16.1 Introduction

On March 11, 2020, the Director-General of the World Health Organization, Tedros Adhanom Ghebreyesus, officially declared COVID-19, caused by the coronavirus SARS-CoV-2, a pandemic. Originating from China in December 2019, this pandemic spread with almost unprecedented speed across the world over the following weeks and months, taking an equally unprecedented toll of infection of hundreds of thousands of citizens. However, there was a remarkable variation regarding the distribution between and within regions and countries as well as the impact in terms of incidence, prevalence, basic reproduction number, and case fatality rate [1–3]. In response to the pandemic, public health measures taken by provincial and national governments, such as decreeing social distancing, contact restrictions, and curfews,
have had an impact on the way of life of millions of people to a degree hardly experienced in Western democratic countries since World War II. At the time of the writing of this chapter, the pandemic appears far from subsiding and continues to spread or spread again swiftly into populations around the world.

As is characteristic for mass casualty scenarios, the COVID-19 pandemic has led to a discrepancy between the need for medical care and the ability of the healthcare systems to provide such care, but on a strikingly more pronounced and perilous scale. Especially with regard to emergency and intensive care medicine, the demands regarding personnel and material clearly have exceeded the relevant capacities in many areas, including exhaustion of reserves and supply chains. The situation has been aggravated by the fact that – at the time of this chapter being written – no proven specific treatment is available, leaving only symptomatic and supportive measures. This has resulted in an enormous requirement for critical care personnel as well as a remarkable consumption of pure space and resources, such as personal protective equipment, pharmaceuticals, and ventilators [4–6].

During its course, the COVID-19 pandemic has raised a number of important general societal questions, among which are the following: To what extent and for how long can civil rights be restricted in order to mitigate the spread of a disease? How will societies act (or react) when its members cannot be equally protected or attended to medically? And how can societies (better) prepare for epidemics and pandemics in the future?

16.2 Challenges for Emergency Medicine and Critical Care in Epidemics and Pandemics

For emergency medicine and critical care, four challenges are of prominent concern:

1. How to sustain or recruit and train personnel for the tasks to be performed – and how to protect and/or restore their physical and mental health?
2. How to procure and/or maintain the equipment needed for safe care of patients?
3. How to allocate scarce resources among the patients in need?
4. How to explain the decisions and measures by necessity taken to ourselves as professionals as well as to patients and their families who cannot be offered limited resources? And how to deal with the potential mental sequelae?

Specifically during the COVID-19 pandemic, the allocation of scarce critical care resources, in particular full ventilatory support (and potentially also noninvasive ventilation), has emerged as an enormous medical and ethical challenge.
16.3 Allocation of Resources in Critical Care

16.3.1 When Resources Are Not Scarce

As long as resources are not scarce, resource allocation needs to be based on medical grounds and widely accepted ethical maxims. The former mainly comprise indication and informed consent, and the latter are conventionally represented by the four renowned ethical principles [7–9]. Allocation decisions need to be taken for every patient individually, observing the necessity of fair distribution of resources. Limitations of certain therapies may apply, but they refer to the fair assessment of benefits and risks for the individual patient as well as to his/her wishes.

16.3.2 When Resources Are Scarce and Cannot Meet the Demand

When resources become scarce despite all institutional efforts, however – referring to, among others, personnel, pharmaceuticals, equipment, nutrition, transportation capacities, or reinforcements in general – the treating teams need to selectively allot the resources available and hence must make prioritization decisions. The focus of care, then, must shift from patient-centered deontology to population-centered utilitarianism, or at least some modification thereof. Clearly, this shift needs to result in fair processes using clinically informed decisions about scarce resource allocation, and this may include preparing, adapting, conserving, substituting, reusing, and reallocating resources. In some jurisdictions, legal stipulations may direct the allocation of resources and may even overrule medical evaluations.

Medical societies in several countries have published recommendations regarding the allocation of scarce critical care resources during the COVID-19 pandemic [9–16]. They partially build on recommendations related to former (and sometimes recurring) epidemics or on general triage principles [8, 17–19]. They are also based on distinct ethical values, formulated more or less explicitly within the societies’ statements and other related publications [5, 10–22]. Notwithstanding the differences between the various healthcare systems as well as local cultural and societal norms, several values and recommendations are shared among the statements regarding crucial issues. For others, however, there is no consensus.

16.4 Ethical Values for Alloting Scarce Healthcare Resources

Three core ethical values appear uncontested: treating patients equally; maximizing the benefits achievable in the context of scarce resources; and giving priority to those with the best odds of success when the limited resources are applied to them.
Each and every patient is of equal value, and there should be no difference in allocating scarce resources between patients with COVID-19 and those not infected, but afflicted by another illness or an injury. As each patient deserves a fair chance of receiving medical care, all prioritization decisions should in principle be centered on the individual patient. However, the odds of success when applying a scarce resource will not be distributed equally among all those in need. Therefore, those with higher odds of success, as defined by transparent and reasoned medical and ethical criteria ex ante, should receive priority for the interventions necessary. Medical determinants that have a negative impact on the prognosis, i.e., the odds of treatment success, need to be described and integrated into the decision-making process [5, 12, 13, 16–21]. “Operationalizing the value of maximizing benefits means that people who are sick but could recover if treated are given priority over those who are unlikely to recover even if treated and those who are likely to recover without treatment” [5]. However, neither chronological age alone, nor the social value, religion, or wealth of a person, should determine his/her chance to benefit from scarce resources. Clearly, the rule of rescue – “the powerful human proclivity to rescue a single identified endangered life, regardless of cost, at the expense of any nameless faces who will therefore be denied health care”, does not have a place under the conditions of scarcity [23, 24].

Whether maximizing benefits means saving more lives – usually measured with mortality predictions – or saving more years of life (in all surviving) – involving inclusion of comorbidities – is disputed. Saving more lives is more frequently advocated, but attempts are being made to adopt allocation algorithms that combine both concepts [21].

A fourth ethical value, promoting and rewarding reciprocity, i.e., giving priority to healthcare workers and research participants when other factors are equal, has not met the same degree of endorsement, as it raises concerns that those making the rules may be protecting themselves. However, keeping the necessary workforce healthy and alive will benefit others in need, and therefore this potential value deserves intensive further deliberation [5, 10, 11, 13].

### 16.5 Time and Decision-Making Process of Prioritization

In clinical practice, there are two primary times for prioritization decisions: (1) before scarce resources must be allotted – during the COVID-19 pandemic, the decision to start intensive care (life-sustaining) treatments, especially ventilatory support; and (2) once scarce resource allotment has already been implemented – that is, the decision whether to continue or withdraw such treatments. The former describes a “contentio ex ante,” and the latter a “contentio ex post” for scarce resources. Withholding and withdrawing are mostly assessed as equally justified for the same individual. The specific question in the COVID-19 pandemic, though, is whether it is justified that one patient be removed from an ICU bed or a ventilator for the sake of another patient who has a higher likelihood of successful ICU and
ventilator treatment. In principle, the same criteria and rules for allocation should apply for both times. Some institutions have elected to commit a minimum time-limited trial of critical care before a patient would have such resources withdrawn. However, there is no concordance as to this difficult question [5, 12, 13, 15, 16, 20, 21, 25–27], and, again, legal stipulations may direct this particular decision.

Irrespective of at what point in the course of a patient’s illness prioritization decisions must be made, they are complex and challenging. They will bear grave consequences for “denied” individual patients – in favor of “selected” others. Such decisions – and related measures, such as quarantine – can contribute or lead to conflicts, moral distress, and burnout among staff as well as to emotional distress, signs of depression, and complicated grief among patients and their families [28–33].

On the societal level, rationing can lead to a loss of trust in the healthcare system or even the civil order. A failure to plan for scarce resource situations may lead to the inappropriate application of crisis standards of care, inadvertent loss of life, and prioritization decisions being made inadequately or even unnecessarily; therefore, healthcare systems’ “duty to plan” is paramount in a pandemic [30]. Hence, it is of the utmost importance that prioritization decisions not be taken as discretionary decisions, but taken thoroughly, consistently, proportionately, and transparently as to rules based on medical assessment and ethical values. Furthermore, these decisions need to be re-evaluated regularly and over a length of time adapted to the course of the disease.

Unless impeded by medical urgency, these serious decisions should be taken according to the principles of interprofessional shared decision-making in order to assure that all relevant professions and specialties are involved in the process and that the rules and recommendations are followed [34]. To alleviate the treating teams from the difficult prioritization decisions, the formation of independent triage officers and triage committees has been advocated and operationalized [5, 21, 27]. Whether this suggestion is widely advocated and attainable remains to be seen.

### 16.6 Recommendations for Fair Allocation of Scare Medical Resources in Critical Care During the COVID-19 Pandemic

Based on ethical principles and values as well as on experience and guidelines related to epidemics in the past, the following recommendations have been formulated (Fig. 16.1):

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1 These recommendations are primarily formulated for high-income countries; in middle- and low-income countries, the availability of a nurse, electricity, intravenous fluids, and supplemental oxygen may already constitute scarce resources. The fairness of the allocation, however, does not depend on the resources specifically scarce, because there may not be an option for a swift (re-) supply. Rather, the process to arrive at proportionate and consistent prioritization decisions needs to be fair – under normal circumstances as well as during health crises.
Decision-making as a team approach (interprofessional shared decision-making):
- Two critical care physicians from the treating team
- (At least) one critical care nurse from the treating team
- Other relevant clinicians, e.g. from the discipline(s) treating initially
  - Ethics committee members, if needed

[Decision-making by a triage officer or committee per institutional discretion]

Step 1: Is there an indication to treat with or use the resource presently scarce?

Step 2: Is there informed consent or an advance care directive (if legally relevant) to treat with or use the resource presently scarce? (If the patient’s wish cannot be ascertained, he/she will be treated as if there were consent.)

Step 3: Is there a reasonable likelihood of success for the individual patient as to treatment with or usage of the resource presently scarce?

Step 4: Prioritization according to consistently applied medical and ethical rules

YES in all steps 1-3:
Patient admitted to the ICU

Any NO in steps 1-3:
Patient not admitted to the ICU
(Patient admitted to usual ward, symptom-based / palliative care)

Step 5: Re-evaluation

- In time-intervals adequate for the specific disease
- When the medical condition of the patient changes or when the discrepancy between demand and availability of the scarce resource lessens

* Criteria to withhold the resource presently scarce, i.e. indicators for a low likelihood of success (Step 3)
- Related to the patient’s present health status
- Related to the patient’s health status in the recent past (comorbidities, frailty)

• Criteria to withdraw the resource presently scarce
- The original goal of therapy cannot be reached and must be changed (to palliation).
- A time-limited trial of critical care has been unsuccessful.
- Progressive multi-organ failure occurs.
- The treatment with or usage of the scarce resource is no longer consented to.

Fig. 16.1 Fair allocation of scarce medical resources in critical care
1. The appropriateness of critical care, and especially ventilatory support, is assessed for every patient in need (not only those afflicted by the pandemic). Exceptionally invasive or resource-consuming procedures, such as renal replacement therapy or extracorporeal membrane oxygenation, need to be scrutinized meticulously. If critical care is not indicated, the patient will not be admitted to an ICU (or another high-care unit, for instance inside the emergency department).

2. The patient’s informed consent is obtained or verified. If necessary, advance care directives need to be elucidated and honored. If there is no valid consent, the patient will not be admitted to an ICU. If the patient’s wish cannot be ascertained, he/she will be assessed further as if he/she had consented.

3. Once the need for critical care treatment has been determined, the clinical likelihood of its success is assessed at least daily, according to reasoned and transparent criteria known at the time. Specifically, indicators for low odds of success are monitored. While success primarily focuses on survival, long-term outcomes and sequelae – as assessed by the patient and the family – are also taken into consideration.

4. Admission to an ICU and/or implementation of ventilatory support does not follow the usually applied “first-come first-serve rule.” Rather, either patients are admitted to an ICU or admittance is withheld, according to their odds of success.

5. Decisions to change the goal of therapy from cure to comfort care only are considered for each and every patient they may apply to (not only for those afflicted by the pandemic) and are taken without delay.

6. Patients so affected will not be admitted to an ICU or will be discharged from the ICU where they are situated, even if this does not follow the usual protocol.

7. All prioritization decisions are re-evaluated regularly in adequate time intervals, and especially when the clinical status of the patient or the availability of resources changes.

8. The decision-making process follows the principles of interprofessional shared decision-making. If needed, local or regional advisory bodies, such as ethics committees or consultants, will be engaged.

9. After deliberation and decision-making within the treating team, the prioritization decisions will be explained to and discussed with the patient (or his/her legal representative) and the family in a transparent manner – if possible according to principles of shared decision-making [35] – and then documented appropriately.

10. To help navigate difficult decisions or phases, psychosocial support is always available to all patients, families, and team members.

Whether patients already on ventilatory support may be removed from the ventilator to provide it to others in need who have a higher likelihood of success remains debatable – especially from a legal standpoint. However, maintaining a patient on a ventilator despite very low odds of survival has a serious impact on the overall availability of ventilators and may deny appropriate care to other patients with clearly better odds of survival [5, 12, 13, 15, 16, 20, 21, 25–27].
Some clinicians do indeed advocate a complete shift from patient-centered to population-centered care with even more emphasis on minimizing opportunity costs. Clearly, decisions during pandemics are required for the entire population, not only for patients in hospitals [36, 37]. In extremis, very sick patients cared for outside a hospital might have to be counseled as to whether being admitted to a hospital and triaged there would really serve their best interest. Home care and mobile care teams, supplying oxygen, pharmaceuticals, and nutrition as needed, could avoid unnecessary transportation and decrease the pressure on hospitals. “This approach would limit hospitalization to a focused target of disease severity, thereby decreasing contagion, protecting patients and health care workers, and minimizing consumption of protective equipment” and other scarce resources as well [37].

16.7 Conclusion

In health crises such as the COVID-19 pandemic, many resources may become scarce. Although all patients still need to be given a fair chance to receive medical care, the treating teams need to selectively allot the resources available and hence must make prioritization decisions, according to reasoned medical and ethical rules formulated ex ante. As a result, the focus of care might have to shift from patient-centered deontology to population-centered utilitarianism. The pertaining decisions are complex and challenging, and they should be taken according to the principles of interprofessional shared decision-making whenever possible.

The values and recommendations deliberated upon and formulated in this chapter refer to the COVID-19 pandemic. However, they could serve as a model for ethically reasoned allocation decisions for future healthcare crises due to epidemics, pandemics, or other disasters.

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