telehealth and HIPAA During the COVID-19 Nationwide Public Health Emergency](#) (March 23, 2020)
- [CMS: End-Stage Renal Disease Provider Telehealth and Telemedicine Toolkit](#) (March 23, 2020)
- [National Consortium of Telehealth Resources Centers: COVID-19 Telehealth Toolkit](#) (March 18, 2020)
- [CMS: General Provider Telehealth and Telemedicine Toolkit](#)
- [DSS: 2020 MO HealthNet Provider Hot Tips](#)

### Hospital Visitation Policies

Hospitals are required as a condition of participation in the Medicare and Medicaid programs to have policies and procedures regarding the visitation rights of patients, including those setting forth any clinically necessary or reasonable restriction or limitation the hospital may need to place on such rights. The right of a patient to

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have visitors may be limited or restricted when visitation would interfere with the care of the patient and/or the care of other patients. The regulation permits hospitals some flexibility, so that health care professionals may exercise their best clinical judgment when determining when visitation is, and is not, appropriate. Best clinical judgment takes into account all aspects of patient health and safety, including the benefits of visitation on a patient's care as well as potential negative impacts that visitors may have on other patients in the hospital.

The Centers for Medicare & Medicaid Services issued a waiver of Patient Rights under 42 CFR §482.13 only for hospitals that are considered to be impacted by a widespread outbreak of COVID-19, defined as those in a state with 51 or more confirmed cases as updated on the CDC website. CMS has waived §482.13(h) related to patient visitation, including the requirement to have written policies and procedures on visitation of patients who are in COVID-19 isolation and quarantine processes. While a written policy and procedure is not required, hospitals should prepare guidance for staff, visitors and authorized contractors on screening procedures, movement within the hospital and safety measures. The Missouri Hospital Association has developed a [guidance tool](#) on staff and visitor screening and safety precautions.<sup>xiii xiv</sup>

## Alternate Care Sites

*Statewide plans to create additional patient care capacity are rapidly progressing and evolving. A general summary of current planning is provided in this document. More detailed information will continue to be provided as available.*

Plans for alternate care sites (ACS) are being established to reduce the surge of patients into the hospitals. These temporary facilities will be managed and staffed separately from the traditional health care system. ACS will be established and located across Missouri based on resource need and availability.

### Settings for Alternate Care Sites

Several settings for ACS have been evaluated that factor safety codes, availability, functionality, accessibility, cost to establish, supplies, location, parking and time required to accept patients. Because of the variability of modeling to determine attack rate, peak, duration and onset of peak, a flexible model has been developed. Although many settings including shuttered hospitals are under consideration, **the most promising model includes hotels or dormitories.** Hotels or dormitories – referred to as supportive housing – provide quick expansion of services in both rural and metropolitan areas at a lower cost than other options. In addition, such facilities with individualized heating ventilation and air conditioning units provide safer care settings to retrofit rooms for negative air flow for a patient under investigation or positive for COVID-19. The state currently is working in several communities to contract with identified hotels and dormitories.

Also considered as a second-tier strategy will be convention centers to provide capacity for a larger number of patients which may be necessary in densely-populated metropolitan areas if interventions such as social distancing and stay-at-home orders have not suppressed the attack rate or prolonged the duration of community spread.

These facilities require approximately 5-6 weeks to stand-up and initial assessments have been conducted. Further development of these venues could be pursued if supportive housing options do not yield sufficient capacity expansion. A 50-bed mobile medical unit will be held in reserve by state officials for a geographical surge that exceeds planning estimates and is without facilities to accommodate the demand.

## Patient Populations

There are two general patient population descriptions identified to receive care in ACS.

- Non-acute patients including but not limited to:
  - Persons under investigation for COVID-19
  - Patients recovering or asymptomatic but positive for COVID-19
  - Patients discharged from hospitals but unable to return home or to post-acute settings
  - Chronically ill patients such as patients with diabetes
- Low-acuity patients including but not limited to:
  - Patients recovering or mildly symptomatic with COVID-19 requiring monitoring and support
  - Patients, with or without COVID-19 and chronic illnesses requiring monitoring and support

Patient Population	Supported Housing (hotels, dormitories)		Convention Centers or Large Spaces
	Common Air System	Individual Room HVAC Units	Common Air System
Non-Acute Patient	x	x	x
Low Acuity Patient		x	

## Patient Services and Equipment

General patient monitoring and support will be provided to non-acute and low-acuity patients in ACS settings. Pharmacotherapy for home, basic and some treatment medications such as breathing treatments or antibiotics may be dispensed in this setting. Types of patient equipment include assessing vital signs, and home equipment such as continuous positive airway pressure for non-acute and intravenous lines for fluids, electrolytes, antibiotics and other basic medications; oxygen via cannula or simple mask; pulse oximetry and continuous positive airway pressure for low-acuity patients.

## Management, Staffing and Supplying Alternate Care Sites

Under the leadership of the Departments of Health and Senior Services and Public Safety, the Missouri Disaster Medical Assistance Team (MO-1 DMAT) will assume responsibility for management and operations of all alternate care sites established in Missouri during the COVID-19 pandemic. The MO-1DMAT roster currently includes approximately 180 clinicians, emergency managers, logistics specialists and others able to establish, manage and operate alternate care sites. These same individuals and system were the initial team that established the temporary hospital in Joplin, Missouri following the 2011 tornado.

Additionally, MO-1 DMAT will recruit for an establish a ‘reserve unit’ specifically for this COVID-19 alternate care site mission. MO-1 DMAT members, including the ‘reserve unit’ deploy as temporary state employees. The State will secure equipment and supplies, including personal protective equipment, as well as wrap-around services for the alternate care sites.

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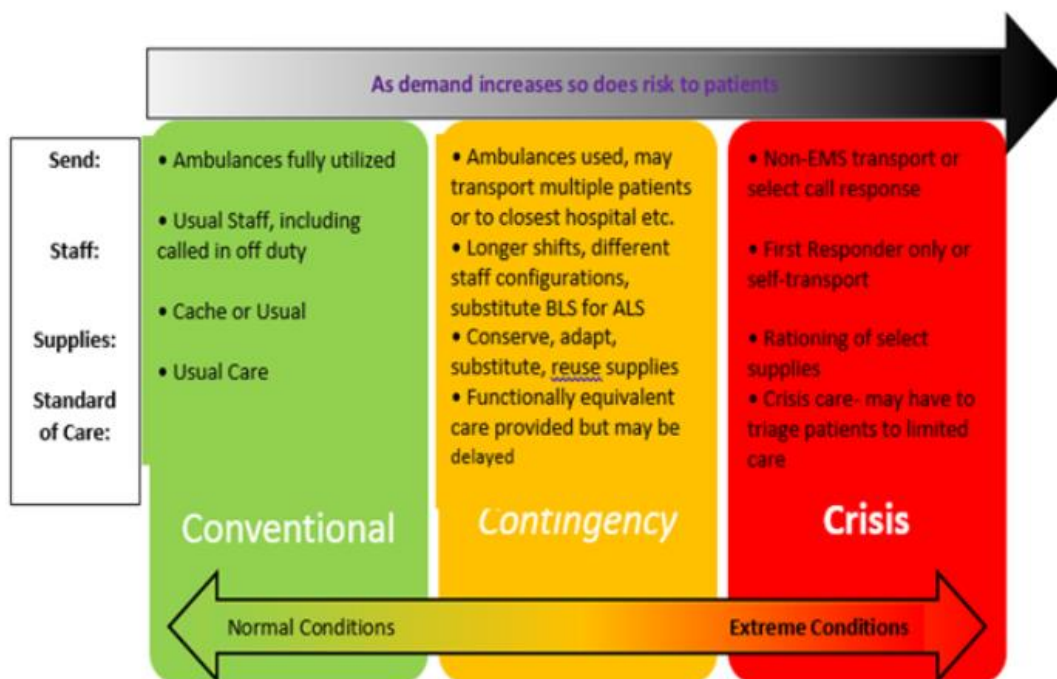
## Screening and Transport of Patients

The continuum of EMS response that can be implemented at the local and regional level is addressed in this document. This section is directed at EMS agencies as it is the responsibility of the ambulance service agency to apply this guidance and current [protocols](#) with the help of their management team and medical director to ensure operational plans are in place. Where applicable, the detail of the supporting roles of State agencies will be provided. <sup>xv</sup>

Ambulance service agencies in Missouri are diverse, but all are at risk of situations where demand exceeds available resources and requires adaptive strategies. All agencies have a duty to plan for such situations and should empower EMS providers through training and standard operating procedures to make good choices that truly do the “greatest good for the greatest number” while assuring available additional resources are requested in a timely manner. On March 19, the Department of Health and Senior Services issued a [waiver](#) authorizing EMS to triage 911 emergency calls during period of high volume due to COVID-19 by prioritizing those needing most urgent transports. Such triage should be done in accordance with protocols developed for this situation and approved by the service’s administrator and medical director.

Rural ambulance services may face greater and more frequent challenges than urban systems due to difficulties in maintaining adequate staffing, limited vehicle availability, prolonged resupply intervals and long response times that can be exacerbated in a disaster. In urban areas, increases in demand during pandemics or epidemics can also rapidly stress and exhaust available resources. Considerations for Public Safety Answering Points (PSAPs) and ambulance dispatch centers as well as first responders are vital components of any surge plan and Crisis Standards of Care planning. <sup>xvi</sup>

**Figure 3.1: Examples of EMS Conventional, Contingency, and Crisis Care (modified from IOM/NAM 201)**



Source: [https://www.health.state.mn.us/communities/ep/surge/crisis/framework\\_ems.pdf](https://www.health.state.mn.us/communities/ep/surge/crisis/framework_ems.pdf)

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## **Dispatch/911/PSAPs**

During a crisis, once a request for ambulance response is received by the PSAP/Dispatch, the goal is to provide the most appropriate services available.

Given the long response and transport times in some rural areas, and the lack of medically trained dispatchers in many communities, determining the best services to match a request can be difficult. Dispatch centers should have authority to use crisis dispatch algorithms and must immediately notify supervisory staff. Unless the situation is clearly limited to a few hours, the supervisor should notify the regional points of contact for the EMS multi-agency coordination center. The community may have first responders that are not currently on the ambulance(s) and can respond to subsequent calls for assistance directly to the scene to help the patient determine the best option for transport.

### *Urban Ambulance Service Dispatch Considerations*

Medical priority dispatch is very helpful in prioritizing pending calls and is widely available to urban PSAPs or EMS agencies serving as secondary PSAPs. A log should be kept of calls that are pending or were referred to self-transport. Adaptations should be considered during a crisis when calls are pending and no ALS or BLS ambulance is available.

## **Treatment**

The medical director and ambulance service agency leadership may approve broader discretion for patients being left at scene by the ambulance service crew (if the condition is not emergent and appropriate follow-up and/or transportation can be arranged). EMS Crews should work at the top of their scope of practice and utilize EMS extenders as necessary, such as other trained First Responders and emergency personnel.

## **Transport**

Ambulance crews may be authorized to leave patients at the scene as discussed in the Treatment section and with pre-established SOPs as authorized for a specific situation by the ambulance service medical director. Crews may “batch transport” or transport more than one victim from a single scene or may respond to calls sequentially when their first patient is stable and another call is pending in the same general area.

Inter-facility/Inter-hospital transfers can take essential local ambulance resources out of the service area for hours at a time particularly in rural areas. Careful consideration should be given for decisions regarding the use of ambulance resources for inter-facility transport during a crisis of care event. EMS Units may need to consider the more aggressive use of rotor-wing aircraft to preserve community response. In some situations, the hospital may need to board patients they wish to have transferred while EMS continues to respond to high volumes of 911 calls. The hospital should understand this dual priority ahead of time and ambulance service leadership, supervisory staff and medical directors may need to be involved in these discussions and negotiations. In a crisis, ambulance resources may be severely limited and alternate transport options may need to be considered and utilized.

## **Destination**

### *Rural ambulance service destination considerations:*

Rural ambulance services usually transport patients to a single hospital in rural response areas, with occasional exceptions. During a disaster, the closest hospital can quickly become overwhelmed with patients self-presenting as well as those transported by ambulance. In these cases, it may be appropriate to change protocols. These changes should be considered and developed ahead of an event. It will usually require a supervisor or manager to approve transport to non-hospital facilities, but a crew may have to decide the most appropriate destination hospital and should be empowered to do so. Alternate patient dispositions could

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include a clinic, alternate care site or other community venue. It is appropriate for ambulance service personnel to transport to those locations provided they are open, appropriately staffed, and the patient does not have any severe symptoms.

*Urban ambulance service destination considerations:*

Urban ambulance services should seek to avoid overloading a single hospital. Though patient preference is usually honored when choosing a destination hospital, during a crisis situation the closest appropriate hospital should be selected to allow the ambulance crew to return to service as quickly as possible.

The Department of Health and Senior Services issued a [waiver](#) allowing providers to deviate from diversion plans to the extent necessary to more efficiently move patients to alternate sites of care, including those outside the boundaries of the hospital's written plan.

## Triage Decision-making

When alternative care sites or redirecting patients to other facilities is not possible or limited, difficult decisions must be made to address excess demand for available resources. When the hospital reaches crisis capacity, the following must be implemented.

- Triage plans to maximize the number of patients saved.
- Cancellation of all non-essential duties; reassignment of personnel to critical care functions.
- If possible, move stable patients not yet ready for discharge to identified alternate care sites.
- Ensure quality palliative or comfort care, along with symptom management, is available to all patients, either at the hospital or an alternative care site.

When possible, the hospital should designate a triage team to be responsible for determining who will receive critical care, including allocation of limited resources. Triage teams should be staffed with critical and acute care specialists experienced in managing trauma and critically ill patients. The team should include physicians and nurses and, where possible, individuals with experience in disaster or emergency planning. If the facility is small, it may be necessary to identify a single decision-maker to make triage and allocation decisions. Ideally, this individual will possess the emergency department or critical care skills described above. **The individual(s) making allocation decisions should not be involved in the care of the patients being triaged.**

Transparent decision making will be important, especially in smaller facilities or those in smaller communities. In some instances, the physician making triage decisions may be familiar with the patient about whom allocation decisions are made. Or, an individual well known to the community may be subject to difficult allocation decisions, leading to media interest in the decision-making process. The ethical principles described above must be wholly incorporated into triage decisions and transparently communicated to the public to dispel fears that patient lives are not appropriately valued by a particular facility.

Following a public health emergency in which it is necessary to implement CSC, hospitals must ensure adequate psychological support for triage decision-makers, who may experience long-term effects from making difficult, though ethical, decisions. Clinicians are trained using principles of a “duty of care” to maximize outcomes for individual patients, not to achieve the greatest good for the greatest number. Crisis standards requires a shift from prioritizing individual patient-centered to public-centered survival goals, challenging the training, professional norms and expectations of clinicians. This can lead to moral stress, feelings of guilt and potential psychological distress. Clinicians engaged in allocation decisions may be at high risk for post traumatic stress disorder. Mental health services should be made available as quickly as possible to support clinicians engaged in triage decisions.

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## Criteria for Resource Allocation Decisions

Resource allocation criteria necessarily involve scoring patients at triage to prioritize those more likely to survive with intensive care treatment. In the most simplistic terms, triage involves determining (1) who is unlikely to survive even with critical interventions; (2) who is likely to survive without critical care; and (3) who is likely to survive if given critical care resources. The allocation criteria should focus on the latter patients. Those with little chance for survival regardless of circumstances are entitled to and must receive appropriate palliative care. Those likely to survive without significant intervention should be diverted to alternate care sites. To promote survival of the maximum number of patients, the latter will be considered for intensive treatment.

Due to the myriad ethical considerations in making resource allocation decisions, MHA is not advocating a “one size fits all approach.” However, regional or even statewide consensus on resource allocation criteria promote better public understand and acceptance of the decision making process. Therefore, MHA is suggesting hospitals consider the framework developed by Drs. Douglas White and Scott Halpern, which has been thoroughly vetted and adopted in other states and by hospitals systems in Missouri, with or without adaption. MHA encourages each hospital to thoroughly examine and assess the criteria it establishes so that resource allocation decisions are true to its mission, values and operations. Each hospital using this guidance should involve key members of its critical care staff and ethics committee in considering and ultimately accepting a model for allocation resources during CSC, and which model should be formally documented.

### Allocation of Scarce Critical Care Resources

#### During a Public Health Emergency – White & Halpern

This model for allocation of scarce resources is based on a decade of research and community engagement by the authors and specifically was developed to provide practical and clear guidance for clinicians during the COVID-19 pandemic. It combines clinical assessment tools and predictive measures to score all critically ill patients, not just those with symptoms of COVID-19. Under this model, patients are provided immediate stabilization, and, if necessary, temporary ventilator support to allow the triage decision-maker to adequately assess the patient’s likelihood of survival with or without further intervention. The [White and Halpern model](#) uses a Multi-Principal Strategy (MPS), which couples the Sequential Organ Failure Assessment (SOFA) score to assess patients’ prognosis for hospital survival with an assessment of comorbidities and prognosis for long term survival. Using these principles, patients receive a total priority score to guide resource allocation decisions. Patient priority scores are grouped into three color-coded levels. Resources are prioritized by group, with the lowest scores given priority.

The efficacy and currency of this model support its effectiveness; however, situations may occur when “ties” must be determined among patients with the same priority scores. White and Halpern posit that age should be the first factor used to ensure individuals are given equal opportunity to experience all stages of life. When rationing health care resources, contemplating the long-term enjoyment of the received benefit often plays a role. However, other ethicists argue that the correlation between chronological and biological age is insufficient to support such decisions. Hospitals wishing to adopt this framework should ensure that ethical discussions occur regarding tie-breaking decisions, especially those using age as a proxy, and clear guidance is provided to triage decision makers when faced with such choices.

White and Halpern also suggest tiebreaker consideration be given to individuals essential to supporting the COVID-19 response. Health care workers serve a critical function during and after the immediate COVID-19 response. Ensuring an adequately functioning health care system provides societal benefit during and after the crisis. When using this criteria, consideration should be given to all individuals involved in caring for patients and ensuring public safety and welfare. However, care should be given when clinicians are making allocation decisions about known colleagues. Hospitals adopting these criteria should ensure ethical supports

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are in place to ensure fairness, transparency and accountability and to promote public acceptance of decisions.

As noted, hospitals may elect to adopt or adapt the White and Halpern model. Its succinct but comprehensive and thoughtful approach combines the ethical principles described above with a relatively straightforward clinical application. However, MHA recognizes that it may not be an appropriate fit for all hospitals. Therefore, we provide the following two models for secondary consideration.

### **Utah Pandemic Influenza Hospital and ICU Triage Guidelines for Adults**

This guidance was developed for allocating resources during [pandemic influenza](#), which can inform the response to COVID-19. The framework uses graded guidelines to incrementally increase control over scarce resources as patient surge increases. The framework also uses modified SOFA scores (MSOFA) and give the highest priority to patients with the best chance for survival with treatment. Those with the highest chance for survival without treatment, along with those who present a low chance for survival with treatment are discharged to home or palliative care. The two middle groups represent the middle range of MSOFA scores, with treatment priority given to the lower-scoring group.

The Utah plan incorporates various triage tools for different conditions, to assist hospitals in scoring patients suffering from conditions other than COVID-19. Scoring systems adapted to particular conditions may help to prioritize patients among a particular disease classification, but may yield disparities when applied to patients with vastly different conditions. Hospitals adopting the Utah plan should ensure that decisions made across a variety of illnesses or injuries ultimately are aligned with the ethical principles guiding all resource allocation decisions.

### **Patient Care Strategies for Scarce Resource Situations – Minnesota Department of Health**

The [Minnesota model](#) uses resource- and condition-specific summary cards to generate a decision-making matrix for conventional, contingency and crisis operations. Each card contains adaptive strategies for conserving, adapting, substituting, reusing or reallocating a particular resource, depending on where the facility is on the continuum. With respect to ventilator allocation, the framework uses a variety of strategies to conserve and adapt to decrease demand. Once those measures are exhausted, the model suggests assigning ventilators to those patients most likely to benefit absent intervention, based on the SOFA score and other prognostic indicators, which may be tailored to the ethical principles of the hospital using this allocation method.

The Minnesota framework is relatively easy to adopt and operationalize. It also contains practical and useful strategies to remain in contingency operations, which is the goal of every facility managing resources during an emergency event. It is important to note that while the model incorporates SOFA scores into ventilator allocation decisions, it also warns that SOFA scores alone are poor predictors of mortality for respiratory failure and further states that they should never be used to deny access to a ventilator. Therefore, other inclusion or exclusion criteria must be factored into triage decision-making for this particular resource and must be considered in light of the Ethical Principles guiding CSC.

### **The Ethics of Inclusion and Exclusion Criteria**

Regardless of the allocation framework chosen, ethical considerations will arise with respect to inclusion and exclusion criteria or tie-breaking factors based on situational, as opposed to non-diagnostic factors. Common criteria include age, the presence of other diseases or congenital conditions, first-come, first-served, preservation of health care workers or a lottery approach. Each has ethical ramifications.

Age is perhaps the most debated allocation criteria. The Department of Health and Human Services suggests that in the abstract, life-cycle considerations generally support prioritizing younger patients over older ones.

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When all other factors are equal, age may be an ethical proxy for decision-making, so long as comorbidities, overall health and likelihood of survival are taken into account. While age may be a useful proxy for health status, it requires consideration of additional, subjective judgments about the patient's likelihood of survival – i.e., a physically fit, healthy 70-year-old patient who runs marathons might warrant a ventilator over a 55-year-old chronic smoker.

It is commonly accepted that the presence of certain conditions likely to lead to imminent or short-term mortality are acceptable allocation criteria. These include cardiac arrest for which ACLS is unsuccessful, massive trauma to the organs or brain, or intractable shock. During a public health emergency, hospitals may use the presence of other health conditions to score patients but must do so with caution. When developing such exclusion criteria, clinicians should be mindful that it is impossible to consider every medical condition during the planning phase, leaving clinicians vulnerable to subjective decisions during crisis situations. Additionally, it is likely that triage decision-makers will not have access to information about a particular patient's exclusion criteria, leading to inadvertent, but inequitable decisions.

As noted above, White and Halpern propose prioritizing patients engaged in the public health emergency response, such as health care workers, first responders, government officials or law enforcement. An ethical argument can be made that the prospective recovery of such individuals will have larger societal benefit, especially if there is recurrence of the illness, as seen in other countries. Additionally, numerous health care workers on the front line of the COVID-19 response may be exposed to the disease due to scarcity of PPE; therefore, it promotes fairness to prioritize those who have been placed in harm's way serving others. Using this method requires consideration of how to prioritize health care workers and responders along the continuum of care, as all play a role in promoting public safety and health. Because triage decision makers may be familiar with the patients about whom such decisions are made, plans using these criteria must include clear standards to avoid subjective motives to inform the process.

Final considerations for tie-breaking criteria include a lottery approach versus treating those that arrive first. From an ethical standpoint, a lottery system seemingly promotes fairness in that all patients have an equally random chance to receive scarce resources. An obvious shortfall to using a lottery system is that it may be difficult to administer in a fluid situation, in which the level and timing of patient surge is unknown. While a first-come/first-served approach also seems to promote fairness and is easy to apply, it does not account for the fact that those arriving first may have better situational awareness or greater resources, thus disadvantaging those with lower socio-economic status.

It is likely that a hospital's CSC plan will necessarily include subjective criteria based on clinical judgment or other non-diagnostic information, if only to break ties between patients competing for scarce resources. Due to the potential for bias in applying such criteria, clinical and ethical committees must consider the possible inequities inherent in such criteria and incorporate the Ethical Principles into their use.

## Palliative Care

The Ethical Principles that underpin CSC require that palliative care resources be made available during the duration of the disaster or emergency. It is critical that palliative care be provided to individuals who are denied resources to lessen their pain and suffering and adhere to compassionate standards of the health care industry. To the extent possible, patients should be provided care to alleviate their symptoms, reduce pain and provide emotional support to patients and their family members.

During the COVID-19 pandemic, it is likely that home health and hospice providers will be similarly overwhelmed as hospitals discharge patients to re-allocate staff, space and supplies to individuals needing critical care. Therefore, hospitals also should plan for methods of caring for patients within the four walls of

the facility while providing palliative or comfort care. Home health and hospice staff should be considered in these efforts.

Alternatively, if the hospital discharges such patients to home, it should consider the information and supplies needed by family members caring for their loved ones. Many hospices offer comfort kits and information sheets to families caring for members at the end of their life. Home health and hospice providers are a valuable resource and should be engaged by hospitals while developing CSC plans to ensure palliative care is adequately addressed.

## Legal Framework

CSC involves an altered standard of care. It is not a lower standard or a deviation from the standard of care. It is a different, but medically appropriate standard based on the emergency circumstances and limited resources available to the hospital, in which the patient-centered focus is secondary to the greater public good. CSC should be applied only when the CSC Trigger Point is met. Health care providers who implement CSC should not be held liable for actions taken in good faith and in accordance with accepted CSC policies and guidelines, except in cases of gross negligence or willful misconduct.

Missouri statutes do not contemplate or acknowledge the existence of CSC. Some liability protections may be found in Missouri law for health care providers or volunteers who are deployed by the State Emergency Management Agency during a declared emergency. Similarly, Section 537.037, RSMo provides liability protection for physicians and nurses who, in good faith, render uncompensated care at the scene of an emergency or accident. None of these protections apply when a hospital implements CSC. Ideally, in an event requiring CSC, the provisions of Section 537.037, RSMo would be extended by executive or legislative action to all providers engaged in responding to the pandemic.

To assure maximum liability protection, a hospital must document the event(s) and circumstances leading to the CSC Trigger Point and formally invoke its CSC Plan. Resource allocation decisions must be made in accordance with the ethical principles and assessment criteria set forth in the plan and carefully documented. Documentation should be focused on patient care as opposed to that necessary for reimbursement.

# APPENDIX

## Appendix A: Missouri Hospital Association Estimate of Capacity and Projected Demand for COVID-19 Cases: A Modified County-Level Harvard Global Health Institute Model, April 4, 2020

**Aim:** Assist Missouri hospitals, public health/emergency management officials and policy makers in COVID-19 mitigation planning by assessing the supply of new and existing hospital beds versus projected demand by patient county of residence.

**Data:** Demand Side -- 1) 2018 Population by age, U.S. Census, American Community Survey, 2) COVID-related hospitalization, ICU and mortality rates by age, U.S. Centers for Disease Control and Prevention, MMWR 3) FY2019 inpatient, ICU and NICU hospital discharges by county of residence.

Supply Side -- 1) 2018q2 estimated occupancy rates and utilization of inpatient beds, ventilators and intensive/critical care units by hospital, U.S. Agency for Healthcare Research and Quality, 2) Reported daily number of new and converted medical/surgical beds and ICUs by hospital, Missouri Hospital Association, EMResource System.

**Basis of Conceptual Model:** On March 17, 2020, researchers at Harvard's T.H. Chan School of Public Health, Global Health Institute published the study *American Hospital Capacity and Projected Need for COVID-19 Patient Care*. Using epidemiological models and empirical evidence on the global COVID-19 outbreak, the authors estimated the existing supply of hospital beds and potential demand for hospital-based care attributable to the pandemic in the U.S. using data from the American Community Survey and American Hospital Association Annual Survey. Supply and demand estimates were provided for the U.S., states and 306 Hospital Referral Regions defined by the Dartmouth Atlas Project. The study provided a range of sensitivity analyses based on infection rates (20-60%), transmission period (6-18 months) and hospital occupancy rates (50% reduction under 2018 baseline).

**MHA Modified Harvard Model:** Using similar sensitivity analyses and new data from the CDC on outcomes for COVID-19 cases in the U.S., MHA developed a modified Harvard model at the county-level for 114 Missouri counties and St. Louis city, in addition to 44 neighboring counties in border states with inpatient and ED discharges among Missouri hospitals totaling at least 3% of the resident population during FY2019. The model estimates total COVID-19 infection, hospitalizations, ICU admissions and deaths (demand side) in addition to available medical/surgical beds, ICU and other critical care units, NICUs and ventilators based on typical patient migration patterns and varied hospital triage policies such as postponing elective procedures and low-acuity cases (supply side).

**Demand Side:** County-level projections of COVID-19 infections, hospitalizations, ICU admissions and deaths were estimated using age-stratified rates from the CDC (Table 1) applied to ACS data from the U.S. Census Bureau under 20-60% infection rate scenarios proposed by the Harvard study. For planning purposes, MHA imputed and applied mid-points for the confidence intervals provided by CDC for each age group and outcome. Probable infection rates were provided in increments of 10 percentage points so the model can be updated to reflect emerging epidemiological data.

Modifiable estimates for the probable transmission period also were provided based on the Harvard study, using three to eighteen-month periods in single-month increments to accommodate refined estimates based

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on potential successes in bending the transmission curve related to social distancing and other public health strategies. Longer transmission periods (i.e. “flattening the curve”) would greatly lessen societal impact and surge demand for hospital care.

**Table 1: Hospitalization, Intensive Care Unit (ICU) Admissions, and Case Fatality Percentages for Reported COVID-19 Cases, by Age Group--United States, Feb 12 - Mar 16, 2020**

Age	Cases	Hospitalization			ICU Admission			Case-Fatality Rate		
		Lower Limit	Mid Point	Upper Limit	Lower Limit	Mid Point	Upper Limit	Lower Limit	Mid Point	Upper Limit
0–19	123	1.6%	2.1%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
20–44	705	14.3%	17.6%	20.8%	2.0%	3.1%	4.2%	0.1%	0.2%	0.2%
45–54	429	21.2%	24.8%	28.3%	5.4%	7.9%	10.4%	0.5%	0.7%	0.8%
55–64	429	20.5%	25.3%	30.1%	4.7%	8.0%	11.2%	1.4%	2.0%	2.6%
65–74	409	28.6%	36.1%	43.5%	8.1%	13.5%	18.8%	2.7%	3.8%	4.9%
75–84	210	30.5%	44.6%	58.7%	10.5%	20.8%	31.0%	4.3%	7.4%	10.5%
85+	144	31.3%	50.8%	70.3%	6.3%	17.7%	29.0%	10.4%	18.9%	27.3%
<b>Total</b>	<b>2449</b>	<b>20.7%</b>	<b>26.1%</b>	<b>31.4%</b>	<b>4.9%</b>	<b>8.2%</b>	<b>11.5%</b>	<b>1.8%</b>	<b>2.6%</b>	<b>3.4%</b>

Source: Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) — United States, February 12–March 16, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:343-346. DOI: <http://dx.doi.org/10.15585/mmwr.mm6912e2>

Probable patient migration patterns under a COVID-19 surge scenario were estimated using FY2019 hospital discharge data from the Hospital Industry Data Institute. Estimated flows of patients from county of residence to inpatient medical/surgical beds were calculated using total inpatient discharges excluding transfers for acute care patients residing in Missouri or included border state counties by acute care facilities in Missouri and the St. Louis metro Illinois area. ICU and NICU migration patterns were estimated using FY2019 discharges for each level of care, independently, using the same inclusion criteria.

*Supply Side:* The probable number of Missouri hospital inpatient beds, ICUs, NICUs, other intensive/critical care units and ventilators (including CPAP machines which can be converted) available to residents of each county were estimated using data provided from the AHRQ Hospital Cost and Utilization project. AHRQ used inventories of each asset reported in the 2018 AHA Annual Survey adjusted by baseline occupancy rates and imposed limitations on elective procedures and low-acuity admissions using 2018 discharge data supplied by 47 states (including Missouri) and the District of Columbia.

The existing supply of hospital-based resources were (and will continue to be) be augmented with daily reports of new and converted medical/surgical beds and ICUs as reported by hospitals participating in the EMResource™ system.

All hospital-based resources were attributed to county populations using the FY2019 patient migration patterns described above.

*Demand vs. Supply:* Using calculations provided by the Harvard model, estimated numbers of hospitalizations and ICU admissions were calculated in beds days, standardized into bed units using the selected transmission period, and juxtaposed by beds available to counties in terms of supply as a percent of demand.

*Sensitivity Analyses—Model Assumptions and Inputs:* To best reflect emerging epidemiological evidence on the COVID-19 pandemic, the MHA modified Harvard model is parameterized with four user-defined inputs: 1)

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infection rate (range 20-60%), 2) hospital triage policies (2018 baseline occupancy, less elective procedures, less elective procedures and low-acuity cases), 3) COVID-19 transmission period in months (range 3-18), and 4) average length of stay for COVID-19 inpatient admissions (continuous, with the default ALOS = 10 days).

**Model Results:** Under a 40% infection rate and six-month transmission period with hospitals eliminating elective and low-acuity patients, and a ten-day average length of stay, Missouri is projected to have 12,772 medical/surgical beds available while 27,958 will be needed (45.7%, table 2). Under these same parameters, the demand for ICU and other critical care units is estimated at 7,503 units while and estimated 2,807 would be available (37.4%). Model results vary widely with changes to the model parameters, particularly lower infection rates and longer transmission periods.

**Table 2: Estimated COVID-19 Related Demand and Supply of Hospital Beds in Missouri by Catchment Region, Model Parameters: 40% Infection Rate, No Elective or Low-Acuity Admissions, 6-Month Transmission Period, 10-Day ALOS**

Hospital Catchment Region	Estimated Supply vs. COVID-19 Driven Demand					
	Hospital Beds Needed	Hospital Beds Available	Bed Supply as a Percent of Demand	ICUs Needed	ICUs Available (includes CCU and other ICU)	ICU Supply as a Percent of Demand
Cape Girardeau	1,191	686	57.6%	324	147	45.4%
Columbia	3,396	1,578	46.5%	913	358	39.2%
Joplin	1,063	471	44.3%	286	63	22.2%
Kansas City	7,058	2,987	42.3%	1,875	804	42.9%
Springfield	3,785	1,271	33.6%	1,036	216	20.8%
St. Louis	11,466	5,778	50.4%	3,069	1,219	39.7%
<b>Missouri</b>	<b>27,958</b>	<b>12,772</b>	<b>45.7%</b>	<b>7,503</b>	<b>2,807</b>	<b>37.4%</b>

Correspondence: For additional questions on the modeling or to request a copy of the full model by county (data use agreements will apply), contact Mat Reidhead, Vice President of Research and Analytics at [mreidhead@mhanet.com](mailto:mreidhead@mhanet.com). For additional questions on COVID-19 mitigation and surge capacity planning, contact Jackie Gatz, Vice President of Safety and Preparedness at [jgatz@mhanet.com](mailto:jgatz@mhanet.com) or Leslie Porth, Senior Vice President of Strategic Quality Initiatives at [lporth@mhanet.com](mailto:lporth@mhanet.com).

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