

Data Supplement:

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1. Rapid Systematic Review Methods Extension

Procedures were aligned with rapid systematic review methodology. Rapid reviews are an emerging form of knowledge synthesis in which components of the systematic review process are simplified to produce information in a timely manner¹⁻³. A rapid review follows most of the critical steps of a systematic review, using systematic and transparent methods to identify, select, critically appraise and analyze data from relevant research. However, to provide timely evidence, some of the components of a systematic review process are omitted⁴. While rapid review methodology can vary relative to a systematic review, only two time-decompression aspects were applied in this manuscript¹⁻³. First, no review protocol was published in advance (to meet the Pediatric Paracorporeal Extracorporeal Therapies Summit deadline), however the search strategy underwent critical review by all members of the PPETS ethics domain (see author list). Second, we omitted gray literature sources (information produced outside traditional publishing and distribution channels) because, acknowledging that many guidelines and documents about the ethical aspects of device use will not feature in the published literature, a parallel approach was undertaken to incorporate international (multi-language) papers.

This simultaneous separate process to obtain existing guidance from colleagues worldwide in local languages from alternate sources utilized World Federation Pediatric Intensive and Critical Care Society contacts and contacted regional societies to broaden the scope of our search.

The inclusion of language and date restrictions or cutoffs as were performed in this rapid review are also variably included in systematic review approaches¹⁻³. Other aspects and processes of a formal systematic review to ensure rigor and minimize bias were included such as comprehensive search strategy scope including three large scientific databases, updated review at a second timepoint, dual blinded review and data extraction as well as assessment of included article quality¹⁻⁴.

1. Watt A, Cameron A, Sturm L, et al. Rapid reviews versus full systematic reviews: an inventory of current methods and practice in health technology assessment. *Int J Technol Assess Health Care*. 2008;24(2):133-139. doi:10.1017/S0266462308080185
2. Khangura S, Konnyu K, Cushman R, Grimshaw J, Moher D. Evidence summaries: the evolution of a rapid review approach. *Syst Rev*. 2012;1:10. doi:10.1186/2046-4053-1-10
3. Tricco AC, Antony J, Zarin W, et al. A scoping review of rapid review methods. *BMC Med*. 2015;13(1):224. doi:10.1186/s12916-015-0465-6
4. Implementation Science Collaborative. Rapid Review vs. Systematic Review: What are the differences? 023 University Research Co. Available at: <https://iscollab.org/rapid-review-systematic-review/>. Accessed 1.3.2021.

2. Search strategy: Pubmed

(((Pedicatrics[mesh] OR Child[mesh] OR Infant[mesh] OR Adolescent[mesh] OR child[tiab] OR children[tiab] OR infant[tiab] OR infants[tiab] OR newborn[tiab] OR newborns[tiab] OR neonate[tiab] OR neonates[tiab] OR neonatal[tiab] OR pediatric[tiab] OR pediatrics[tiab] OR paediatric[tiab] OR paediatrics[tiab] OR baby[tiab] OR babies[tiab] OR teen[tiab] OR teens[tiab] OR teenager[tiab] OR teenagers[tiab] OR youth[tiab] OR youths[tiab] OR adolescent[tiab] OR adolescents[tiab] OR adolescence[tiab]) AND ("Decision Making"[mesh] OR "Decision Support Techniques"[mesh] OR "Clinical Decision-Making"[mesh] OR Ethics[mesh:noexp] OR "Ethics, Clinical"[mesh] OR "Ethics, Professional"[mesh] OR "Resource Allocation"[mesh] OR "Withholding Treatment"[mesh] OR ethic[tiab] OR ethics[tiab] OR ethical[tiab] OR decision[tiab] OR decisions[tiab] OR moral[tiab] OR morals[tiab] OR morality[tiab] OR metaethics[tiab] OR metaethical[tiab] OR utilization[tiab] OR use[tiab] OR withdrawal[tiab] OR discontinuation[tiab] OR initiation[tiab] OR candidacy[tiab] OR candidate[tiab] OR candidates[tiab] OR "resource allocation"[tiab] OR "allocating resources"[tiab] OR "allocation of resources"[tiab] OR "allocative efficiency"[tiab] OR "healthcare rationing"[tiab] OR "health care rationing"[tiab] OR "resource distribution"[tiab] OR inappropriate[tiab] OR unnecessary[tiab])) AND ("Renal Replacement Therapy"[mesh] OR "Extracorporeal Membrane Oxygenation"[mesh] OR "Heart-Assist Devices"[mesh] OR "Ventilators, Mechanical"[mesh] OR "Plasma Exchange"[mesh] OR Leukapheresis[mesh] OR Photopheresis[mesh] OR Tracheotomy[mesh] OR Tracheostomy[mesh] OR "renal replacement"[tiab] OR dialysis[tiab] OR hemodialysis[tiab] OR hemofiltration[tiab] OR hemodiafiltration[tiab] OR "kidney replacement"[tiab] OR "mechanical support"[tiab] OR "mechanical circulatory support"[tiab] OR ECMO[tiab] OR "extracorporeal membrane oxygenation"[tiab] OR "extracorporeal membrane oxygenations"[tiab] OR "extracorporeal membrane oxygen"[tiab] OR "extracorporeal membraneous oxygen"[tiab] OR "extracorporeal membraneous oxygenation"[tiab] OR "extracorporeal membraneous oxygenations"[tiab] OR "extracorporeal membrane oxygenator"[tiab] OR "extracorporeal life support"[tiab] OR "extracorporeal life supports"[tiab] OR ECLS[tiab] OR "ventricular assist"[tiab] OR "biventricular assist"[tiab] OR "circulatory assist"[tiab] OR "artificial ventricle"[tiab] OR "artificial ventricles"[tiab] OR "ventricle assist"[tiab] OR VAD[tiab] OR Impella[tiab] OR LVAD[tiab] OR RVAD[tiab] OR "left VAD"[tiab] OR "right VAD"[tiab] OR "extracorporeal CO2 removal"[tiab] OR "extracorporeal carbon dioxide removal"[tiab] OR ventilator[tiab] OR ventilators[tiab] OR ventilated[tiab] OR ventilation[tiab] OR "plasma exchange"[tiab] OR PLEX[tiab] OR leukopheresis[tiab] OR leukapheresis[tiab] OR lymphopheresis[tiab] OR photopheresis[tiab] OR photochemotherapy[tiab] OR photochemotherapies[tiab] OR paracorporeal[tiab] OR Tracheostomy[tiab] OR Tracheostomies[tiab] OR Tracheotomy[tiab] OR Tracheotomies[tiab])) AND ("Guidelines as Topic"[mesh] OR "Practice Guideline"[Publication Type] OR Guideline[Publication Type] OR Policy[mesh] OR guideline[tiab] OR guidelines[tiab] OR policy[tiab] OR policies[tiab])) NOT ("Randomized Controlled Trial"[Publication Type] OR "Randomized Controlled Trials as Topic"[mesh] OR "Controlled Clinical Trial"[Publication Type] OR "randomized controlled trial"[tiab] OR "Randomized controlled trials"[tiab] OR "randomized control trial"[tiab] OR "randomized control trials"[tiab] OR RCT[tiab] OR RCTs[tiab] OR "clinical trial"[tiab] OR "clinical trials"[tiab] OR "Clinical Trial"[Publication Type] OR "Clinical Trials as Topic"[mesh] OR "Case Reports"[Publication Type] OR "Single-Case Studies as Topic"[mesh] OR "case study"[tiab] OR "Case studies"[tiab] OR "case report"[tiab] OR "Case reports"[tiab]) AND (humans[Filter])



PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	Title page
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 3
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 3
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 4, 5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 4
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	Supplement
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Page 4, 5
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Page 4, 5
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Page 4, 5
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Page 4, 5
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 4, 5
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	N/A
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Page 4
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	NA
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 4
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	NA
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	NA
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	NA
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	NA
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	NA



PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Page 6, Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	N/A – specifically comprehensive
Study characteristics	17	Cite each included study and present its characteristics.	Results page 6- and supplemental tables 1-5
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	supplemental tables 1-5
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	NA
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Results page 6- and supplemental tables 1-5
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	NA
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	NA
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	NA
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	NA
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	NA
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Page 12
	23b	Discuss any limitations of the evidence included in the review.	Page 14-15
	23c	Discuss any limitations of the review processes used.	Page 14-15
	23d	Discuss implications of the results for practice, policy, and future research.	Page 12-14
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Page 4
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	NA – Brief Systematic review
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	NA – Brief Systematic review



PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Title page
Competing interests	26	Declare any competing interests of review authors.	Title page
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Data supplement

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: <http://www.prisma-statement.org/>

Supplemental Table 1: Guidelines

Study ^a	Title	Society/ies represented	Country/ies Represented	Population, Device and Relative pediatric/ethical components and goal of ethical analysis	How was the guideline derived?	Quality (score/7)	Summary
Riaño 2000 ^b	Towards guidelines for dialysis in children with end-stage renal disease	Spanish Pediatric Nephrology Association	Spain	Pediatric: End-stage renal disease (ESRD). Renal Replacement therapy (RRT). All pediatrics and ethical use. ^d	Expert opinion consensus statements (Survey)	Medium (5)	Ethical guidelines for inclusion and exclusion criteria/decision-making for RRT in children in Spain; 1. All pediatric patients receiving dialysis must meet the following criteria – Signed, informed consent must be given by the parent(s) or legal guardian(s), the patient must have real possibilities for kidney transplantation, there must be a reasonable expectation that the patient will have an acceptable quality of life during dialysis therapy and after kidney transplantation 2. Patients with irreversible diseases that make survival extremely unlikely will not be considered as candidates for dialysis 3. Those patients meeting the criteria stated in guideline 1 will not be refused treatment for economic, social, or psychological factors, nor in relation to age, sex, race, or a physical handicap 4. Dialysis treatment will not be withdrawn against the wishes of the patient and parent(s) or guardian(s) 5. The cessation of dialysis will be considered if therapeutic results are not satisfactory or will not be reasonably achieved. A decision to stop treatment must always be made with the agreement of the responsible physician, the patient, and the parent(s) or guardian(s). While 90% of responders found dialysis inadvisable for children in certain cases, decision making in such situations was based on existence of serious physical and/or mental handicap(s) - coexistence of serious medical abnormalities and the likelihood of mortality have a strong influence on the treatment choices of pediatric nephrologists, a poor prognosis, and the expressed desire of the parents. 54% agreed that the final decision for treatment should be made by the physician and the family, while 44% conferred this power to an Ethics Committee. Discussion related to Quality of Life, Informed Consent, Withholding or withdrawing treatment, best interests, benefits and burdens, autonomy, self-determination, consideration of economic factors with fair allocation issues in the setting of limitation and, capacity in children, duty to preserve life is limited.
Renal Physicians Association (RPA) 2010	Shared decision-making in the appropriate initiation of and withdrawal from dialysis	RPA (endorsed by several other professional societies)	USA	Allcomers. Renal replacement therapy. 50% guideline Pediatric, all ethical decision-making. ^d	Evidence-based (Literature summary) applying American Medical Association's Attributes for Clinical Practice Guideline Development. Guideline recommendations considering: 1) ethical principles; 2) legal statutes; 3) shared decision-making; 4) the amount, type, quality, and consistency of supporting research evidence; and 5) the anticipated feasibility of implementation.	Medium (4)	Guideline addressing withholding and withdrawing dialysis in adult and pediatric patients with acute kidney injury (AKI), chronic kidney disease (CKD), or ESRD. Nine recommendations were offered specific to Decision making and best interests. The overarching goal was to improve the process of decision-making about dialysis initiation and withdrawal - to provide clinicians, patients, and families with 1) the most current evidence about the benefits and burdens of dialysis for patients with diverse conditions, 2) recommendations for quality in decision-making and treatment of patients with acute kidney injury, chronic kidney disease, and end-stage renal disease, and 3) practical strategies to help clinicians implement the guideline recommendations. Establishing Family-centered Shared Decision-Making Recommendation No. 1 Develop a patient-physician relationship that promotes family-centered shared decision-making for all pediatric patients with AKI, CKD, and ESRD Recommendation No. 2 Fully inform patients with AKI, stage 4 or stage 5 CKD, or ESRD and their parents about the diagnosis, prognosis, and all appropriate treatment options. Inform children and adolescents in a developmentally appropriate manner, and if feasible, seek their assent about treatment decisions. Recommendation No. 3 Facilitate informed decisions about dialysis for pediatric patients with AKI, CKD or ESRD, discuss prognosis, potential complications, and quality of life with the patient, parents, and/or legal guardian. Resolving Conflicts about What Dialysis Decisions to Make Recommendation No. 4 Establish a systematic due process approach for conflict resolution if disagreements occur about dialysis decisions. Use conflict resolution interventions when family members disagree with one another, when children disagree with their parents, when families disagree with the health care team, or when the health care team disagrees about initiating, not initiating, or withdrawing dialysis. Facilitating Advance Care Planning Recommendation No. 5 Institute family-centered advance care planning for children and adolescents with AKI, CKD, and ESRD. The plan should establish treatment goals based on a child's medical condition and prognosis. Making a Decision to Not Initiate or to Discontinue Dialysis Recommendation No. 6 Forgo dialysis if initiating or continuing dialysis is deemed to be harmful, of no benefit, or merely prolongs a child's dying process. The decision to forgo dialysis must be made in consultation with the child's parents. Give children and adolescents the opportunity to participate in the decision to forgo dialysis to the extent that their developmental abilities and health status allow. Recommendation No. 7

Supplemental Table 1: Guidelines

							Consider forgoing dialysis in a patient with a terminal illness whose longterm prognosis is poor if the patient and the family are in agreement with the physician that dialysis would not be of benefit or the burdens would outweigh the benefit. Recommendation No. 8 Consider the use of a time-limited trial of dialysis in neonates, infants, children, and adolescents with AKI or ESRD to allow for the assessment of extent of recovery from an underlying disorder. Providing Effective Palliative Care Recommendation No. 9 Develop a palliative care plan for all pediatric patients with ESRD from the time of diagnosis and for children with AKI who forgo dialysis. The development of a palliative care plan is a continuation of the process of advance care planning and should be family-centered. Offer a standardized decision making via a prescribed ethical framework. Ethical decisions should be analyzed by means of four topics: medical indications, patient preferences, quality of life, and contextual features (i.e., the social, economic, legal, and administrative context in which the decision occurs). A 7-Step Process of Ethical Decision-Making in Patient Care is outlined - a systematic, step-by-step way to identify, analyze, and resolve most ethical problems with the goal to promote the value or values identified as most important in the case while causing the least infringement on the other recognized values in the case 1. What are the ethical questions? 2. What are the clinically relevant facts? 3. What are the values at stake? 4. List options. What could you do? 5. What should you do? Choose the best option from the ethical point of view. 6. Justify your choice. Refer back to the values and give reasons why some values are more important in this case than others. 7. How could this ethical issue have been prevented? Would any policies/guidelines/practices be useful in changing. there is a potential tension between an evidence-based approach that leads to a particular recommendation for a particular group of patients (e.g., those who are terminally ill from cancer) and a normative approach that addresses what should be done for the individual patient with a unique set of values. Neither the outcomes for the particular group of patients nor the preferences of the individual patient should be ignored. In dialysis decision-making as in other types of medical decision-making, clinicians need to strike a balance between the two.
Zurowska 2013	Clinical practice recommendations for the care of infants with stage 5 chronic kidney disease (CKD5)	European Pediatric Dialysis Working Group	Poland, France, UK, Italy, Greece	Pediatric: Infants who need dialysis. 1 of 12 sections related to ethics.	Evidence-based (Literature summary) plus expert opinion via consensus meetings and extended e-mail discussion. Grading of recommendations is based on National Kidney Foundation Disease Outcomes Quality Initiative nomenclature and methods.	Low (1)	With changing attitudes towards offering RRT (renal replacement therapy) to both newborns and infants as data have accumulated on their improved survival and long-term outcomes. The management of this challenging group of patients differs in a number of ways from that of older children. The authors have summarized basic recommendations for treating infants with CKD5. Recommended decision-making for both commencement and withholding of RRT in the neonate or infant. The principle criterion used to make these decisions is the best interest of the child. The following issues should be addressed for discussion with members of the team: 1. Short and long-term prognosis (co-morbidities influencing medical care and outcome). 2. Medical care issues (availability of equipment, expertise and financial resources, possibility of future transplantation). 3. The predicted quality of life for the child (additional disabilities) and the family. This difficult issue is associated with the feasibility of delivering high-dependency care for the infant by the caretakers, involving their social situation and family structure and possible sources of support. Pediatric nephrology centers advocate multi-professional team discussions, which may be guided by a clinical ethics committee where appropriate, to decide upon offering RRT to newborns and infants. The parents need to obtain detailed information on all issues and be actively involved in the decision-making process.
Bosslet 2015	An Official ATS/AACN/ACC P/ESICM/SCCM Policy Statement: Responding to Requests for Potentially Inappropriate Treatments in Intensive Care Units (ICU)	ATS/AACN/ACCP/ESICM/SCCM	USA, European Countries	Allcomers: Intensive care. "Life-prolonging therapies" E.g.s given as ventilation, tracheostomy and extra corporeal membrane oxygenation (ECMO). All related to ethics. ^{ed}	Literature review followed by iterative expert opinion consensus process, including expert committee development and peer review by designated committees of each of the participating professional societies	Medium (4)	Multi-society statement providing recommendations to prevent and manage intractable disagreements about the use of ICU treatments. Recommend that (1) Institutions should implement strategies to prevent intractable treatment conflicts, including proactive communication and early involvement of expert consultants, (2) The term "potentially inappropriate" should be used, rather than futile, to describe treatments that have at least some chance of accomplishing the effect sought by the patient, but clinicians believe that competing ethical considerations justify not providing them. Clinicians should explain and advocate for the treatment plan they believe is appropriate. Conflicts regarding potentially inappropriate treatments that remain intractable despite intensive communication and negotiation should be managed by a fair process of conflict resolution; this process should include hospital review, attempts to find a willing provider at another institution, and opportunity for external review of decisions. When time pressures make it infeasible to complete all steps of the conflict resolution process and clinicians have a high degree of certainty that the requested treatment is outside accepted practice, they should seek procedural oversight to the extent allowed by the clinical situation and need not provide the requested treatment. (3) Use of the term "futile" should be restricted to the rare situations in which surrogates request interventions that simply cannot accomplish their intended physiologic goal. Clinicians should not provide futile interventions. (4) The medical profession should lead public engagement efforts and advocate for policies and legislation about when

Supplemental Table 1: Guidelines

							life-prolonging technologies should not be used. Ethical Principles Discussed: Best Interests, Autonomy, and Procedural fairness - process-based approaches better fulfill democratic ideals for resolving conflicts involving fundamental interests, such as transparency, legitimacy, accountability, and opportunity for appeal.
Amin 2017 ^b	Pediatric home mechanical ventilation: A Canadian Thoracic Society clinical practice guideline executive summary; Section 3: Ethics of initiation of long-term ventilation in children	Canadian Thoracic Society	Canada	Pediatric: home mechanical ventilation. ^c 5% related to ethics	Evidence-based (Literature summary) with GRADE, AGREE II Instrument, formal voting process, independent review/rating	Medium (5)	Discussed ethics of initiation of long-term mechanical ventilation at home in children; The decision to start home ventilation should be made via a shared decision-making model of providers and parents and involve the children to the extent that their capacity allows. The diagnosis of a life-limiting condition or the decision to pursue an approach focused on comfort does not prohibit the use of mechanical ventilation at home. Health care practitioners assist families by exploring goals of care and making recommendations in line with those goals in order to reach a consensual decision. the child's best interests should guide decision making; however the incapable child should be involved to the extent that he or she is able and willing to participate, with their wishes being an important consideration and consent must be obtained from the child who is deemed to have the capacity. Early advanced care planning discussions with families - encourages them to think about their wishes prior to the time a decision is required, ideally removed from a crisis. Home ventilation is also appropriate in the context of palliative care and/or for the purposes of transport home for compassionate discontinuation at home. These interventions have not only been shown to help some children live longer, they may also help them to feel better and engage in meaningful activities. Health care practitioners, patients, and families must consider more than just "will this intervention prolong life?" before a decision to initiate long-term ventilation is reached. Ethical Principles Discussed: Best Interests
Doi 2018	The Japanese Clinical Practice Guideline for Acute Kidney Injury 2016	Japanese Society of Nephrology, Society of Intensive Care Medicine, Society of Dialysis Therapy, Society of Blood Purification in Critical Care, Society of Pediatric Nephrology	Japan	Allcomers. RRT. ^c 1 of 31 segments related to ethics	Evidence-based (Literature summary) but in the absence of high-level evidence hence this relied on expert opinion so strength of recommendation: Not graded. Quality of evidence: D	Low (0)	Recommended that multidisciplinary health care team should consider the individual patient's case and ultimately decide what to do after consulting the patient's family. Medical care staff should first consider the patient's present status and survival prognosis discuss the indication for renal replacement therapy among themselves. Afterwards, they should explain the advantages and disadvantages of the different treatments to the patient's family (including no RRT) and consult with them about suitable therapeutic strategies and document discussions. As there are no definitive criteria upon which to determine the indication for RRT in children. Dialysis can be done safely in children with mitochondrial/chromosomal disorders or those that are "severely impaired" but each patient should be dealt with as appropriate on a case-by-case basis. Subsequent follow-up and reconsideration of the treatment strategy according to progress. When the patient's family and the health care team cannot agree on a strategy, advice should be sought from a committee comprising the institutional review board and many other experts. When the patient him/herself is evidently conscious and is capable of expressing their will but has a poor survival prognosis (such as in the case of older children with terminal malignancy), the patient's own will must be respected and prioritized.
Russell 2019	Brain death, the determination of brain death, and member guidance for brain death accommodation requests: American Academy of Neurology (AAN) Position Statement	AAN	USA	Allcomers: Death by Neurological Criteria. "Organ sustaining technology" focused on mechanical ventilation. Minimal ethical analysis of devices specific to pediatrics.	Expert opinion consensus statements based on a summit and working group	Medium (4)	Summary of endorsements by AAN guidance to its members responding to requests for accommodation / for continuing organ support following brain death, including discussion re: accommodation of family request for ongoing organ support after declaration of death whereby according to the concept of constrained autonomy. There is no "right" to receive desired but unjustified medical treatment (e.g., continued mechanical ventilation). There is no ethical obligation to provide medical treatment to a deceased person. Discussed the Uniform Determination of Death Act; lack of legal obligation in 49 states to "provide indefinite organ-sustaining" treatment (except New Jersey). Despite its respect for cultural and religious perspectives, and its empathy for grieving loved ones, the AAN recognizes the potential for harm to the patient, the family, or other patients and the health care team from indefinite accommodation. These potential harms include mistreatment of the newly dead, deprivation of dignity, provision of false hope with resultant distrust, prolongation of the grieving process, undermining of the professional responsibility of the physician to achieve a timely and accurate diagnosis, and an anticipated societal harm arising from a negotiated and inconsistent standard of death. The AAN endorses the implicit position of the UDDA that death is a biological reality that may result from irreversible injury to the heart or brain. Accordingly, the AAN believes that its members have both the moral authority and professional responsibility, when lawful, to perform a brain death evaluation including apnea testing, after informing a patient's loved ones or lawful surrogates of that intention, but without obligation to obtain informed consent. The AAN recognizes that when attempts to reconcile disputes pertaining to indefinite accommodation fail, transfer of an individual to another facility, when lawful and feasible, represents a measure of last resort. Unilateral withdrawal of organ-sustaining technology (other than in pregnant women) over the objection of loved ones is acceptable, when supported by law and institutional policy, and represents a measure of last resort. In the event that a brain-dead patient is pregnant, the ethical analysis should largely focus on the welfare of the fetus. Ethical Principles Discussed: Principlism (nonmaleficence, respect for autonomy); deontological (physician integrity, professionalism, duty to practice medicine per the guidelines); relational ethics (doctor-surrogate relationship).
Macmillan 2020 ^b	Crisis Standards of Care Guidelines for the COVID-19	**Regional/hospital system base	USA (Fresno, CA)	Allcomers: COVID-19. Ventilation and ECMO defined ^c .	Expert opinion consensus statements from an interdisciplinary	High (6)	Ethical analysis/justification of triage protocols of resources in scarcity. When considering how to best benefit patients optimally and justly, each framework must determine the "horizon of benefits," that is, the farthest into the future the framework considers a patient's potential condition when determining priority. Criteria are mainly

Supplemental Table 1: Guidelines

	Pandemic: Fresno Resource Allocation Guide (FRAG)			High proportion related to ethical analysis but not device specific	working group applying conceptual methodology: reflective equilibrium and literature review		medical related with 'acute'/longer-term survival risk key (noting limited models in children) and importance of performing individualized assessment combined with robust goal-of-care discussion with the patient or family. Ethical Principles Discussed: procedural fairness, justice, equity, utilitarianism, transparency, maximization life, decisions based on short term life-expectancy. They do not attempt to maximize life-years granting that while when all else is equal, longer life for each patient is a worthy goal, it is inappropriate to game the system in order to maximize a statistical measure of population health by sacrificing those most at risk of shorter life so that the persons who are already healthier may receive more benefit. To do so would only exacerbate existing inequalities in healthcare access.
Prekker 2020 ^b	Regional Planning for Extracorporeal Membrane Oxygenation Allocation During Coronavirus Disease 2019	**Regional /hospital system base	USA	Allcomers: COVID-19. ECMO. Minimal ethical analysis	Expert opinion consensus statements	Low (2)	Triage of resources in scarcity. Recommended that when demand for ECMO is high and prioritization by indication is necessary, preference should be given to conditions with historically better outcomes and shorter expected duration of support. Triage protocols should include ethicists. Criteria are medical related - 3 tiers based on expected survival and predicted duration of ECMO support with pediatric conditions intermixed; the most common indications for ECMO divided into three tiers based on expected outcome, with cut points at 30% and 60% approximate survival. These tiers are further divided into short or long expected duration of ECMO support, using a consensus cut point of 5 days. When determining a patient's eligibility and priority for ECMO during a public health emergency, the regional ECMO triage team—or in its absence, ECMO physicians at the hospital level—will assess the prognosis by ECMO indication, critical illness severity, the anticipated duration of use, and patient age.
Shekar 2020	ELSO Coronavirus Disease 2019 Interim Guidelines: A Consensus Document from an International Group of Interdisciplinary ECMO Providers	Extracorporeal Life Support Organization (ELSO)	International	Allcomers: COVID-19. ECMO. 10% related to ethics.	Expert opinion consensus statements	Low (0)	Recommended that when disease burden increases and systems move to escalating levels of surge capacity selection criteria should become more stringent to use this resource for those most likely to benefit and return to an acceptable quality of life. Specific clinical criteria discussed – related to survival. For children they recommend using existing indications and thresholds for consideration of ECMO in children as per currently published ELSO guidelines. Some of the COVID-19 specific indications and contraindications include 'Lethal chromosomal anomalies (e.g., trisomy 13 or 18)' and 'Severe global developmental delay'. Candidacy should be pre-emptively determined. The cannulation consent process should explicitly include discontinuation of ECMO care in the absence of recovery of lungs, heart or both within an acceptable time frame or if ECMO is actively harming the patient - parents and family members should be made aware of this plan during the consent process and ethics consult and palliative care involved. Resource availability and lack of improvement over time may necessitate reassessment of treatment goals and redirection of care. If 'futile' / poor quality of survival is highly likely ECMO should be discontinued. During a pandemic, if decompression of an overwhelmed hospital within a region is needed, preferentially relocate suitable ECMO candidates (young, single organ failure, previously healthy) to available ECMO centers. And pediatric hospitals associated with adult hospitals should reserve ECMO equipment for potential non-COVID-19 neonatal and pediatric ECMO use, taking into special consideration, those diagnoses with historically excellent outcomes when supported with ECMO.
Vergano 2020	Clinical ethics recommendations for the allocation of intensive care treatments in exceptional, resource-limited circumstances: the Italian perspective during the COVID-19 epidemic and guideline	Italian Society of Anesthesia, Analgesia, Resuscitation and Intensive Care (SLAARTI)	Italy	Allcomers: COVID-19. ICU therapies – Ventilation. ^c Majority related to ethics but not device specific	Expert opinion consensus statements	Medium (4)	Ethical framework for ICU triage in Italy. Application of restrictive (rationing) policies is justifiable only if all the relevant stakeholders ("task forces," hospitals, institutions) have already tried to increase the availability of resources and have already assessed the feasibility and safety to transfer patients to other hospitals. When the availability of resources is overwhelmed by their need, a decision to deny access to one or more life-sustaining therapies, solely based on the principle of distributive justice, may ultimately be justified. If so, the need for ICU treatments should be integrated with additional criteria for ICU admission, ration in favor of highest possibility of success taking into account the type and severity of the current disease, comorbidity, the presence and reversibility of organ failures, and the potential for recovery. Offered that every admission to the ICU should be considered and communicated as an "ICU trial". "First come, first served" criterion for ICU admission does not necessarily have to be followed. change in the ICU admission policy should be shared maximally among the staff involved. Decision to deny admission to the ICU by applying a "ceiling of care" should always be motivated, communicated and documented; the patients who are affected by the application of new, more stringent criteria of eligibility for ICU admission (and/or their proxies) should be informed of the extraordinary nature of the measures in place, as a matter of duty of transparency and to maintain confidence in the health service. Applies proportionality of care, prognosis, maximizing lives saved, rationing only if failed resources and transparency in process and HCW support for these decisions.
Brown 2020	International Society for Peritoneal Dialysis practice recommendations: Prescribing high-quality goal-directed peritoneal dialysis	International Society for Peritoneal Dialysis (ISPD)	Australia, UK, China, Singapore, Argentina, Hong Kong, USA, Canada, Brazil	Allcomers: requiring peritoneal dialysis. 50% related to ethics	Evidence-based (literature summary) and Expert consensus from globally representative nephrologists using the GRADE system. Expanded additional publications beyond this summary piece.	Medium (3)	Recommendations related to ethical use of peritoneal dialysis (PD). PD should be prescribed using shared decision-making between the person doing PD and the care team. First: The aim is to establish realistic goals that (1) maintain quality of life for the person doing PD as much as possible by enabling them to meet their life goals, (2) minimize symptoms and treatment burden while (3) ensuring high-quality care is provided overall dialysis delivery should be 'goal-directed' with discussions between the person doing PD and the care team (shared decision-making). Second: The PD prescription should take into account the local country resources, the wishes and lifestyle considerations of people needing treatment, including those of their families/caregivers', especially if providing assistance in their care.

Supplemental Table 1: Guidelines

							Third: For some people who require dialysis and who have a poor prognosis, there may be a quality-of-life benefit from a reduced dialysis prescription to minimize the burden of treatment. Fourth, in low and lower middle-income countries, every effort should be made to conform to the framework of these statements, taking into account resource limitations. Fifth, the principles of prescribing and assessing delivery of high-quality PD to children are the same as for adults. In all cases, the PD prescription should be designed to meet the medical, mental health social and financial needs of the individual child and family
Badulak 2021	ECMO for COVID-19: Updated 2021 Guidelines from the Extracorporeal Life Support Organization	ELSO	International	Allcomers: COVID-19. ECMO. 20% related to system capacity decisions about ECMO and regional resource sharing	Expert opinion consensus statements and Literature summary	Low (0)	ELSO guideline recommending contraindications for ECMO use should become more stringent as ECMO capacity diminishes, outlining system capacity tier criteria for continuing or ceasing to offer ECMO. i.e., capacity and then medical factors define decisions surrounding ECMO support such that with increasing capacity more restrictive exclusion criteria emerge to select patients with highest likelihood of survival and with consideration of run duration. This does not apply for children, for whom conventional selection criteria and management practices should be the standard. The consent process should include a discussion outlining criteria with family for when ECMO support will be stopped once it is determined to be unlikely to provide further benefit to the patient including consideration given for withdrawal of life-sustaining therapies (futility and principle of proportionate therapy). Ethical Principles Discussed: Use for maximal benefit - utilitarianism.
Schönhofer 2021	Prolonged Weaning: S2k Guideline Published by the German Respiratory Society	German Respiratory Society	Germany	Allcomers: requiring respiratory support. Ventilation. 1 of 7 sections relates to “Ethical Considerations” with a subsection on pediatrics. Of 55 recommendations, 2 pertain to ethics in children, 8 pertain to ethics overall.	Expert opinion consensus statements and Literature summary. “Association of Scientific Medical Societies criteria for rational decision making and good clinical practice.” Recommendations were extensively discussed, agreed upon and revised in a nominal group process	Medium (4)	German consensus-based statements developed through literature review regarding the underlying pathophysiology, diagnostic approaches, and therapeutic strategies associated with patients undergoing prolonged ventilation weaning. Mechanical ventilation should only be initiated or continued if 1) it is medically appropriate (i.e. a professionally justified opinion that a treatment measure is suitable for achieving a specific therapeutic goal with a certain probability - based on evidence and individual prognosis) and 2) it is within the person's wishes. In Germany, the withholding or withdrawal of therapy in infants and children is necessary and currently ethically accepted in two situations: (1) If treatment is futile, its continuation only means prolongation of suffering. Futile here means only a short gain in life span, which is not in proportion to the suffering the patient has to endure. (2) In case of survival, the child's quality of life is considered to be that of unacceptable suffering, without any possibility of improvement. Note is made that severe mental or physical disabilities or home MV need not significantly impair a child's subjective quality of life. It is the task of the physician to ascertain whether it is living or dying that is in the best interest of the child (some lawyers also refer to the presumed will of the child). Decisions about the continuation or withdrawal of treatment are suggested to be made in the framework of an ethical consultation, and with the agreement of the parents using structured communication with goal directed focus. There are no clear, evidence-based recommendations for the decision-making process associated with the discontinuation of therapy in ventilated patients. Primary palliative care/ethics knowledge is important for intensivists. Gradual limitation of therapy appears less intrusive and less stressful, this procedure can sometimes lead to an unjustifiable prolongation of the dying process however immediate termination of MV can lead to a significant shortening of the dying process requiring symptom plans.
Guerguerian 2021	Pediatric Extracorporeal Cardiopulmonary Resuscitation ELSO Guidelines	ELSO	USA, Canada, South Africa, Italy, Singapore	Pediatric: Extracorporeal Cardiopulmonary Resuscitation. ECMO. Minimal ethical analysis. Only one section on ethics/informed consent.	Expert Opinion Consensus Statements	Low (1)	Because of the rapid nature of ECPR (ECMO cannulation while receiving CPR) deployment obtaining informed consent for ECPR may be impractical. In organizations where ECPR is offered, oversight for informed consent processes is best aligned with approaches used for conventional CPR. Patients eligible for ECMO or who may have consented to ECMO may not be suited for ECPR nor consent for ECPR. Recommends frequent conversations regarding changes in condition and prognostic information including the time-limited purpose for extracorporeal support based on institutional bridging options, possibilities of survival, survival with morbidities, and of death.
DiNardo 2022	ECMO in children receiving hematopoietic cell transplantation and immune effector cell therapy: an international and multidisciplinary consensus statement	ELSO, PALISI, EBMT, PTCTC, POKER, ESPNIC	Italy, USA, France, Germany, Netherlands, UK, Singapore, Australia	Pediatric: Stem cell transplant. ECMO. Minimal ethical analysis	Evidence-based (Literature summary)	Low (1)	International candidacy recommendations regarding appropriate use of ECMO in children receiving stem cell or immune effector cell treatments. Strong agreement was reached that ECMO be considered in children when there is a reasonable likelihood of recovery within 2–3 weeks and a low risk of malignant recurrence. While minimal considerations beyond clinical factors, recommendations also include incorporating family expectations and foals of care as secondary considerations regarding candidacy.
Fauoux 2022	ERS statement on paediatric long-term noninvasive respiratory support	European Respiratory Society	France, UK, Italy, Netherlands, Canada, Belgium, Slovenia, Sweden,	Pediatric: requiring respiratory support. Non-invasive Ventilation (NIV). Minimal ethical analysis.	Evidence-based (Literature summary)	Low (1)	Use of NIV as a component of palliative care aims to relieve suffering may contribute to symptom control and improvement in quality-of-life, and provide comfort to patients and their families, addressing their physical, psychological, spiritual, social and ethical needs but noninvasive respiratory therapies are underused, limited by lack of experience, cost, unavailability in many hospitals and lack of literature reporting experience and efficacy. NIV could be considered and integrated within a shared plan of care that involves the caregivers, healthcare staff and children who are deemed competent.

Supplemental Table 1: Guidelines

			Spain, Germany, Portugal				
Jung 2022	Executive summary of the Korean Society of Nephrology 2021 clinical practice guideline for optimal hemodialysis treatment	Korean Society of Nephrology	Korea	Pediatric. Peritoneal dialysis. Minimal ethical analysis	Evidence-oriented review and Expert consensus statements graded by the strength of recommendations and quality of the evidence.	Low (1)	Dialysis use is influenced by a variety of clinical factors, and the precise timing will likely affect the cost of dialysis services and clinical outcomes, certain factors related to mortality, degree of improvement in symptoms and functions, quality of life, and other medical expenses should also be considered. Recommended that whether and when to start hemodialysis be decided through a careful discussion between the patient and the healthcare provider about the benefits/harms of the treatment and the patient's values and preferences about initiation.

^a all were multicenter, multi-author, ^{**} all except 2 indicated that were regional or hospital system based guidelines represented a society

^b Bioethics affiliation explicitly stated

^c Also reference general ICU therapies

^d Ethical Analysis of the Device as the primary goal

Abbreviations: The American Thoracic Society, The American Association for Critical Care Nurses, The American College of Chest Physicians, The European Society for Intensive Care Medicine The Society Of Critical Care Medicine ATS/AACN/ ACCP/ESICM/ SCCM, RPA; Renal Physicians Association, SCCM: Society of Critical Care Medicine, AAHPM: American Academy of Hospice and Palliative Medicine, AAP: American Academy of Pediatrics, AACN: American Association of Critical Care Nurses, AGS: American Geriatrics Society, GRADE: Grading of Recommendations Assessment, Development and Evaluation

Supplemental Table 2: Literature Reviews

Study ^a	Title	Country/ies Represented	Population and Device and relative ethical components and goal (d)	Methodology (eg PRISMA) and papers reviewed	Quality of ethical analysis (score/7)	Summary
Hollander 2016 ^b	Compassionate deactivation of ventricular assist devices in pediatric patients	USA	Pediatric: children with heart failure. VAD. Ethical analysis of the device was primary goal	Not explicit	Medium (3)	Need for pediatric guidelines re: compassionate withdrawal of VAD in pediatric patients. As VAD support for pediatric patients increases in frequency, the pediatric heart failure and palliative care communities must work toward establishing guidelines to clarify the complex issues surrounding compassionate deactivation. Patient, family and clinician attitudes must be ascertained and education regarding the psychological, legal and ethical issues should be provided.
Grychtol 2018 ^c	The role of sleep diagnostics and non-invasive ventilation (NIV) in children with spinal muscular atrophy (SMA)	UK, Australia	Pediatric: children with SMA type 1. Ventilation (including non-invasive and tracheostomy). Ethical considerations in clinical discussion	Not explicit	Medium (4)	Ethical considerations of NIV and trach/vent in children with SMA Type 1. Without assisted ventilation or novel therapies, most children with SMA type 1 die before the second year of life due to respiratory failure as the respiratory muscles and bulbar function are severely affected. Active respiratory treatment (mechanically assisted cough, invasive or non-invasive ventilation) has improved survival significantly in recent decades, but often at the cost of becoming ventilator dependent. This review summarizes the existing knowledge about sleep-disordered breathing and respiratory failure in patients with SMA, especially Type 1, as well as the evidence of improved outcome and survival in patients treated with non-invasive or invasive ventilation. Practical considerations and ethical concerns are delineated with discussion on how these may be affected by the advent of new therapies.
Piscitello 2020 ^{bc}	Variation in Ventilator Allocation Guidelines by US State During the Coronavirus Disease 2019 Pandemic: A Systematic Review	USA	Allcomers: COVID-19. Ventilation. Minimal ethical analysis.	PRISMA with current guidelines internet search using public health websites for each individual state and the Google search engine.	Low (2)	Systematic review evaluating publicly available guidelines about ventilator allocation for all states in the US and in the District of Columbia using Department of Health websites for each state and internet searches. As of May 10, 2020, 26 states had publicly available ventilator guidelines, and 14 states had pediatric guidelines. Use of the Sequential Organ Failure Assessment score in the initial rank of adult patients was recommended in 15 state guidelines (58%), and assessment of limited life expectancy from underlying conditions or comorbidities was included in 6 state guidelines (23%). Priority was recommended for specific groups in the initial evaluation of patients in 6 states (23%) (ie, Illinois, Maryland, Massachusetts, Michigan, Pennsylvania, and Utah). Many states recommended exclusion criteria in adult (11 of 26 states [42%]) and pediatric (10 of 14 states [71%]) ventilator allocation. Withdrawal of mechanical ventilation from a patient to give to another if a shortage occurs was discussed in 22 of 26 adult guidelines (85%) and 9 of 14 pediatric guidelines (64%). These findings suggest that although allocation guidelines for mechanical ventilatory support are essential in a public health emergency, only 26 US states provided public guidance on how this allocation should occur. Guidelines among states, including adjacent states, varied significantly and could cause inequity in the allocation of mechanical ventilatory support during a public health emergency, such as the COVID 2019 pandemic.
Jöbges 2020 ^{bc}	Recommendations on COVID-19 triage: international comparison and ethical analysis	International	Allcomers: COVID-19. Ventilation. Ethical analysis was primary goal	11 International guidelines reviewed	High (6)	Based on reviewed national/international guidelines/expert opinion consensus statements from Australia/New Zealand, Belgium, Canada, Germany, Great Britain, Italy, Pakistan, South Africa, Switzerland, the United States and international society critical care guideline. Areas of consensus, including the importance of prognosis, patient will, transparency of the decision-making process, and psychosocial support for staff, as well as the role of justice and benefit maximization as core principles. Areas of disagreement included the role of

Supplemental Table 2: Literature Reviews

			with devices just mentioned.			survival versus outcome, long-term versus short-term prognosis, the use of age and comorbidities as triage criteria, priority groups and potential tiebreakers such as 'lottery' or 'first come, first served' and acknowledged tension between maximizing benefits and aiming at non-discrimination of groups who are characterized by more fragile health.
Gerdfarmarzi 2020 ^b	Neonatal end-of-life decisions and ethical perspectives	Europe: Switzerland, Germany, Italy, France, Netherlands, Sweden, Spain, UK, Austria	Pediatric: Premature infants and neonates with life threatening/life limiting diseases. Ventilation. ^d	Not explicitly stated	Medium (3)	Ethical decision making process and practices for severely ill or terminal neonates. Highlights perceptions and practices of clinicians involved in neonatal resuscitation/end of life care including differences in neonatal end-of-life decision management in Europe; parents' role in neonatal end-life decisions; reviews several national guidelines on withdrawing/withholding life-sustaining therapies and review of ethical and legal framework for neonatal resuscitation. Ethical discussion includes principlism (respect for parental authority, beneficence, non-maleficence); best interest standard.
Moynihan 2021 ^c	Decision-Making, Ethics, and End-of-Life Care in Pediatric Extracorporeal Membrane Oxygenation: A Comprehensive Narrative Review	USA, Australia	Pediatric. ECMO. Ethics one of 3 primary search criteria.	Systemic literature review (narrative) with 3513 screened, 2581 abstracts, 87 full text, 36 data synthesis.	Low (1)	Narrative review regarding communication, decision making, and EOL/discontinuation in pediatric ECMO. Summary that encompassed both empiric and non-empiric data or opinion/ conceptual based synthesis of the data. Ethical issues/considerations related to ECMO include consent, initiation, discontinuation, resource allocation, research ethics. Recommendations related to communication education, palliative care consultation, role of ethics and palliative care in outcomes, shared decision making. Ethical discussion included principlism (beneficence, non-maleficence, respect for autonomy, justice); virtue ethics, vitalism, utilitarianism, personalist bioethics, and preventative ethics. Despite numerous ethical issues reported surrounding pediatric extracorporeal membrane oxygenation, there is limited patient-level research and no practical guides for communicating with families or managing extracorporeal membrane oxygenation discontinuation.
Burgos 2022	Premature and Extracorporeal life support: Is it time?	Sweden	Pediatric: Neonates born prematurely <34 and 34-37 weeks GA. Extracorporeal Life Support (ECLS). ^d Ethical considerations in clinical discussion with minimal ethics analysis.	Systemic literature review with 197 screened, 97 full text, 36 studies extracted	Low (1)	Systematic review evaluating the existing literature on ECLS in early and late (34–37 GA) prematurity focusing on survival to hospital discharge and the complication intracranial hemorrhage (ICH). The authors concluded in the context of technology advances that we are approaching a new era that changes our paradigm of who to treat, and who not to treat. Based on this data they challenge that gestational age < 34 weeks might no longer be considered a contraindication for ECLS in premature neonates focusing on principlism (beneficence and non-maleficence).

^a all were multi-author, none represented a society.

^b Bioethics affiliation explicitly stated

^c multicenter

^d also reference general ICU therapies

Supplemental Table 3: Empiric Citations; Patient Data

Study abede	Title	Country/ies Represented	Population and Device	Methodology and pediatric patient numbers (% of total)	Quality of ethical analysis (score/7)	Summary
Chesnay 2017 ^{bc}	Mortality risk disparities in children receiving chronic RRT for the treatment of end-stage renal disease across Europe: an ESPN-ERA/EDTA registry analysis	Austria, Belgium, Croatia, Denmark, Finland, Greece, Iceland, Netherlands, UK, Norway, Spain, Sweden, Switzerland, France, Czech, Germany, Hungary, Poland, Lithuania, Portugal, Russia, Romania, Ukraine, Slovakia, Macedonia, Slovenia, Belarus, Bulgaria, Estonia, Montenegro, Albania, Serbia, Bosnia, Herzegovina	Pediatric: RRT in Europe	Quantitative study on device use; comparison of RRT utilization and mortality risk. Aim is to provide data to develop guidelines. All pediatric. 23,078 years of follow-up in 7108 patients and 365 deaths.	Low (1)	Description of RRT approaches according to patient and country variables including macroeconomic factors. Finding of significant international variation in mortality in children receiving RRT and observing economic welfare as a key determinant of health and access to health services for children with renal disease. Public health expenditure was strongly associated with mortality risk and explained 67% of the variation in mortality between countries, impacting availability and quality of pediatric renal care. Gross domestic product per capita was also relevant. Call to strive for more equitable outcomes/justice.
Fauriel 2004 ^{cd}	Decisions concerning potentially life-sustaining treatments in paediatric nephrology: a multicentre study in French-speaking countries	French Speaking European countries. France, Belgium, Luxemburg, Switzerland	Pediatric: RRT	Mixed methods - patient level data review and semi-structured interview of clinicians involved. N=440 patients, all pediatric. Survey of 31 clinicians involved in life-sustaining treatments (LST) decisions	Medium (5)	The aim of this work was to evaluate how decisions to withhold or to withdraw potentially LST are made in nephrology centres to inform guidelines. Observed lack of standardization of criteria to withhold or to withdraw LST, parents' involvement in the decision-making process differed between centers and no specific guidelines exist for decisions regarding discontinuation of dialysis. Patients: treatment was stopped in 50 of 440 children (27<1 yr, 23>1 yr) and in 28/50 deaths subsequent Quality of Life based on long term living conditions was coded as critical for the decision. Severe neuro-comorbidity or severe extra renal disease, survival unlikely or family consequences or suffering discussed as being considered to be the most important for decisions - However, they are extremely complex and health care professionals generally lack reliable tools for predicting quality of life. Relational aspects of life / family considerations were also considered. An ethics committee consult was placed in 14% patients. For the majority, informing the parents consisted largely of gradually helping the parents to accept the medical decision. In five cases, all of the medical information available was given to the parents as objectively as possible, to enable the parents to decide for themselves. In five other cases, the information was given to the parents with the aim of determining their preferences, and the doctors then made the final decision, taking into account the parents' opinion.
Moosa 2016 ^{cd}	Use of the 'Accountability for Reasonableness' Approach to Improve Fairness in Accessing Dialysis in a Middle-Income Country	South Africa	Allcomers: Renal replacement therapy	Quantitative study on use of device; utilization of renal replacement therapy with application of a guideline. 1101 patients, children not differentiated.	Medium (4)	To promote optimal use of the scarce dialysis facilities in SA, selection guidelines were reengineered using the 'Accountability for Reasonableness' (procedural fairness) framework to develop a hierarchical set of priorities. This descriptive study of end stage kidney failure patients evaluated for dialysis treatment at a tertiary renal unit over 7yrs studied implementation/evaluation of this guideline to fairly ration dialysis in South Africa. Category 1 patients guaranteed renal replacement therapy, Category 3 patients palliated, and Category 2 offered treatment if resources allowed. Overall 25.2% were accepted for renal replacement treatment (most 48% were Category 2). 98% of Category 1 patients were accepted for treatment while 99.5% of Category 3 patients were excluded. Patients accepted for dialysis were younger, employed, married with children and not diabetic. On multivariate analysis, the odds of receiving treatment was greater for those who were younger, married, female, had more dependent children, had higher levels of education and were employed. Diabetes, HIV or hepatitis B infection reduced the odds of patients being offered treatment. Race did not impact on the decision to accept patients for treatment - reversing the white racial predominance of previously reported selection. Economic dependence was the most common socioeconomic factor patients were turned down and poor adherence to treatment and drug/alcohol addiction were common psychosocial reasons for exclusion. Compared with our previous selection process our current method of priority setting based on procedural fairness arguably resulted in more equitable allocation of treatment implying accountability for reasonableness selection criteria is morally, legally and ethically more defensible - fairness in access to dialysis, and the need for an ethical basis for decision-making.
Flamm 2014	Family members' requests to extend physiologic support after declaration of brain death: a case series analysis and	USA	Allcomers: Patients meeting death by neurologic criteria.	Case series, 2 children (15%)	High (6)	A review of internal case series and thematic characterization of "what worked" and what remained "sore spots" in cases of removal of organ support in patients meeting death by neurological criteria. Reflections were that there should be policy development and legal recommendations for consistent approach to accommodate families who request ongoing physiologic/organ support following brain death declaration. Requests to continue physiologic life support after brain death more easily managed when time limited with achievable goals but may require institutional response when values are in conflict or requests for indefinite

Supplemental Table 3: Empiric Citations; Patient Data

	proposed guidelines for clinical management		Primarily ventilation, one patient on ECMO at time of demise.			accommodation. Recommends institutional preparation of legal/policy responses to requests for accommodation, removal of organ support in DNC; resource allocation. Requirements in 3 states that "reasonable accommodations" of religious, cultural or moral objections to determination of DNC be made. Applies principlism (beneficence, nonmaleficence, respect for autonomy, justice); deontological and virtue ethics (moral duty to prevent harm, stewardship of resources; professional integrity, duty to preserve life-resource allocation); and considers equity in care provided.
Orr 2002 ^{ad}	Clinical ethics case consultation	USA	Pediatric: Neonates, Jehovahs Witness. ECMO	Case, 1 child	Medium (3)	Discussion of ethics using a case surrounding blood transfusion and ECMO in a Jehovah's witness patients. Autonomy and harm principles related to overriding parental decision-making.
Wolfson 2005	ECMO after stem cell transplant: clinical decision-making in the absence of evidence	USA	Pediatric: Stem Cell Transplant patients. ECMO	Case, 1 child	Medium (5)	Innovation with technology advances over time means new indications are emerging for devices. Discusses research as well as informed consent implications for such last-ditch efforts with a novel therapy.
Ares 2019	Outcomes and associated ethical considerations of long-run pediatric ECMO at a single center institution	USA	Pediatric: Prolonged ECMO runs	Case series, 14 children (100%)	Medium (3)	Discusses concepts of uncertainty in clinical judgment, challenges with informed consent, medical futility and moral distress associated with longer-term ECMO use.
Shankar 2014	Ethical dilemma: offering short-term ECMO support for terminally ill children who are not candidates for long-term mechanical circulatory support or heart transplantation	USA	Pediatric: malignancy who are not candidates for long-term MCS or heart transplant / Foreign nationals. ECMO.	Case, 1 child	Medium (5)	Ethical issues and reimbursement issues for children who are not candidates for long-term MCS or heart transplant supported on ECMO. Discusses limits in futility and The Texas Advanced Directives Act of 1999 (established a set of provisions and a process by which physicians could legally and unilaterally withdraw treatment in the setting of medical futility even when the patient's family or surrogate did not agree). Applies concepts of benefit/burden/harm, respect for cultural and religious beliefs, autonomy and adolescent assent along with resource implications. Concludes that clinicians should work with families to facilitate reasonable requests that contribute to a patient's quality of life, even in the critical care setting.
Truog 2015	Ethical dilemmas with the use of ECMO as a bridge to transplantation	USA	Pediatric; Neonates. ECMO.	Case, 1 child	Medium (5)	Uses a case to discuss decision-making over bridge to nowhere with ECMO; patients who no longer have the medical indications for which ECMO was initiated. Suggests that the options of either to stop ECMO as soon as possible or to continue ECMO indefinitely can both be defended by straightforward ethical arguments, despite reaching opposite conclusions. Alternatively, continuing but restricting the use of life-support, is ethically and psychologically complex, yet an emotionally supportive way to share the moral burden of decisions with the family when the more ethically straightforward approaches seemed difficult to accept. Considers resources and QOL factors.
Peterec 2018 ^d	Is Extracorporeal Membrane Oxygenation for a Neonate Ever Ethically Obligatory?	USA	Pediatric. ECMO.	Case, 1 child	High (6)	In the setting of evolving use and accumulation of data, could circumstances emerge where ECMO is an ethically obligatory treatment permitting override of parental decisions. Uses a case of Meconium aspiration in a Jehovah' witness and considers parental autonomy, best interests, and the rights of the child which require that potentially life-saving treatments be provided, even over parental objection. Offers that justifications for overriding parental refusals of life-saving treatment have generally included the primacy of the child's best interest vs harm.

^a Single author (vs multiple)

^b Represented a society (European Society for Paediatric Nephrology/European Renal Association-European Dialysis and Transplant Association ESPN-ERA/EDTA Registry)

^c Multicenter (vs single center)

^d Bioethics affiliation explicitly stated

^e For no citations was Ethical Analysis of the Device the primary goal

Supplemental Table 4: Empiric Citations; Survey Data

Study ^a	Title	Country/ies Represented	Population and Device	Methodology and Survey/Interview Numbers, Recruitment approach, Response rate	Quality of ethical analysis (score/7)	Summary
Cuttini 2006	Ethical issues in neonatal intensive care and physicians' practices: a European perspective	France, Germany, Great Britain, Italy, Luxembourg, Netherlands, Sweden, Spain	Pediatric; Neonates. Ventilation. ^c	Survey: Physicians and Nurses who work in NICUs and are involved in end-of-life decisions, 4350 (1235 physicians, 3115 nurses), census and random sampling, 86%. Literature review performed	Medium (4)	To assess views and practices regarding ethical decision making in the NICU. Every European country examined has some form of limitation of neonatal intensive care, but specifics vary by country. Most physicians reported having been involved at least once in setting limits to intensive care because of a baby's incurable condition and/or poor neurological prognosis. Adopted strategies varied between countries. Practices such as the continuation of current treatment without escalation and the withholding of emergency rescue appeared widespread. In contrast, the frequency of doctors reporting withdrawal of mechanical ventilation was highest in the Netherlands (93%), Sweden (91%) and the Great Britain (88%), intermediate in France and Germany, and lowest in Spain and Italy (34 and 21%, respectively). Parents' role in decision-making (more explicit in the UK) also varied.
Kinali 2006	UK physicians' attitudes and practices in long-term non-invasive ventilation of Duchenne Muscular Dystrophy	UK (authors Italy and Canada)	Allcomers; Duchenne Muscular Dystrophy. Ventilation	Survey: Pediatricians, neurologists, pulmonologists, geneticists, and others, 38, Surveys sent by mail to members of the UK Muscular Dystrophy Campaign, 64%	Medium (3)	Examined UK physicians' practices related to allocation of resources and factors influencing individual physician's practice and their opinions on long-term NIV of DMD; 13% of UK physicians do not discuss long-term ventilation with DMD patients and most wish for more guidelines. The majority (81.5%) of respondents inform families and patients about long-term ventilation support options. Discussion re LTV related to perception of potential improvement of QOL, ethical obligations. 50% consider inappropriate use of medical resources to be a problem in this area of practice and 66% believed cost should not enter into decision-making on resource utilization. UK physicians promote shared decision-making with patients but also acknowledge the influence of autonomy, fiduciary obligations, and stewardship of resources considerations on their judgement.
Miljeteig 2006 ^c	My job is to keep him alive, but what about his brother and sister? How Indian doctors experience ethical dilemmas in neonatal medicine	India	Pediatric: NICU patients. Ventilation. ^c	Qualitative study; data from 14 interviews with Doctors in NICUs	High (7)	To explore and describe how Indian doctors experience ethical dilemmas concerning the withdrawal of treatment among critically sick and/or premature neonates and where rationing decisions are faced commonly. Discussed concrete episodes, ethical dilemmas, and what was felt to be difficult. They identified lack of training on handling withdrawal of life-sustaining therapy and focused on family/societal considerations over patient/parent autonomy emphasizing physician decisional impact to family's reputation, economy, ability to provide (food, education) for other children, resource availability to other patients, and the use of resources in an underprivileged population. Denote "western" focus on rights of patients and families in contrast to Indian focus on siblings, parents, and society with high reluctance to allow parental opinion to influence physician decision. Suggest global beneficence to family, society and state replace the best-interest framework. Highlights limited western knowledge of the influence of culture on ethical reasoning.
Geevasinga 2007	Physician attitudes towards ventilatory support for spinal muscular atrophy type 1 in Australasia	Australia, New Zealand	Pediatric; SMA Type 1. Ventilation	Survey: Geneticists, ICU MDs, neurologists, and respiratory physicians, 92, Distributed through Royal Australasian College of Physicians. 59%	Low (1)	To assess physician views on ventilation approaches in SMA 1 patients. Half (47%) opposed invasive ventilation of children with SMA1 in intercurrent illnesses and 76% opposed long term invasive ventilatory support for chronic respiratory failure in SMA1 (10% agreed). Non-invasive ventilation (NIV) was supported for acute respiratory deteriorations by 85%, with 49% supporting long-term NIV. 76% disagreed all available treatments should be offered to all patients. 60% believed it is wrong to prolong life in SMA 1 due to lack of immediate hope for recovery/cure. Cost of care and bed availability were not held to be valid reasons to withhold. Decisions are guided by experience and prognostic knowledge. Most favored shared decision-making, but 57% believed they should retain the right to refuse to offer ventilator support. Attitudes varied by specialty.
Chapman 2009 ^{c,d} (survey of Extracorporeal Life Support Organization centers)	Patient selection for neonatal extracorporeal membrane oxygenation: beyond severity of illness	ELSO - 12% Europe, North America 84%	Pediatric. ECMO. ^f	Survey: ECMO Directors - Members of ELSO, 81, Publicized in ELSO newsletter and through electronic invitations, 65%	Medium (3)	Goal was to ascertain clinician attitudes regarding neonatal ECMO criteria. Generally (87%) decision-making is by consensus. There is variability in ECMO candidacy considerations across comorbidities. There was also variability in how conflicts between parents and ECMO team about a neonate's ECMO candidacy are approached. When ECMO is perceived to be beneficial, 22% of respondents stated they would never seek to override parental refusal of ECMO, with the same percentage stating they would always do so (15% reported initiating ECMO at least once despite parental objection; overriding more common in MAS). 57% of respondents reported that they had refused to provide ECMO to a child whose parents requested this therapy while 46% of respondents reported that they had treated a child with ECMO whom they felt was not an appropriate candidate, because of strong parental request to do so. Parental

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						perspectives and medical comorbidities influenced decisions. Primarily a discussion about conflict with minimal ethical analysis.
Dybwik 2011 ^b	Ethical challenges in home mechanical ventilation: a secondary analysis	Norway	Pediatric. Home mechanical ventilation.	Qualitative study: both family members of HMV patients - children and adults with neuromuscular diseases who depended full time on a ventilator and extensive care and health care workers (HCW). 21 focus group sessions and individual in-depth interviews.	Medium (4)	Qualitative analysis of focus group /individual interviews to extract themes describing ethical challenges associated with home ventilation. Ethical themes centered on decision-making: suitable patients for home ventilation, decisional authority, and how decisions relate to core ethical principles. Noted challenges balancing ethical principles - autonomy, beneficence, non-maleficence, best interests of patient vs family, paternalism, utilitarianism, quality of life, dignity, and justice. Justice considerations included resource repletion for others, equal access, and fairness impeded by variability in approaches.
Benson 2012	International survey of physician recommendation for tracheostomy for Spinal Muscular Atrophy Type I	USA, UK, New Zealand, Australia, Malaysia, India, South Africa, Canada, Singapore, and others within Europe, Latin America, Middle East, Asia, Africa	Pediatric; SMA. Ventilation and Tracheostomy	Survey: Clinicians who care for SMA 1 patients, 367, Email invitation based on membership in 3 professional societies, 21%	Medium (4)	To identify physician and geographic characteristics associated with recommending tracheostomy for SMA 1 patients, physician knowledge of consensus guidelines, and attitudes and experience with SMA and end-of-life care. Those physicians who agreed with life as sacred above all recommended tracheostomy. Overall, physicians felt that non-invasive ventilation is an acceptable intervention for an SMA I patient with acute or chronic respiratory failure, and intubation acceptable for acute respiratory failure. A smaller proportion (60%) agreed that tracheostomy/mechanical ventilation is an acceptable intervention for chronic respiratory failure. 95% agreed that parent's refusal for invasive ventilation in child SMA I should be upheld. 21% felt that the physician could refuse this invasive ventilation if requested. Physician and regional differences influenced recommendation for tracheostomy. Physicians from Commonwealth countries were less likely to recommend tracheostomy/ventilation than U.S. physicians (7% vs. 25%). Less years of experience, pediatric pulmonology specialty (vs PICU), agreement with a pro-life statement, and recommendation for non-invasive ventilation were predictive of recommendation for long-term invasive ventilation for SMA I.
Feltman 2012	Survey of neonatologists' attitudes toward limiting life-sustaining treatments in the neonatal intensive care unit	USA	Pediatric; Neonates. Ventilation. °	Survey: Neonatology attendings involved in end-of-life decisions in the NICU, 451, Members of AAP Perinatal Section via email invitation, 17%	Low (1)	Survey evaluating US neonatologist's agreement and comfort with ethical concepts and application in cases with preferences for limiting LSTs across scenarios. Withdrawing MV or vasopressors and providing pain control noncontroversial (<3%disagreed). Withdrawing MV while on paralytics was the only statement more respondents disagreed (46.8% vs 41.9). 1/3 indicated some disagreement withhold TPN/hydration and response associated with gender and religious affiliations. High agreement to recommending limitation of LSTs when QOL had a greater role than imminent death. Majority felt withhold and withdraw equivocal, some disagreed. All ascribe to the double effect doctrine.
Needle 2012	Influence of personal preferences for life-sustaining treatment on medical decision making among pediatric intensivists	USA	Pediatric. Ventilation.	Survey; Pediatric Intensivists, 471, via mail to the AMA Masterfile of PICU MDs, 30%	Low (1)	To characterize the relationship between physician's personal preferences for life-sustaining treatment and recommendations made to families. Physician's personal preferences (for their own life-sustaining treatment) affect whether they offer life-sustaining treatments to children. Physicians who had a higher Personal Preference Score (higher preference for their own life-sustaining treatment) were more likely to recommend a tracheostomy (1.38 [1.35–1.41]) and reintubation (1.87 [1.81–1.94]). Pediatric intensivists who had a lower Personal Preference Score (lower preference for life-sustaining treatment) were more likely to recommend that the patient not be reintubated if extubation failed (1.42 [1.39–1.46]) and to recommend Do Not Resuscitate status (1.34 [1.31–1.37]). Some influence of social demographics on relationships. As a result of this study, physicians might consider determining and utilizing their Personal Preference Score, and collaborate with colleagues of differing life-sustaining treatment preferences as part of professional development and skill enhancement around quality end-of life care delivery for patients in the PICU
Morparia 2012 ^c	Futility: unilateral decision making is not the default for pediatric intensivists	United States	Pediatric. Ventilation. °	Survey: Active members of the American Academy of Pediatrics Section of Critical Care, 266, Online survey emailed, 43%	Medium (3)	To elucidate the perspective of pediatric critical care physicians on "futility" and unilateral decision making. Clinical vignette ascertained whether or not respondents would order procedures (yes in 32-54%), enact unilateral DNAR (9-55% - highest when DNC met), how they would try to resolve the conflict, and what they would need to go against the family's wishes (most frequent were support of colleagues and hospital risk management / court order).

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Kuo 2017	Should Extracorporeal Membrane Oxygenation Be Offered? An International Survey	International	Pediatric; cardiopulmonary failure. ECMO	Survey; ICU MD, Surgeons, Neonatologists, Adult Specialists, 226, ECMO Program Directors from ELSO registry, 31%	Low (1)	To assess attitudes of ECMO program directors regarding eligibility for ECMO among children and factors influencing decision - in 10% of free texts parental preference was stated as critical for decision-making. Physician views varied widely with regard to which populations should be offered ECMO. Prognosis/reversibility and QOL were key factors in DM, and views varied by institution ECMO capability, subspecialty. Variability in whether respondents would offer ECMO to any of the 5 scenario patients ranged from 31% who would offer ECMO to a child with trisomy 18 to 76% who would offer ECMO to a child with prolonged cardiac arrest and indeterminate neurologic status. Even physicians practicing the same specialty sometimes held widely divergent opinions (50% of pediatric intensivists would offer ECMO for child with severe developmental delay, 50% would not. Factors such as quality of life and neurologic status influenced decision making and were used to support decisions for and against offering ECMO.
Biddison 2018 ^c	Scarce Resource Allocation During Disasters: A Mixed-Method Community Engagement Study	Maryland, USA	Allcomers; COVID-19. Ventilation. ^{e f}	Mixed methods: survey and forum, healthcare / disaster workers and the general public, recruited by mixed media and solicited for geographic diversity and website registration. 324 total: 83HCW 228 Public. RR not provided.	High (6)	Resource allocation prioritization principles discussed in general public forums then surveyed for how often each should be applied and which to be used 1st. Public opinion on prioritization principles in ventilator triage prioritizing short-term and long-term survival, but they indicated that these should not be the only factors driving decision-making during a crisis considering maximization life years, first come first served, fair innings / life cycle, instrumental values, lottery. - Prioritize those most likely to survive the current illness (71% often/always) Prioritize those most likely to live the longest after recovery (considering comorbid conditions 56%) Prioritize those who have lived fewer life stages (30% often always). Prioritize those who have particular instrumental value to others in a pandemic (48% often always). First come, first served (21% often/always), Lottery (4% often). Ventilator withdrawal and reallocation 58% general population; 79% HCW.
Linder 2018	Neonatal renal replacement therapy: An ethical reflection for a crucial decision	France	Pediatric; neonates with end stage kidney disease. Dialysis. ^f	Survey: Pediatric nephrologists, intensivists, and neonatologists, 134, online survey emailed physicians in France, RR not provided	Medium (4)	Clinician attitudes exploring the decision-making process when contemplating starting renal replacement therapy (RRT) or delivering palliative care to neonates or infants with pre-end-stage or end-stage renal disease and the ethical quandaries. Weight of influence on decision-making for comorbidities (neurological with differences between subspecialties and level of experience - nephrologists favored intervention, residents favored palliative care) and parental preferences. 76% agreed medical components should be a combined decision with intensivists and nephrologists. Some reflection on principlism, resource allocation, and fairness/variability as well as prognostic uncertainty/lack of consensus, role of shared decision making, palliative care / continuity of information provision.
Kaufman 2019	Compassionate deactivation of ventricular assist devices in children: A survey of pediatric ventricular assist device clinicians' perspectives and practices	US, Canada, and others represent 5% from UK, Europe, S America	Pediatric. VAD	Survey: Physicians, Nurses who care for VAD patients, 118, Distributed through ISHLT, International Consortium of Circulatory Assist Clinicians Pediatric Task Force, and Pediatric Cardiac Intensivist Society, RR not provided	Low (1)	To assess provider's understanding and perspectives on the indications for compassionate deactivation of VAD support discussing shared decision-making: Opinions on when to honor a parent's request and/or a child's request for VAD deactivation and gaps in knowledge of ethical and legal issues. Limited agreement on the indications for compassionate deactivation of VAD in children. Equal numbers of respondents "Agreed" and "Disagreed" that physician-directed VAD deactivation against a patient's and/or family's wishes is ethically appropriate if VAD is only prolonging dying. 56% "Agreed" that request of parent is an indication for VAD withdrawal, only 9% "Agreed" that this request should be honored at any time regardless of patient's age. In contrast, 84% reported that a child's request for VAD deactivation should be honored at any time Seventy-four, 84%, reported that professional society supported guidelines related to VAD deactivation in children would be useful in their clinical practice as only 38% felt fully informed regarding the ethical issues related to VAD deactivation and 15% the legal issues.
Schneider 2019	End-of-Life Decisions 20 Years after EURONIC: Neonatologists' Self-Reported Practices, Attitudes, and Treatment Choices in Germany, Switzerland, and Austria	Austria, Germany, Switzerland	Pediatric; Neonates. Ventilation	Survey: Neonatologists, 104, Survey emailed to those on national registries, 53%	Low (1)	To characterize changes in neonatologists' beliefs regarding withdrawing or withholding treatments between 1996 - 2016. Self-reported attitudes were similar across countries. Comparison with prior results revealed that in contemporary NICUs, less physicians agreed with the statements "Even with severe physical disability, some life is always better than no life at all." "The burden that a disabled child will represent for the family is not so relevant when making ethical decisions for that neonate" reflecting increasing relevance of child's "quality of life" and to the parental perspective. Overall increased willingness to involve parents into decisions about starting, continuing, or withdrawing intensive care and accepting the parents' decision - 80% would not override parental decisions. A lower proportion of physicians were concerned about abuse with WLST and were less likely to make an ethical distinction between withholding intensive care from the very beginning and its later withdrawal. Ethical analysis overall a primary goal related to Best Interests, Shared Decision Making, QOL, zone of discretion/autonomy, not focused on the device.

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MacGregor 2020	Extracorporeal Membrane Oxygenation for Pediatric Patients with Coronavirus Disease 2019-Related Illness	USA	Allcomers; COVID-19. ECMO	Survey: ECMO medical program directors or coordinators, 81, electronically contacted, 64%	Low (1)	Survey for ECMO guideline for use in COVID; 5 questions on key elements of that guideline and opinion on pediatric prioritization and unilateral DNR/ECPR. ECMO was offered for coronavirus disease 2019–positive pediatric patients: Venovenous 46/46 (100) Venoarterial 42/47 (89). Guideline restrictions were implemented for the use of ECMO: Terminal disease 45/47 (96%); Severe CNS damage 43/47 (92); Renal failure 9/47 (19); Multisystem organ failure 38/47 (81%); Mechanical ventilation for > 7 d 15/47 (32%). Additional opinion questions related to if children should be given higher priority over adult patients when rationing extracorporeal membrane oxygenation for COVID-19–related illnesses (68% agreed); Pediatric patients hospitalized with confirmed COVID-19 should be made DNR, regardless of the wishes of the patient or family (noted almost uniform disagreement 98% disagreed); Extracorporeal cardiopulmonary resuscitation should be offered to COVID-19–positive pediatric patients who experience a cardiac arrest (60% disagreed); variation in opinions on pediatrics prioritized over adults and 60% of program directors did not support the use of extracorporeal cardiopulmonary resuscitation for coronavirus disease
Matheny Antommara 2020 ^{c d} (Association Bioethics Program Directors)	Ventilator triage policies during the COVID-19 pandemic at U.S. hospitals associated with members of the Association of Bioethics program directors	USA	Allcomers; COVID-19. Ventilation	Survey: Bioethics Program Center Directors affiliated with hospitals, 67, electronically contact, 92%	Low (2)	To characterize the development of ventilator triage policies and compare policy content. Determining if ventilator allocation policy was developed; examining for variation in applied ethical principles. Requested institutional policies for ventilator triage with analysis of the conceptual and procedural content of triage protocols noting a lack of attention to fairness, equity, transparency, and mitigating bias as well as procedural deficits that will lead to inequities. The most frequently cited triage criteria were benefit (25 policies [96.2%]), need (14 [53.8%]), age (13 [50.0%]), conservation of resources (10 [38.5%]), and lottery (9 [34.6%]). Twenty-one (80.8%) policies use scoring systems, and 20 of these (95.2%) use a version of the SOFA score. Thirteen (50.0% of all policies) require or recommend those making triage decisions not be involved in direct patient care, but only 2 (7.7%) require that their decisions be blinded. For triage team's composition all require or recommend a physician member, 87.0% a nurse, 69.6% an ethicist, 34.8% a chaplain, and 34.8% a respiratory therapist.
Wilkinson 2020 ^e	Which factors should be included in triage? An online survey of the attitudes of the UK general public to pandemic triage dilemmas	UK	Allcomers; COVID-19. Ventilation ^e	Survey: general public, 763, online format recruited for demographic variables to be generalizable; excluded if lack of measured attention to Qs based on response times; #s chosen based on power calculations to find significant difference	Low (2)	To understand general public opinion on triage allocation decisions (ventilator allocation scenarios to see public preference for resource prioritization) and literature review of 12 survey papers on public opinion triage (not all specific to devices). The public prioritized largely on utilitarian basis, favored lottery when outcome/survival differences became minimal. Patient vignettes differed in: chance of survival, life expectancy, age, expected length of treatment, disability, and degree of frailty. Respondents were given the option of choosing one patient to treat or tossing a coin to decide. Most respondents prioritized patients who had a higher chance of survival (72%–93%), longer life expectancy (78%–83%), required shorter duration of treatment (88%–94%), were younger (71%–79%) or had a lesser degree of frailty (60%–69%, all p<0.001). Where there was a small difference between two patients, a larger proportion elected to toss a coin to decide which patient to treat. A majority (58%–86%) were prepared to withdraw treatment from a patient in intensive care who had a lower chance of survival than another patient currently presenting with COVID-19. Respondents also indicated a willingness to give higher priority to healthcare workers and to patients with young children. Results largely matches triage policies in UK.
Abbasi-Kangevari 2021 ^b	Public Opinion on Priorities Toward Fair Allocation of Ventilators During COVID-19 Pandemic: A Nationwide Survey	Iran	Allcomers; COVID-19. Ventilation	Survey: Both clinicians and general public, 2043, 13% participants healthcare workers, RR not provided	Low (0)	Iranian public priorities for ventilator allocation in COVID-19 based on set questions considering age groups, gender, Iranian nationality, Muslim religion, MD caring for COVID-19, MD not caring for COVID-19, RN for COVID-19, RN not for COVID-19, other healthcare professional, high SES, high government position, novel research position, celebrity, unemployment, pregnancy, having <2yo child, smoking, drug abuse, having underlying disease, immunocompromise, malignancy, end-stage status, obesity. No preference was given religion or nationality. Very high priority was assigned for pregnancy and having <2yr old children and high priority for physicians and nurses of patients with COVID-19, patients with novel research position, those aged <40 years (no preference for children specifically), those with underlying disease, immunocompromise status, and malignancy. Age>80 was the only factor participants assigned low priority. Belief socioeconomic factors should not be involved in prioritizing mechanical ventilators at the time of resources scarcity.
Gandhi 2021 ^c	Variation in COVID-19 Resource Allocation Protocols and Potential Implementation in	Chicago, USA	Allcomers; COVID-19. Ventilation. ^e	Survey; physician or ethicist with access to their hospital's ventilator allocation policy/plan; part 2 to triage officers. Email with link to redcap	High (6)	Ascertain variation in triage policies in Chicago; ascertain variation in prioritization of patient vignettes. Discusses ethical allocation of devices/ICU care in scarcity outlining wide variation in resource allocation policy substance and application based on responses for hypothetical patients (even within center across profession, age, risk of mortality, comorbidities and included 1 pediatric patient - 12 yo with severe cognitive disabilities) and discussed how this is worrisome as it may increase disparities and undermine public trust and is not publicly accountable. Ethical analysis overall a primary goal, not focused on the

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	the Chicago Metropolitan Area			survey. 44% (8/18 hospitals), 90% (9/10) second survey (triage officers).		device but quality analysis of ethical allocation of devices/ICU care in scarcity, social justice, equity, risk of harm to vulnerable, public trust, public health ethics, transparency, and accountability.
Ashuntantang 2022 ^c	Bedside rationing and moral distress in nephrologists in sub-Saharan Africa	Saharan Africa	Allcomers; acute kidney injury (AKI) or end-stage kidney failure (ESKF). Dialysis	Survey: Nephrologists in Africa, 40 by random selection/meeting attendance with RR not provided	High (6)	To assess challenges faced by nephrologists in Africa for patients needing dialysis; how they respond to bedside rationing situations. More than 1/3 reporting having to choose between patients for dialysis. Burdens related to ability to provide dialysis, weighing clinical benefits versus harm, weighing family/economic benefits versus harm, and benefits versus harm between patients with similar needs; tension in navigating between the patient's resource limitations and those of the institution. The burden of bedside rationing of care may be reduced by development/implementation of national/institutional guidance on resource allocation. Most respondents in this study articulated that guidance on dialysis allocation was lacking, and that guidelines are needed to improve transparency of criteria governing access to dialysis, and consistency and fairness of decision-making at the bedside, when resources are limited. Discussion of the moral distress / burden of decisions for providers in addition to accountability for reasonableness, principlism.
Kappes 2022 ^c	Race and resource allocation: an online survey of US and UK adults' attitudes toward COVID-19 ventilator and vaccine distribution	US UK	Allcomers; COVID-19. Ventilation	Survey: General public, representative sample recruited from large market research panels and paid. USA n=1296, UK n=1284. RR not provided	Medium (4)	To examine determinants of prioritization: the relative weight given by the public to race, obesity, sex, and survival and to explore whether prioritization preferences differed between racial groups, socioeconomic status or political orientations or were related to stereotypes and covert racial attitudes using scenarios. Participants prioritized patients with higher chances of survival - were highly sensitive to small differences in predicted outcome. Relatively few respondents endorsed priority for ventilators for those from racial minorities. Overall race and sex did not affect allocation decisions for ventilators, but obesity did so negatively. We also found support from a large minority for inclusion of race as a tie-break consideration in vaccine allocation. Country of participants (US vs UK) did not alter allocation attitudes. Age, gender, socioeconomic status, education, and political ideology did not impact ventilator allocation attitudes. Race of participant impacted ventilator allocation attitudes in the UK but not in the USA - In the UK, Asian and black participants had more positive attitudes toward race in allocation of ventilators than white participants.
Knoepke 2022	Variation in Left Ventricular Assist Device Postdischarge Caregiver Requirements: Results from a Mixed-Methods Study with Equity Implications	USA	Pediatric. VAD	Mixed methods: Survey and interviews of Social Workers. Nationwide online survey of advanced heart failure social workers distributed through the Society for Transplant Social Workers. 67 survey responses (response rate 47%) and 22 interviews.	Medium (3)	To describe assessment structure and policies guiding LVAD candidacy; describe how caregiving plan adequacy impacts LVAD candidacy with a focus on equity. Caregiving plan inadequacy was the most common psychosocial contraindication however assessment/operationalization/degree of flexibility were different between centers with implications for women, and those with lower SES or diverse race/ethnic backgrounds. Particularly challenging was lack true empirical basis to standards and lack of predictive value that duration of caregiving has for outcomes in the LVAD population. Emphasizes need to standardize assessment, and support medically appropriate patients with strained social resources. Future research should investigate the clinical viability of such possibilities, as they stand a chance to mitigate unintentional, historically grounded, systemic racism and classism by limiting more restrictive caregiver duration requirements to patients whose safety would benefit from extended in-home support.
Friedland-Little 2022 ^d (Advanced Cardiac Therapies Improving Outcomes Network)	Patient and Device Selection in Pediatric MCS: A Review of Current Consensus and Unsettled Questions	USA	Pediatric. VAD	Survey; Cardiologists, VAD coordinators and surgeons at VAD centers at ACTION member sites. 22 responses. RR not provided	Low (1)	To assess physician practice regarding VAD implant in children via clinical decision-making survey and provide an overview of contemporary approaches to patient and device selection, highlighting specific populations for whom there is not a consensus approach to achieving reliably good VAD outcomes, as these populations may benefit most from future research and quality improvement efforts directed toward identifying best practice.

^a All were multiauthor.

^b Single center (vs multicenter),

^c Bioethics affiliation explicitly stated

^d Representing a society (name)

^e Also reference general ICU therapies

^f Ethical Analysis of the Device as the primary goal

Supplemental Table 5: Non-empiric Citations

Study ^{abcd}	Title	Country/ies Represented	Population and Device	Quality of ethical analysis (score/7)	Summary
Young 2004	Providing life-saving health care to undocumented children: Controversies and ethical issues	United States	Pediatric; "undocumented" pediatric immigrants. Dialysis and renal transplant. ^e	Low (1)	There is an urgent need to prioritize researching initiatives and developing ethically sound policies to address the delivery and financing of expensive lifesaving health care for children who rise in the US and are not documented citizens.
Mitchell 2006 ^{ab}	Spinal muscular atrophy type 1: What are the ethics and practicality of respiratory support?	Canada	Pediatric; SMA Type 1. Ventilation (invasive and non-invasive) ^f	Low (1)	Medical decision making regarding potential options for respiratory support for children with SMA Type 1 is complex. Physicians play an important role in communicating with families regarding potential options, ranging from invasive ventilation to palliative and supportive care. Optimal communication is necessary where physicians have insight into their own biases and recognize that an assessment of doing what is in the "best interest" of the child is challenging. Honesty, compassion, and devotion, in addition to acknowledging the value of the parent-child relationship are important qualities to uphold when guiding families.
Trachsel 2006 ^b	Indications for tracheostomy in children	Switzerland	Pediatric; chronic respiratory failure. Ventilation and tracheostomy	Low (1)	Medical decision making regarding placement of tracheostomy in children is challenging due to the increasing medical complexity of pediatric disease processes. These decisions often require a multi-disciplinary approach prior to medical emergencies. Alternative therapies, including non-invasive ventilation, may also be considered.
Kilham 2007 ^d	Spinal muscular atrophy type 1: Is long-term mechanical ventilation ethical? Commentary	Australia	Pediatric; SMA Type 1. Ventilation and tracheostomy ^f	High (7)	Children with SMA Type 1 should not be offered long term invasive mechanical ventilation because suffering outweighs the potential benefit of prolonging life and is an inappropriate utilization for health care resources. If parents disagree of a child with SMA Type 1 disagree, physicians should be prepared to involve the court to help decide the best course of action for the child.
Crow 2009	Extracorporeal life support: utilization, cost, controversy, and ethics of trying to save lives	United States	Allcomers; ECMO ^f	Medium (5)	Refinement of patient selection criteria and outcome evaluation of outcomes are essential for thoughtful utilization of a costly therapy, ECMO, to maintain balance between prolonging life and allowing for a chance of quality of life in recovery from critical illness.
Bernat 2010 ^d	The circulatory-respiratory determination of death in organ donation	United States	Allcomers; Patients dying a circulatory-respiratory death (DCDD). ECMO ^f	Medium (4)	There is a call for greater precision around determination of death by circulatory-respiratory criteria and establishment of consistent hospital protocols to guide ethical practices in organ donation after circulatory determination of death (DCDD). The use of modified ECMO in DCDD has numerous ethical considerations due to potential risk of violation of the dead donor rule. At a minimum, families of DCDD donors should be informed of potential procedures and have the option to opt out.
Kissoon 2010	Use of extracorporeal technology during pandemics: ethical and staffing considerations	Canada	Pediatric; ECMO ^f	Medium (3)	Allocation of pediatric ECMO during pandemics is complex and requires a rationing plan based on a sound ethical framework.
Zaritsky 2011	Peritoneal dialysis in infants and young children	United States	Pediatric; end stage kidney disease. Dialysis	Low (1)	Collaborative decision making with the family is complex in regard to initiation of peritoneal dialysis for infants and young children with chronic kidney disease. Unique ethical and technical considerations need to be addressed.
Rul 2012	Tracheotomy and children with spinal muscular atrophy type 1: ethical considerations in the French context	France	Pediatric; SMA Type 1. Ventilation and tracheostomy ^f	Medium (4)	Medical decision making regarding tracheotomy in children with SMA Type 1 is complex requiring careful analysis of numerous ethical considerations, incorporation of family and child perspective (when feasible), and assessment of the societal context, including financial cost to the family.
Mavroudis 2012 ^d	Ethical considerations for post-cardiotomy extracorporeal membrane oxygenation	United States	Pediatric; post-cardiotomy heart disease. ECMO ^f	Medium (5)	Moral risks arise when deciding about ECMO pre, during, and post pediatric cardiac surgery. These moral risks should be carefully considered by surgeons when they consider ECMO utilization in their patients.
Sprung 2014	The Durban World Congress Ethics Round Table Conference Report: I. Differences between withholding and withdrawing life-sustaining treatments	Israel, South Africa, Canada, German, Australia, China,	Allcomers; Ventilation. ^f	Medium (4)	Invited faculty of the World Federation of Societies of Intensive and Critical Care Medicine Congress in 2013 with an interest in ethics participated in a survey and round table discussion regarding ethical considerations in critical care. Majority of participants concluded that there is no moral difference between withholding (not starting or escalating) and withdrawing (actively stopping) a life sustaining treatment.

Supplemental Table 5: Non-empiric Citations

		Netherlands, France			
Ryan 2015 ^{a b}	Extracorporeal membrane oxygenation for pediatric cardiac arrest	United States	Pediatric; cardiac arrest - ECPR. ECMO ^f	Low (1)	Pediatric extracorporeal cardiopulmonary resuscitation (ECPR) invokes numerous ethical considerations including when to initiate ECPR and withdraw ECMO. A holistic approach to care and support for the family is essential under these circumstances.
duToit 2016 ^{b d}	The Ethics of Continued Life-Sustaining Treatment for those Diagnosed as Brain-dead	United States	Allcomers; death by neurologic criteria. Ventilation. ^e	High (6)	Continued physiologic support of patients diagnosed as brain dead is ethically permissible when families disagree that brain death is equivalent to death and request to preserve the life of their loved one. Policy should be developed to allow family members of brain dead loved ones to request ongoing medical management (e.g., mechanical ventilation, nutrition) for their loved one. Transfer of these patients to facilities where ongoing medical needs can be managed should be facilitated for these families.
Carter 2017 ^{a b}	Ethical Considerations for Care of the Child Undergoing Extracorporeal Membrane Oxygenation	United States	Pediatric; congenital heart disease. ECMO ^f	Medium (4)	Principlism is an ethical framework that may be used to navigate difficult decisions regarding ECMO utilization for children with congenital heart disease
Jericho 2018 ^{a b}	Withdrawal of life-sustaining therapy	United States	Allcomers; VAD. ^e	Low (0)	Withdrawal of life sustaining therapies should be discussed as a potential option for patients receiving advanced medical therapies. Discussion regarding deactivation of LVAD should occur prior to utilization. In general, clinician exploration of the wishes and spiritual beliefs of the patient and the patient's family is important to improve trust and provide support for patients and families when making decisions regarding withdrawal of life sustaining therapies.
Kirsch 2018 ^d	Ethical and end of life considerations for neonates requiring ECMO support	Canada, United States	Pediatric; neonates with cardiac and/or respiratory failure. ECMO ^f	High (7)	Initiation and discontinuation of ECMO in neonates invokes numerous ethical considerations, especially when the patient will not likely survive. In these circumstances, a palliative care approach may be beneficial to help guide the family in confronting the difficult decision to discontinue ECMO.
Choong 2018 ^b	Re A (A Child) and the United Kingdom Code of Practice for the Diagnosis and Confirmation of Death: Should a Secular Construct of Death Override Religious Values in a Pluralistic Society?	United Kingdom	Allcomers; death by neurologic criteria. Ventilation. ^e	Medium (4)	Pluralistic societies (such as the UK) should accommodate the views of families who object to the medical diagnosis of death by neurological criteria (DNC) based on religious values regarding the sanctity of life. Legal recognition of this accommodation is necessary to respect the moral obligation of society to honor and respect diverse religious convictions and to facilitate cultural sensitivity and compassionate medical care.
Harris 2019 ^{c d}	Increasing access to integrated ESKD care as part of universal health coverage. (International Society of Nephrology)	Australia, USA, India, UK, Canada, Belgium, Mexico, Switzerland, South Africa, Brazil, Uruguay, Kenya, Taiwan, Chile	Allcomers; end stage renal disease. Dialysis	Medium (4)	Ninety-two international individuals (including representation from low-middle income countries) with diverse expertise participated in a summit designed to describe the global burden of end stage kidney disease (ESKD) in adults and children and to design a strategic plan to improve worldwide access to integrated ESKD care. To promote ESKD ethics, an increased awareness of ethical issues in ESKD care among healthcare workers, development of specific ethical guidelines for ESKD care, and additional research and interventions in ethical issues in ESKD care are necessary.
Brookes 2019 ^{a b}	Long-term ventilation in children	UK	Pediatric; chronic respiratory failure. Ventilation, non-invasive ventilation and tracheostomy	Low (1)	Medical decision making regarding long term ventilation (non-invasive and invasive) for children ranges from simple to complex and should be performed via a "prescribed ethical framework". For patients with complex conditions, the decision making regarding long term ventilation may be complex and requires an assessment of potential burden of treatment weighed against the potential benefit of "reasonable" quality of life. This decision often requires incorporation of multi-disciplinary expertise and families' hopes and wishes for their children. Discharge planning is often complex, requiring extensive education, planning, and identification of resources to support patients outside of the hospital setting.

Supplemental Table 5: Non-empiric Citations

Joong 2019 ^b	Providing Compassionate End of Life Care in the Setting of Mechanical Circulatory Support	United States	Pediatric; heart failure. VAD, ECMO	Medium (4)	Providing compassionate end of life care for patients on mechanical circulatory support (extracorporeal membrane oxygenation and ventricular assist devices) requires a multi-disciplinary approach, early consultation with palliative care, and utilization of shared decision making, including frequent conversations, honest communication about prognosis and clinical pathways, and eliciting family goals of care.
Di Nardo 2019 ^d	Principlism and personalism, comparing two ethical models applied clinically in neonates undergoing extracorporeal membrane oxygenation support	Italy, Netherlands Canada	Pediatric; ECMO ^f	High (6)	Principlism and Personalism are two ethical frameworks that may be used to help guide utilization of ECMO in neonates
Antiel 2020	Should Pediatric Patients Be Prioritized When Rationing Life-Saving Treatments During COVID-19 Pandemic	USA	Pediatric; COVID-19. ECMO ^e	Medium (4)	Numerous ethical principles may be applied to guide allocation of scarce medical resources, including prognosis, lotteries, sickest-first, social worth, essential worker prioritization, and prospective instrumental value. A complete lives system of resource allocation where medical resources are allocated to younger patients first to save more "life-years" is ethically justified especially when instituted in combination with other factors, such as prognosis.
Chu 2020	Reallocating ventilators during the coronavirus disease 2019 pandemic: Is it ethical?	USA	Allcomers; COVID-19. Ventilation ^f	Low (0)	When medical resources are scarce, such as during the COVID-19 pandemic, discontinuation of mechanical ventilation to re-allocate the ventilator to another patient is unethical unless there is patient/family consensus to withdraw the ventilator. Reallocation of ventilators to benefit society or the "greater good" is "abhorrent" and is against the Hippocratic oath to do no harm and deontological duty not to kill. The decision to withdraw mechanical ventilation should always be made jointly between the patient's family members and the health care team, regardless of resource scarcity.
Truog 2020 ^{b d}	The Toughest Triage - Allocating Ventilators in a Pandemic	USA	Allcomers; COVID-19. Ventilation ^f	Medium (5)	During a pandemic, creation of a "triage committee" made up of "respected clinicians and leaders among peers and the medical community" to ration mechanical ventilators (often a "life or death choice") has several advantages. First, clinicians may maintain their role as fiduciary advocates for their patients. Second, the committee has flexibility to consider unique factors, such as the fluctuation in availability of ventilators, in their decisions. Finally, the committee removes the emotional and moral burden from individual clinicians of making decisions that may directly harm patients. Communicating with families regarding the decisions of the triage committee and providing end of life care should be tasks delegated to the triage committee or other teams, such as palliative care, who have expertise in end of life care.
Emanuel 2020 ^d	Fair Allocation of Scarce Medical Resources in the Time of Covid-19	USA	Allcomers; COVID-19. Ventilation ^e	High (6)	Six recommendations are provided to guide policy development regarding allocation of scarce medical resources fairly and consistently during the COVID-19 pandemic: 1) Maximize benefits, specifically aim at saving the most lives and maximizing improvements in individuals' post-treatment length of life; 2) Critical COVID-19 resources (e.g., testing, personal protective equipment, ICU beds, vaccines, etc.) should be allocated first to health care providers and those who keep the health care infrastructure running; 3) For patients with similar prognosis, random allocation through lottery should be invoked to treat patients "equally"; 4) Prioritization guidelines should differ based on intervention and should be modified according to changing scientific evidence; 5) Individuals who participate in research to evaluate the safety and effectiveness of vaccines should receive some priority for COVID-19 interventions; 6) There should be no difference between allocation of scarce resources between patients with COVID-19 and those with other medical conditions as allocation should be determined based on maximizing benefit to the greatest number of patients.
White 2020 ^d	A Framework for Rationing Ventilators and Critical Care Beds During the COVID-19 Pandemic	USA	Allcomers; COVID-19. Ventilation ^e	High (6)	To fairly allocate scarce resources during the COVID-19 pandemic, multiple criteria should be integrated into a single tool ("multi-principle allocation framework") to prioritize which patients should receive ventilators. This allocation framework prioritizes: 1) patients with greatest likelihood of surviving to hospital discharge, and 2) patients with greater likelihood of achieving longer-term survival based on presence or absence of comorbid conditions that impact survival. In addition to this framework, more guidance is needed to improve re-allocation of ventilators, including improved communication with families, extending the length of trial of mechanical ventilation to prevent rapid cycling, creation of a triage team to help guide decisions, and engaging with palliative care for

Supplemental Table 5: Non-empiric Citations

					terminal extubations to optimize patient comfort and support for families. Allocation schemes that categorically exclude large groups of patients based on co-morbid conditions or solely focus on survival to hospital discharge are ethically insufficient and problematic.
Martin 2020 ^{c d}	Ethical challenges in nephrology: a call for action. (Joint Working Group on Ethical Issues in Nephrology; American Society Nephrology, European Renal Association, International Society of Nephrology)	Australia, India, UK, Belgium, Italy, USA	Allcomers; end stage renal disease. Dialysis ^f	Medium (4)	In order to develop better training and support of clinicians and contribute to ethical policy making in nephrology, three academic societies (The American Society of Nephrology, the European Renal Association-European Dialysis and Transplant Association, and the International Society of Nephrology Joint Working Group on Ethical Issues in Nephrology) identified and discussed several areas of ethical concern that require additional analysis and collaborative action, including: 1) equity in access to kidney failure care, 2) avoiding futile dialysis, 3) reducing dialysis costs, 4) shared decision-making in kidney failure care, 5) living donor risk evaluation and decision-making, 6) priority setting in kidney disease prevention and care, 7) ethical implications of genetic kidney diseases, 8) responsible advocacy for kidney health, and 9) management of conflicts of interest.
Kalantar-Zadeh 2020 ^d	Ensuring choice for people with kidney Failure - Dialysis, supportive care, and hope	United States	Allcomers; end stage renal disease. Dialysis ^f	Medium (4)	Patients with end stage kidney disease should be offered more than the perceived dichotomy of palliative care without dialysis versus dialysis. Rather, there is a middle zone where patients can receive "less aggressive" dialysis and palliative care simultaneously, such as optimizing holistic medical management as long as possible prior to initiation of dialysis, promoting a gradual transition to dialysis, or offering palliative dialysis with a decrease in frequency and intensity over time with the goal of improving comfort. Increasing the range of options for patients with end stage kidney disease through collaboration and amended policies may lend to improved quality of care for patients that better aligns with their goals.
Luyckx 2020 ^{c d}	Developing the ethical framework of end-stage kidney disease care: from practice to policy. (International Society of Nephrology),	Switzerland, France, US, Australia, South Africa, Canada, Hong Kong, Bolivia, Argentina, Thailand, Nigeria, Malaysia, India, UK, Singapore, Ethiopia,	Allcomers; end stage renal disease. Dialysis ^f	High (6)	There are significant inequities in access to end stage kidney disease (ESKD) care globally. Developing the ethics of end stage kidney disease (ESKD) care is necessary to provide ethical guidance in decision making and support the ethical practice of delivery of ESKD care. Development of an international professional statement that articulates fundamental norms in ESKD care in addition to increasing the visibility of ethics in ESKD care by supporting education and work on ethical challenges in the delivery of ESKD care are important action steps to guide policy and practice.
Carlisle 2020 ^{b d}	Emerging issues in the ethical utilization of pediatric extracorporeal membrane oxygenation	United States	Pediatric; ECMO ^f	Medium (4)	Provides ethical analysis of three distinct areas in ECMO, including: 1) clinical settings where ECMO is obligatory; 2) decision making regarding discontinuation of ECMO; and 3) just allocation of ECMO and equitable access within the healthcare system
Kucewicz-Czech 2021 ^b	Triage during the COVID-19 pandemic	Poland	Allcomers; COVID-19. Ventilation, ECMO and RRT	Medium (3)	Describes the underpinnings of triage principles for allocation of scarce resources, emphasizing that COVID-19 pandemic triage decisions should be based on a protocol, ideally using a committee approach. In assessing the need for medical measures and therapy benefits, the first step is to consider exclusion criteria and the risk of death. The next step includes sequential clinical assessment, repeatable at defined intervals with priority given to those who would benefit most.
Teitelbaum 2021 ^c	KDOQI US Commentary on the 2020 ISPD Practice Recommendations for Prescribing High-Quality Goal-Directed Peritoneal Dialysis. (National Kidney Foundation and Kidney Disease Outcomes Quality Initiative)	USA	Allcomers; end stage renal disease. Dialysis (peritoneal)	Low (0)	United States commentary is provided regarding the 2020 International Society for Peritoneal Dialysis (ISPD) practice recommendations. The international guideline discusses three relevant recommendations related to peritoneal dialysis (PD) and ethical use. First, peritoneal dialysis should be prescribed using shared decision-making between the person receiving PD and the health care team. The aim is to establish realistic goals that (1) maintain quality of life for the person doing PD as much as possible by enabling them to meet their life goals, (2) minimize symptoms and treatment burden while (3) ensuring high-quality care is provided. Second, the PD prescription should consider the local country resources, the wishes and lifestyle considerations of people needing treatment,

Supplemental Table 5: Non-empiric Citations

					including those of their families/caregivers', especially if aiding in their care. Third, for some people who require dialysis and who have a poor prognosis, there may be a quality of life benefit from a reduced dialysis prescription to minimize the burden of treatment.
Kochan 2021 ^d	Disagreement about surgical intervention in trisomy 18	United States	Pediatric; Trisomy 18. Ventilation, tracheostomy	High (7)	Life sustaining treatments, including tracheotomy and gastrostomy tube, when requested by parents after counseling, should be offered for children with Trisomy 13 and Trisomy 18, as these are no longer considered universally fatal genetic syndromes.
Luyckx 2021	Priority Setting as an Ethical Imperative in Managing Global Dialysis Access and Improving Kidney Care	United States, South Africa	Allcomers; end stage renal disease. Dialysis ^f	Medium (4)	Based on the ethical framework of an individual's right to human health, Universal Health Coverage (UHC) is necessary to ensure equitable access to priority health services for all. Unfortunately, in most low-middle income countries, dialysis is not accessible to many with chronic kidney disease, which is a high-burden condition. Physicians and health care workers on the front lines often have to make rationing decisions. However, a multi-stakeholder approach to priority setting regarding dialysis, as an expensive yet important therapy, is required to develop transparent, appropriate, and just guidance and policy to allocate resources fairly and improve equitable access to care in resource limited settings.
Wearne 2021	Radically Rethinking Renal Supportive and Palliative Care in South Africa	South Africa	Allcomers; end stage renal disease. Dialysis ^f	Low (0)	Access to dialysis for adults and children with end stage kidney disease is limited in South Africa, which requires rationing of a scarce resource. Explicit guidelines and innovative ways to provide access to renal supportive care programs, for patients who qualify for dialysis, and palliative care, for patients who cannot access dialysis, are necessary to optimally manage patients with end stage kidney disease and ensure non-abandonment. Importantly, improving access to palliative care should not be an excuse to avoid improving preventative or curative care.
Moynihan 2022 ^d	Discretion Over Discrimination: Toward Good Decisions for Extracorporeal Membrane Oxygenation Use in Patients with Neurological Comorbidities	Australia, USA, Canada	Pediatric; neurologic co-morbidities. ECMO ^f	High (6)	Commentary response to an empiric manuscript that revealed similar outcomes for children with and without neurologic co-morbidities who were supported with ECMO. Neurologic diagnoses should not be indiscriminately applied as exclusion criteria for ECMO support and clinicians should use good judgement in counseling patients and families on what they recommend, including an explicit discussion regarding an honest assessment of the potential benefits and burdens of ECMO use.
Moynihan 2022 ^d	Extracorporeal Membrane Oxygenation Candidacy Decisions: An Argument for a Process-Based Longitudinal Approach	Australia, USA, Canada	Pediatric; ECMO ^f	High (6)	Organizations should develop procedurally fair processes for ECMO decision-making, including for initiation and discontinuation, that are collaborative, interdisciplinary, and aligned with principles of transparency, relevant reasoning, accountability, review, and appeal. These processes should not be tied to a particular time point and should be revisited along a patient's illness trajectory.
Butler 2022 ^d	Staffing crisis capacity: a different approach to healthcare resource allocation for a different type of scarce resource	USA (Seattle, WA)	Allcomers; ECMO, ventilation	Medium (4)	Instituting standardized, transparent, and operational policies and plans are important to support staffing and maintain limited staff resources when resources are scarce. Alternative approaches to allocation of limited staffing exist, including crisis capacity strategies such as: 1) prioritizing "worst off" patients for hospitalization while limiting hospital admission for patients with low clinical risk, 2) prioritizing staff interventions with high near-term value and restricting selected interventions and devices that require substantial staff time or energy and offer minimal near term patient benefit, such as ECMO.

^a Single author (vs multiple authors)

^b Single center (vs multicenter)

^c Represented a society

^d Bioethics affiliation explicitly stated

^e Also reference general ICU therapies

^f Ethical Analysis of the Device the primary goal