

Strategic and principled approach to the ethical challenges of epilepsy monitoring unit triage

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ABSTRACT

Electroencephalographic monitoring provides critical diagnostic and management information about patients with epilepsy and seizure mimics. Admission to an epilepsy monitoring unit (EMU) is the gold standard for such monitoring in major medical facilities worldwide. In many countries, access can be challenged by limited resources compared to need. Today, triaging admission to such units is generally approached by unwritten protocols that vary by institution. In the absence of explicit guidance, decisions can be ethically taxing and are easy to challenge. In an effort to address this gap, we propose a two-component approach to EMU triage that takes into account the unique landscape of epilepsy monitoring informed by triage literature from other areas of medicine. Through the strategic component, we focus on the EMU wait list management infrastructure at the institutional level. Through the principled component, we apply a combination of the ethical principles of prioritarianism, utilitarianism and justice to triage; and we use individual case examples to illustrate how they apply. The effective implementation of this approach to specific epilepsy centres will need to be customised to the nuances of different settings, including diverse practice patterns, patient populations and constraints on resource distribution, but the conceptual consolidation of its components can alleviate some of the pressures imposed by the complex decisions involved in EMU triage.

INTRODUCTION

Clinicians triage patients in medicine every day.¹ Guidance on best practices serves to eliminate bias and increase trust in the delivery of healthcare in both routine and challenging circumstances.¹ The management of patients with epilepsy represents a major pressure on resource allocation in healthcare and could benefit significantly from a tightening of care processes.^{2–5} Indeed, the epilepsy literature increasingly advocates for early referral of patients with drug-resistant epilepsy (DRE) to dedicated epilepsy centres for resource-intensive, continuous video-EEG monitoring and potential life-saving surgical intervention. Additionally, timely epilepsy monitoring unit (EMU) spell characterisation allows for harm reduction through the discontinuation of potentially unnecessary treatments and promotes beneficence through improved patient access to alternate diagnosis-specific treatments in the event that epilepsy is disproven. Accompanying strategies to inform wait list management protocols and triage have not been formalised. EMU wait lists are often adopted passively, out of need and with limited resources to allocate towards process improvements. Until epilepsy resources are available to

meet demand, strategic and principled guidance can beneficially inform responses to inequalities, risks and benefits to patients, and differing societal values.¹

ETHICS CHALLENGES UNIQUE TO EPILEPSY MONITORING UNITS

Epilepsy is a global concern, with a high societal cost that is concentrated in the approximately one in three patients who have uncontrolled seizures despite adequate trials of anti-seizure medications.^{6–8} Access to surgical therapy, which offers up to a 50%–80% rate of freedom from disabling seizures for patients with focal-onset DRE, features particularly tight EMU bottlenecks that can result in major diagnostic and subsequent treatment delays.^{4 7 9 10} In one study that compared two epilepsy centres in Canada and Mexico, the average wait time from first epilepsy consult to videoelectroencephalographic (EEG) was reported as 15.1 months and 27.4 months in Canadian and Mexican centres, respectively.¹¹ A cross-sectional study of all EMUs in Saudi Arabia reported an average wait time of 11 weeks for EMU evaluation.¹² Unlike other wait times in epilepsy care pathways, such as time-to-referral or access to neurosurgical resources, epileptologists can directly control the management of EMU wait lists, providing a key opportunity for agency.

Evaluation for epilepsy surgery often requires admission to a specialised, resource-intensive inpatient EMU for continuous video-EEG monitoring. Costs vary between healthcare systems; in the USA, they average USD\$35000–USD\$40000 for a single evaluation.¹³ Although EMUs are expensive to operate, they are the gold standard for localising seizures, distinguishing seizures from their mimics and optimising treatment.¹⁴ In addition, EMU evaluation is considered an ethically permissible alternative to the use of induction techniques for confirming a diagnosis of psychogenic non-epileptiform seizures (PNES).¹⁵ Delays to diagnosis of PNES are common and lead to many adverse outcomes including increased risk of medication side effects such as teratogenicity and cognitive impairment, unnecessary intubation and intensive care unit admission and reduced likelihood of remission.^{16–18} If implemented appropriately, EMU monitoring results in improved patient care and cost savings overall.^{19 20} EMU admission is also safer and more useful in capturing spells than bedside video-EEG monitoring.¹⁴ EMU monitoring is not always necessary, however, there may be reasonable alternatives for certain patient populations, such as ambulatory



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Table 1 Illustrative cases observed at Vancouver General Hospital, British Columbia, Canada (2019 to present)

Clinical course	Medicoethical issues
Observational case 1: Rare seizures and enthusiasm for surgery	
Longstanding non-lesional focal epilepsy	Psychosocial suffering despite low seizure burden
Rare breakthrough seizures on antiseizure medications	Low seizure frequency predicts longer monitoring time (prolonged EMU admission)
Medication intolerance	Use of potentially harmful seizure provocative manoeuvres such as sleep deprivation and medication withdrawal is expected
Unable to drive	Potential for curative surgery
Severe depression	
Keen to undergo surgery	
Clinical suspicion for focal epilepsy that may respond to surgery	
Observational case 2: Psychogenic non-epileptiform seizures (PNES) with high morbidity and lack of mental health follow-up	
Functional neurological disorder and longstanding structural focal epilepsy	High seizure burden predicts shorter duration of EMU admission
Prior EMU evaluation documenting PNES as primary cause of disability, yet interictal epileptiform discharges correspond to structural abnormality seen on MRI	Diagnostic uncertainty: PNES versus epilepsy
Not an optimal surgical candidate unless PNES first better controlled	Need to repeat EMU evaluation with limited utility
Inconsistent history with limited collateral suggests high morbidity with multiple different spell types occurring daily	Lack of further medical management options
Failed maximal medical management	Limited downstream resources for mental health and stressor management
No acceptance of PNES diagnosis with lack of longitudinal mental health follow-up	
Observational case 3: Preadmission mortality due to service not accessed in time	
Longstanding history of focal-onset DRE	Lack of patient and physician autonomy in obtaining urgent admission
Sudden unexpected death in epilepsy while on EMU wait list for presurgical evaluation	Limited ability for patient to advocate for self
	Childcare and socioeconomic factors limit ability to attend appointments and comply with medications
	Uncertainty of potential benefit of EMU admission
	Possibly preventable loss of life

DRE, drug-resistant epilepsy; EMU, epilepsy monitoring unit.

continuous EEG and prolonged video-EEG monitoring in different outpatient or inpatient circumstances. Indeed, many factors must be considered when allocating EMU beds to patients with varied contexts, as illustrated by the clinical examples in [table 1](#).

To date, limited attention has been paid to the complex ethical decisions surrounding who should get the next available EMU bed. The combination of the opportunity for epileptologists to better manage triage to EMU and complex issues pertaining to resource allocation provide the foundation for our present focus on time-to-EMU admission.

Towards a principled ethics model for the EMU

We performed an extensive search of the peer reviewed literature in the Google Scholar and PubMed databases for publications pertaining to ethical issues surrounding triage in neurology broadly and EMUs specifically. Search terms were triage, rationing, resource allocation, justice, wait list management, distributive justice and variations on these in combination with epilepsy, epilepsy monitoring and neurology. We performed a further search on triage in emergency medicine, critical care, disaster and military medicine, infectious disease, surgery, transplant medicine, nephrology and psychiatry to inform the development of our model.

Themes common to triage across the literatures were the importance of infrastructure for accountability in triage,^{21–24} benefits of explicit clinical guidelines and institutional protocols for promoting cooperation and limiting human error in triage decisions,^{1 21 25} and the sheer complexity of effective triage decisions.^{26–28} The three principles of prioritarianism, utilitarianism and justice dominate the literature we examined, in particular on resource allocation of organs for transplant.²⁶ We applied the strategic themes and three principles to the two-component ethics approach for EMU triage illustrated in [figure 1](#) and further elaborated in [table 2](#).

Strategic targets for EMU triage infrastructure

The triage literature shows how protocols express the values of society at large and allow for effective resource utilisation to reduce the burden of long wait lists that can lead to further medical complications and multilevel costs.¹ Dedicated time and resources to support this process are required to facilitate accountability and allow improvements. Wait lists are deceptive.²⁵ While they are often regarded as straightforward administrative tools that do not need significant attention, in reality, they represent a complex interplay of administrative, clinical and ethical factors.²⁵

The first component of the proposed EMU triage approach, therefore, involves an explicit commitment to three strategic targets: (1) accountability to the patient and the public; (2) engagement of clinicians and hospital administration supported by objective metrics and (3) empowerment of dedicated wait list managers.^{23 29 30}

Accountability: Accountability towards patients and the public fosters transparency and eliminates real and perceived bias where possible. It requires specific attention to patient literacy and respect for patient autonomy. Alongside the necessary focus on risk and benefit in consent, transparency about wait lists, including patient location on the list, wait time targets,²⁹ anticipated wait time and built-in procedures for reassessment and even patient-initiated or family-initiated appeals define improved, if not true, accountability. Through an enhanced consent process, patients may also better express their accountability towards physicians in accepting the EMU evaluation when a bed becomes available.

Engagement: Improvements in wait list management infrastructure require the integral involvement of both clinicians and hospital programme managers.²⁹ One of the greatest barriers to improving wait list management is the often competing interests between managers and physicians. Organisational and systemic factors can exacerbate these tensions.³¹ Objective external

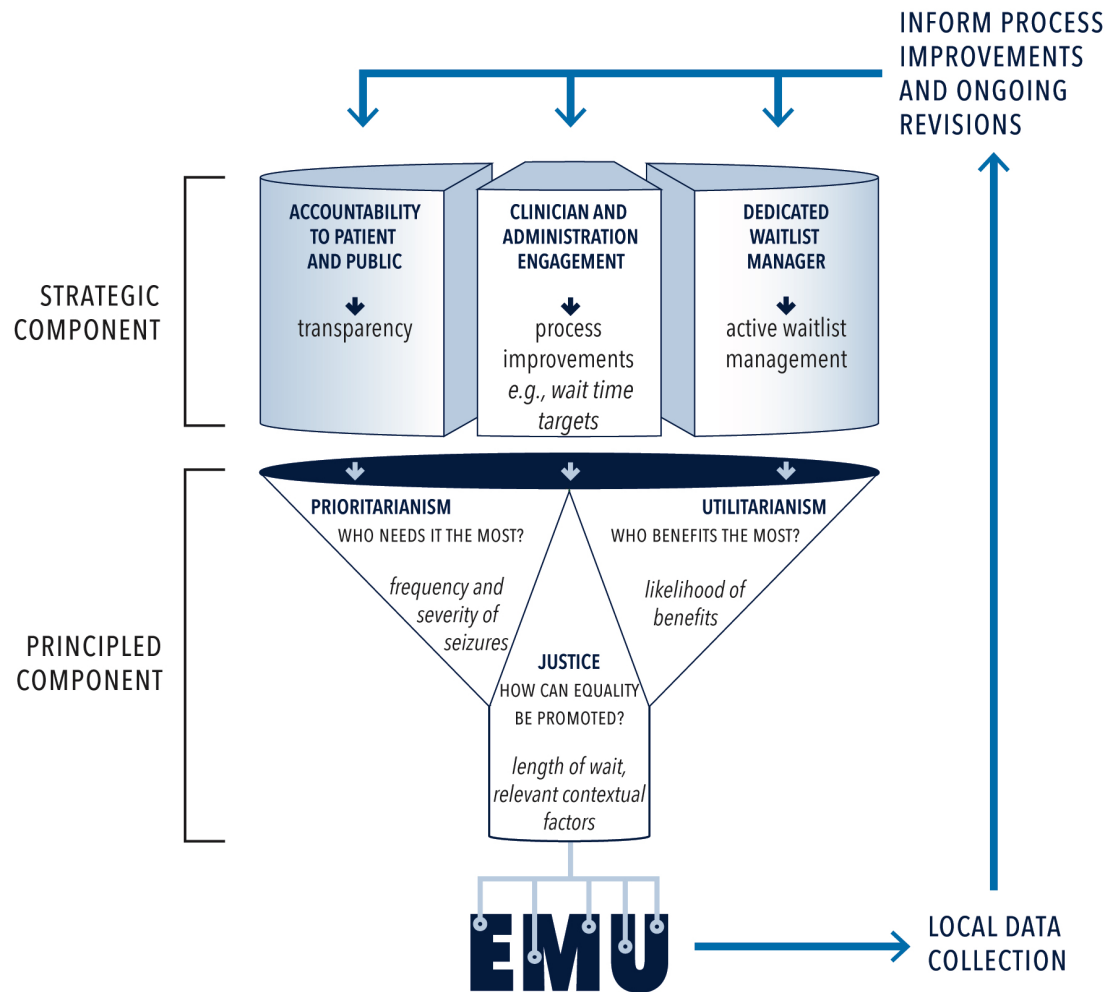


Figure 1 A two-component ethics approach for triage to the Epilepsy Monitoring Unit (EMU) setting.

review and regular auditing of EMU statistics are expected to lead to beneficial improvements in both philosophy towards, as well as management of, triage decisions; hence, better engagement of key stakeholders.

Dedicated wait list management: Centralised oversight is essential to ensure the integrity and efficiency of triage protocols at all levels. This can be achieved by dedicating wait list managers to the task to evaluate patients for changes in their condition, maintain contact with them, assess their engagement in the process, ensure their continuity of care and determine available epilepsy centre resources. They can also offer EMU alternatives where appropriate.³²⁻³⁴ One study reported that by appointing an epilepsy surgery nurse manager who initiated process improvement interventions, patient flow through each stage of the presurgical pathway following EMU evaluation increased by as much as 96%.⁹

Principles for EMU wait list triage

Prioritarianism: The principle of prioritarianism in the context of epilepsy supports the allocation of scarce resources to patients with the most severe conditions as they will have a worse prognosis if left untreated.²³ Defining the sickest for the EMU setting, however, is not a trivial task. Observational case 1 illustrates that patient suffering can be independent of seizure frequency and severity given the psychosocial burden of epilepsy. That said, seizure frequency is associated with greater morbidity and even mortality.³⁵ Surrogates of this metric may include frequency of

rescue medication use and the number of emergency department visits for breakthrough seizures. However, frequency of spells alone is inadequate to characterise the worst off without also considering the degree of event-related disability. Increased seizure severity, as characterised by drop attacks, generalised tonic-clonic seizures or status epilepticus, incurs higher risk of irreversible neurological compromise, serious injury and even death, adding weight to prioritisation. As such, case 2 would be prioritised over case 1 based on the frequency and severity of seizures.

An additional or alternative approach to prioritising seizure frequency and severity is to use age as a proxy for disease severity.²⁶ Seizure-related disability in early life can shape long term life-impacting decisions surrounding education, relationships, work and quality of life. Unlike factors such as gender or race, accounting for age in triage decisions can further promote fairness in decision making.³⁶⁻³⁷ However, age cannot be the main consideration here as case 3 was the oldest in years among the patients in the cases, and likely would have benefited most from the EMU evaluation.

Utilitarianism: Utilitarianism helps to ensure that available treatment measures are used maximally for those patients who are most likely to benefit from them, particularly when resources are finite and there are limitations in management options in a given healthcare environment. The utilitarian principle highlights outcomes that can be measured in total life-years saved

Table 2 Example questions to guide a multiprincipled ethics approach to EMU triage

Principles	Questions to consider for EMU triage
Prioritarianism Who needs it the most?	<p>What is the current frequency of seizures? How often are rescue medications needed? How often are emergency department visits? Have there been prior episodes of status epilepticus and/or seizure-related ICU admissions? How disabled is the patient by their seizures? Do seizures entail impaired awareness or loss of consciousness? Are there generalised tonic-clonic seizures? Are there seizure-related falls and/or other injuries? Are there ictal or postictal behaviours that cause significant risk of injury or social disability, such as psychosis or aggression? What is the patient's age?</p>
Utilitarianism Who benefits the most?	<p>Is there potential for a life-changing outcome? How longstanding is the epilepsy? How many years of functioning in society could be realistically expected for this patient? What kinds of epilepsy surgery are available should the patient be found to be a surgical candidate? What kinds of mental health services are available in the event of a diagnosis of PNES? What is the patient's level of engagement in their health and the process? What are the patient's comorbidities and baseline functions? How many dependants does the patient have who would be affected by the EMU outcome? Will the patient be likely to work and/or achieve a higher level of functioning? Is this a repeat EMU evaluation, and if so, what would be the likelihood of a change in the original conclusion? Is there an EMU alternative that would achieve a similar or better outcome?</p>
Justice How can equality be promoted?	<p>How long has the patient been waiting for EMU admission? Are seizures currently the patient's biggest problem? Is the patient marginalised as a result of their epilepsy? Are there additional factors contributing to stigma/bias against this patient, such as low socioeconomic status, racial or cultural considerations? Is the patient unable to advocate for themselves? Is the patient applying disproportionate pressure on the care team for sooner admission? Does the patient's physician have another specific reason for admitting them sooner?</p>

EMU, epilepsy monitoring unit; ICU, intensive care unit; PNES, psychogenic non-epileptiform seizures.

or quality-adjusted life-years.^{1 26} In the proposed model, utilitarianism is balanced with prioritarianism for initially triaging patients. Essentially, the frequency and severity of the seizure events informs the priority of patient triage to the EMU,^{38 39} thus achieving the objective of the admission and benefit. Case 2 would be expected to require a much shorter EMU evaluation than case 1 given the higher frequency of seizures, maximising overall utility of this resource.

At a minimum, the principle of utilitarianism states that patients should not go on the wait list if there is little chance of patient benefit from evaluation. EMU overutilisation is prevented by applying this principle. Case 2 had a low likelihood of benefit from admission and had already had a prior EMU evaluation; case 3, therefore, would take precedence over case 2 despite the priority of case 2 based on patient suffering. Careful balance of these first two principles further ensures that inequalities attributable to patient socioeconomic factors, administrative restrictions or physician bias are checked.

Justice: The principle of justice brings impartiality of access to EMU triage protocols by highlighting contextual patient features, including their ability to self-advocate.^{23 40} Indeed, disregard of the full range of such factors listed in table 2 can lead to unintended inequalities, such as prioritising patients without cognitive dysfunction as they can advocate for sooner admission. A principled and explicit focus on justice for EMU triage over, for example, a lottery system,²⁶ may also mitigate corruption arising from socioeconomic, social supports and education differences among wait listed patients.^{26 41 42} Case 3 had a delayed flow through the surgical evaluation EMU process due to socioeconomic factors that limited the individual's ability to follow through with recommendations needed to expedite

timely assessment. Had this inequity been formally recognised at the time of initial EMU wait listing, EMU admission for the other two cases may not have taken precedence over the person with financial disadvantage, limited social supports and low capacity to self-advocate. We acknowledge that determining and defining justice combined with formalising it operationally with objective criteria for the EMU context is a daunting task. However, with open discussion and opportunities for factor modification over time, we believe that this goal can be reasonably achieved.^{43 44}

PUTTING PRINCIPLES INTO PRACTICE

We have drawn on and interpreted literature on triage from various fields of medicine to address a gap in neurology where necessary EMU resources may fall short of need. The outcome is an approach that emphasises infrastructure for overall strategy, and ethics principles for decision making (figure 1). The focus on infrastructure emphasises a commitment to wait list management, patient and public accountability, and clinician and administration engagement. The ethics endorse a combination of priorities, utility and justice.

The degree of emphasis placed on priority versus utility may be best individualised to a given centre's resources and ability to optimally manage patients psychologically, medically and surgically. We note that lower resource programmes are likely to benefit from a more utilitarian approach, whereas those with higher resources can afford to more heavily weigh principles of prioritisation. Prioritarianism must be balanced with other principles as it ignores postdiagnosis treatment, prognosis and future sickness. In the setting of an EMU admission, however, it is often advisable to proceed with admission when a patient is having frequent events. This allows the events to be captured

Table 3 Example scoring system to inform admission priority currently in use at the authors' tertiary care adult epilepsy centre

Most disabling seizures	Status epilepticus: 4	Generalised convulsive seizures: 3	Focal impaired aware seizures: 2	Focal aware seizures: 1
Seizure frequency	Daily: 4	Weekly: 3	Monthly: 2	Yearly or less: 1
Falls	>50% of seizures: 4	30%–50% of seizures: 3	<30% of seizures: 2	A few falls or none: 1
Ictal/postictal psychosis/behavioural changes	Frequent (two or more times/year) and severe life-threatening aggression: 4	Rare severe life-threatening aggression (<1/year): 3	Frequent and/or severe postictal behaviours that cause significant social disability: 2	Rare and/or mild postictal behaviours change or none: 1
Motivation for EMU outcome (ie, interest in surgery and/or mental health attention)	Patient is eager to follow through with surgical process or eager to pursue psychiatric follow-up: 4	Patient is committed to follow through surgical process or is committed to psychiatric follow-up: 3	Patient is uncertain if they would have a surgical procedure if deemed eligible or is uncertain if interested in psychiatric follow-up with diagnostic clarity: 2	Patient is uncertain if they would have a surgical procedure if deemed eligible or is not interested in psychiatric follow-up even with diagnostic clarity: 1
Admission priority score: ____/20	≥13=high		7–12=medium	≤6=low

EMU, epilepsy monitoring unit.

quickly, thus minimising burden on both the patient and hospital resources. Although the most severely affected patients may have higher upfront resource requirements, the potential for overall benefit is often higher as well. The sooner a patient is diagnosed with epilepsy and/or PNES and treated for their condition, regardless of age, the better their prognosis.^{16 45} Justice emphasises that, when all other factors are equal, patients who have been waiting the longest are more appropriately served first. In contrast, those who have connections, wealth or resources that enable strong self-advocacy should not receive unfair advantage due to such factors. Without explicit attention and controls in place, such factors may otherwise easily override the above key ethical principles.

While the concepts are complex and influencing factors multi-factorial, any clinical triage tool that is likely to succeed with effective application to practice requires simplification for ease of EMU wait list generation, timely updating and longitudinal management. Within this process, a given patient's clinical factors and a given centre's resources are often dynamic over time. Scoring systems can be considered to at least categorise patients into high, medium and low priority groups. There should be an emphasis on transparency and an expected incentive for quality improvement generated through a more organised capacity to study wait time targets, strengthening collective clinician, administrator and patient engagement in the process. **Table 3** provides an example of the EMU triage scoring system that the clinical nurse EMU wait list manager at our region's adult epilepsy centre applies prospectively and updates regularly, guided by the model we have developed.

CONCLUSION

There is a positive duty in neurology to adopt some explicit form of ethical structure to EMU triage over the current state of the art, which is largely none at all. The proposed strategic and principled approach to EMU triage is focused on a critical aspect of the management pathway for patients with refractory epilepsy or those who require spell characterization. It is unlikely that one solution will fit all, but this practical two-component approach is a starting point. Testing, refinement and revision of the model, with consideration of its ethical, medical and financial impacts, will bring out its potentially valuable strategic and principled role in epilepsy monitoring settings around the world.

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REFERENCES

- Scheunemann LP, White DB. The ethics and reality of rationing in medicine. *Chest* 2011;140(6):1625–32.
- England MJ, Liverman CT, Schultz AM, et al. Epilepsy across the spectrum: promoting health and understanding. A summary of the Institute of medicine report. *Epilepsy Behav* 2012;25(2):266–76.
- Englot DJ. The persistent under-utilization of epilepsy surgery. *Epilepsy Res* 2015;118:68–9.
- Sadanand V. Epilepsy: a call for help. *Brain Sci* 2018;8(2):22.
- Bui K-TA, Wahby S, Jetté N, et al. Inequalities in the utilisation of epilepsy surgery for adults and children in Canada. *Epilepsy Res* 2018;148:63–8.
- Begley CE, Durgin TL. The direct cost of epilepsy in the United States: a systematic review of estimates. *Epilepsia* 2015;56(9):1376–87.
- Schuele SU, Lüders HO. Intractable epilepsy: management and therapeutic alternatives. *Lancet Neurol* 2008;7(6):514–24.
- Vaughan KA, Lopez Ramos C, Buch VP, et al. An estimation of global volume of surgically treatable epilepsy based on a systematic review and meta-analysis of epilepsy. *J Neurosurg* 2018:1–15.

- 9 Hill CE, Raab J, Roberts D, *et al.* Addressing barriers to surgical evaluation for patients with epilepsy. *Epilepsy Behav* 2018;86:1–5.
- 10 Jetté N, Sander JW, Keezer MR. Surgical treatment for epilepsy: the potential gap between evidence and practice. *Lancet Neurol* 2016;15(9):982–94.
- 11 Martínez-Juárez IE, Funes B, Moreno-Castellanos JC, *et al.* A comparison of waiting times for assessment and epilepsy surgery between a Canadian and a Mexican referral center. *Epilepsia Open* 2017;2(4):453–8.
- 12 Aljafen BN, Alfayez SM, Alanazy MH, *et al.* Epilepsy monitoring units in Saudi Arabia: where do we stand compared to developed countries? *Neurosciences* 2018;23(3):244–9.
- 13 Agrawal S, Turco L, Goswami S, *et al.* Yield of monitoring in an adult epilepsy monitoring unit (P2.097). *Neurology* 2015;097 https://n.neurology.org/content/84/14_Supplement/P2.097
- 14 Shih JJ, Fountain NB, Herman ST, *et al.* Indications and methodology for video-electroencephalographic studies in the epilepsy monitoring unit. *Epilepsia* 2018;59(1):27–36.
- 15 Conway J. *Ethical perspectives in neurology. Contin lifelong learn Neurol*, 2007: 13. https://journals.lww.com/continuum/Fulltext/2007/08000/ETHICAL_PERSPECTIVES_IN_NEUROLOGY.11.aspx
- 16 Gelauff J, Stone J. Prognosis of functional neurologic disorders. *Handb Clin Neurol* 2016;139:523–41.
- 17 Asadi-Pooya AA, Tinker J, Epilepsy TJ. Delay in diagnosis of psychogenic nonepileptic seizures in adults: a post hoc study. *Epilepsy Behav* 2017;75:143–5.
- 18 Kerr WT, Janio EA, Le JM, *et al.* Diagnostic delay in psychogenic seizures and the association with anti-seizure medication trials. *Seizure* 2016;40(Suppl. 1):123–6.
- 19 Bowen JM, Snead OC, Chandra K, *et al.* Epilepsy care in Ontario: an economic analysis of increasing access to epilepsy surgery. *Ont Health Technol Assess Ser* 2012;12(18):1–41.
- 20 McGinty RN, Costello DJ, McNamara B, *et al.* Investment in epilepsy monitoring units improves epilepsy care-experience in a regional neuroscience centre. *Ir Med J* 2017;110(7):601.
- 21 Truog RD, Brock DW, Cook DJ, *et al.* Rationing in the intensive care unit. *Crit Care Med* 2006;34(4):958–63.
- 22 Laughlin DTO, Hick JL. Ethical issues in resource triage 2008:190–200.
- 23 Daniels N. Justice, health, and healthcare. *Am J Bioeth* 2001;1(2):2–16.
- 24 Oedingen C, Bartling T, Mühlbacher AC, *et al.* Systematic review of public preferences for the allocation of donor organs for transplantation: principles of distributive justice. *Patient* 2019;12(5):475–89.
- 25 Brown SA, Parker JD, Godding PR. Administrative, clinical, and ethical issues surrounding the use of waiting Lists in the delivery of mental health services. *J Behav Health Serv Res* 2002;29(2):217–28.
- 26 Persad G, Wertheimer A, Emanuel EJ. Department of ethics principles for allocation of scarce medical interventions. *Lancet* 2009;373:423–31.
- 27 White DB, Katz MH, Luce JM, *et al.* Who should receive life support during a public health emergency? using ethical principles to improve allocation decisions. *Ann Intern Med* 2009;150(2):132–8.
- 28 McGuire A, McConnell PC. Resource allocation in ICU: ethical considerations. *Curr Opin Anaesthesiol* 2019;32(2):190–4.
- 29 Pomey M-P, Forest P-G, Sanmartin C, *et al.* Toward systematic reviews to understand the determinants of wait time management success to help decision-makers and managers better manage wait times. *Implementation Sci* 2013;8(1).
- 30 Daniels N. Accountability for Reasonableness. *BMJ* 2000;321(7272):1300–1.
- 31 Wenghofer EF, Williams AP, Klass DJ. Factors affecting physician performance: implications for performance improvement and governance. *Healthc Policy* 2009;5(2):e141–60.
- 32 Domres B, Koch M, Manger A, *et al.* Ethics and triage. *Prehosp Disaster Med* 2001;16(1):53–8.
- 33 Chafe R, Coyte P, Sears NA. Improving the management of waiting lists for long term care. *Health Manage Forum* 2010;23(2):58–62.
- 34 Samuel D, Coilly A. Management of patients with liver diseases on the waiting list for transplantation: a major impact to the success of liver transplantation. *BMC Med* 2018;16(1):113.
- 35 Maguire MJ, Jackson CF, Marson AG, *et al.* Treatments for the prevention of sudden unexpected death in epilepsy (SUDEP). *Cochrane Database Syst Rev* 2016;7.
- 36 Clarke CM. Rationing scarce life-sustaining resources on the basis of age. *J Adv Nurs* 2001;35(5):799–804.
- 37 Tsuchiya A, Dolan P, Shaw R. Measuring people's preferences regarding ageism in health: some methodological issues and some fresh evidence. *Soc Sci Med* 2003;57(4):687–96.
- 38 Sun PY, Wyatt K, Nickels KC, *et al.* Predictors of length of stay in children admitted for presurgical evaluation for epilepsy surgery. *Pediatr Neurol* 2015;53(3):207–10.
- 39 Lampe E, Forster J, Herbst E, *et al.* Pre-Admission clinical factors affect length of stay in the epilepsy monitoring unit. *Neurodiagn J* 2014;54(2):138–47.
- 40 Okorie N. Partiality, impartiality and the ethics of triage. *Dev World Bioeth* 2019;19(2):76–85.
- 41 Burneo JG, Jette N, Theodore W, *et al.* Disparities in epilepsy: report of a systematic review by the North American Commission of the International League against epilepsy. *Epilepsia* 2009;50(10):2285–95.
- 42 Nathan CL, Gutierrez C. Facets of health disparities in epilepsy surgery and gaps that need to be addressed. *Neurology* 2018;8(4):340–5.
- 43 Jonsen AR, Siegler M, Winslade WJ. *Clinical ethics: a practical approach to ethical decisions in clinical medicine*. 8e. Eighth Edit. New York: McGraw-Hill Education, 2015.
- 44 Lane H, Sarkies M, Martin J, *et al.* Equity in healthcare resource allocation decision making: a systematic review. *Soc Sci Med* 2017;175(1):11–27.
- 45 Bjellvi J, Olsson I, Malmgren K, *et al.* Epilepsy duration and seizure outcome in epilepsy surgery: a systematic review and meta-analysis. *Neurology* 2019;93(2):e159–66.