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Ethical prioritization of patients during disaster triage: A systematic review of current evidence

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ABSTRACT

Introduction: Triage is a dynamic and complex decision-making process in order to determine priority of access to medical care in a disaster situation. The elements which should govern an ethical decision-making in prioritizing of victims have been debated for a long time. This paper aims to identify ethical principles guiding patient prioritization during disaster triage.

Method: Electronic databases were searched via structured search strategy from 1990 until July 2017. The studies investigating patients' prioritization in disaster situation were eligible for inclusion. All types of articles and guidelines were included.

Result: Of 7167 titles identified in the search, 35 studies were included. The important factors identified in patient prioritization were grouped into two categories: medical measures (medical need, likelihood of benefit and survivability) and Nonmedical measures (saving the most lives, youngest first, preserving function of society, protecting vulnerable groups, required resources and unbiased selection). Demographic characteristics, health status of patients, social value of patient, and unbiased selection are discriminatory factors in disaster triage.

Conclusion: Various factors have been introduced to consider ethical patient prioritization in disaster triage. Providers' engagement, public education, and ongoing training are required to reach a fair decision.

1. Introduction

Disasters have the potential to create resource scarcity [1]. They are medically defined as events with many casualties in which the number of patients requiring assistance exceeds the capacity of the responders for delivering timely and effective services [2,3]. In such situation medical care resources are overwhelmed and rationing of health care resources is inevitable [4–8]. Triage, as a part of medical rescue chain [9,10] is used to assist resource allocation decisions in such situations [11].

Models of triage have been developed as a process of rapid sorting and categorizing of victims based on injury severity and available resources [5,6,9,12], in order to achieve the greatest good for the greatest number of victims [5,7,10]. While the ethical concept of utilitarianism

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usually supports the practice of triage in disaster [13–15]. Utility principle is silent regarding which one of these determines the greatest good "the number of lives saved, saved years of life, quality adjusted years of life or a few other parameters" [16]. Petrini explained that because the history and practice of triage incurs based on egalitarian ethics and focuses on assisting those with greatest need, a utilitarian approach cannot be an adequate framework for disaster triage [13]. As a result, the decision components of triage for prioritizing patients as to what order the victims should be treated and transported has long been an ethical issue [5,17].

Recent evidence also reveals that the process of triage is often unofficial or decisions are taken in an ad hoc fashion, and its practical aspects are implemented in different ways [18–20]. Then, without clear, concise and explicit guidelines, triage is often perceived as inadequate or poorly organized by patients and the public [6], and raises specific ethical challenges for health care providers [9].

Accurate triage application is important according to the principles of justice, beneficence and do no harm [21]. Hick et al. explained, disaster triage decision-making needs a structured approach with proactively defined goals and ethical principles [15]. The most important factor is to establish reasonable and widely accepted criteria for ethical decision-making in disaster triage [22–25]. The aim of this systematic review was to explore the principles used to assist in ethical patient prioritization during disaster triage.

2. Method and material

The systematic review involved the structured searching of Medline (via pubmed.com), Scopus (via https://www.scopus.com), Web of Science (via www.webofknowledge.com) and ProQuest (www.proquest.com) from January 1990 through July 2017. The authors also searched Google Scholar, the Global Health Library, the Global Ethics Library, and the World Health Organization (WHO) websites, as well as the Grey Literature Report using modified search strategy. This systematic review was performed according to the PRISMA guideline [26]. The protocol of this review was registered at PROSPERO (http://www.crd.york.ac.uk/PROSPERO) (CRD42016040102) [27].

3. Study identification

The search strategy was developed based on a combination of MeSH terms which were related to "disaster and ethics" and other keywords from a systematic review about resource allocation in disaster and emergencies [19]. The search terms were combined with a cluster approach, and search strategies were adapted for each database. The database searches were supplemented by hand searching of two journals with the most number of records in the Scopus search and the reference list of included articles.

4. Data collection

Retrieved titles were imported into Endnote software. Duplicated titles were deleted and the remaining titles were screened by the first authors. Abstracts of the remaining titles were evaluated by the first author and the third author also reviewed the results. The full texts of references with unclear abstracts were reviewed by the first author, and selected articles were reviewed by the third. Discrepancies were resolved by discussion to reach a consensus and checking with the fourth author. A PRISMA flowchart depicts the steps of study selection (Fig. 1).

4.1. Study eligibility

Inclusion criteria:

- Articles that explained the ethical aspects of triage or patient prioritization or resource allocation in the pre-hospital or hospital settings during a disaster.
- Guidelines or book chapters that explained the ethical aspects of triage or resource allocations in a disaster setting.
- All languages were included.

Exclusion criteria:

- Articles that defined the ethical aspects of macro or meso resource allocation.
- Articles that defined ethical aspects of resource allocation in emergency departments or pre-hospital in routine care.
- Articles without full text or those whose full texts were not accessible despite sending emails to their corresponding authors twice.
- Letters to the editors or the conference papers without full texts.

Quality assessment and data extraction:

The first author (V.Gh) assessed the quality of studies using the International Narrative Systematic Assessment tool (INSA) [28], (Table 1). The results were reviewed by the third author (A.Z) and any differences identified were resolved through discussion. A data extraction form was designed according to the study goals in the Microsoft Excel. First author, publication date, country, type of event, and the factors which were considered or not investigated in the patients' prioritization in triage or resource allocation were extracted. All the extracted data were checked by the fourth author (A.N). Finally, extracted data were descriptively and thematically categorized in terms of related and unrelated factors for ethical prioritization of patients in disaster triage.

5. Result

The search yielded 7167 citations, of which 1320 duplicate titles and 5357 unrelated titles were removed. In the third step, the abstracts of the remaining 490 titles were reviewed and 91 articles were finally selected. 91 full texts were assessed to determine their eligibility. The full texts of two articles were not accessible despite sending emails twice to the corresponding author [29,30]. Finally, 33 articles were included from databases [7,12,13,16,25–43,8,44–51] and 3 studies selected through the hand searching process [52–54].

Table 1 shows the characteristics of included articles: Author name, publication date, title, country, event type (ET), article type (AT) and the results of the quality assessment (QA).

Most of the studies were conducted in the United States (77%), and only two studies were conducted in underdeveloped and developing countries. Nearly half of the articles discussed resource allocation or triage during the influenza pandemic or other epidemic events.

5.1. Related factors for prioritizing patients

Factors mentioned for ethical prioritization of patients were categorized into two categories: Medical and Nonmedical measures. Table 2 shows this classification.

5.2. Irrelevant factors for prioritizing patients

Table 3 shows irrelevant factors for patients' prioritization in disaster triage.

Unrelated factors, thematically, were categorized into three categories: patient related factors (demographic characteristics, previous health condition), social value of patients and unbiased selection.

6. Discussion

There is increasing recognition that resource rationing is inevitable in the health care setting, particularly in the setting of disaster events [58]. There are differences in applying the factors that have to be

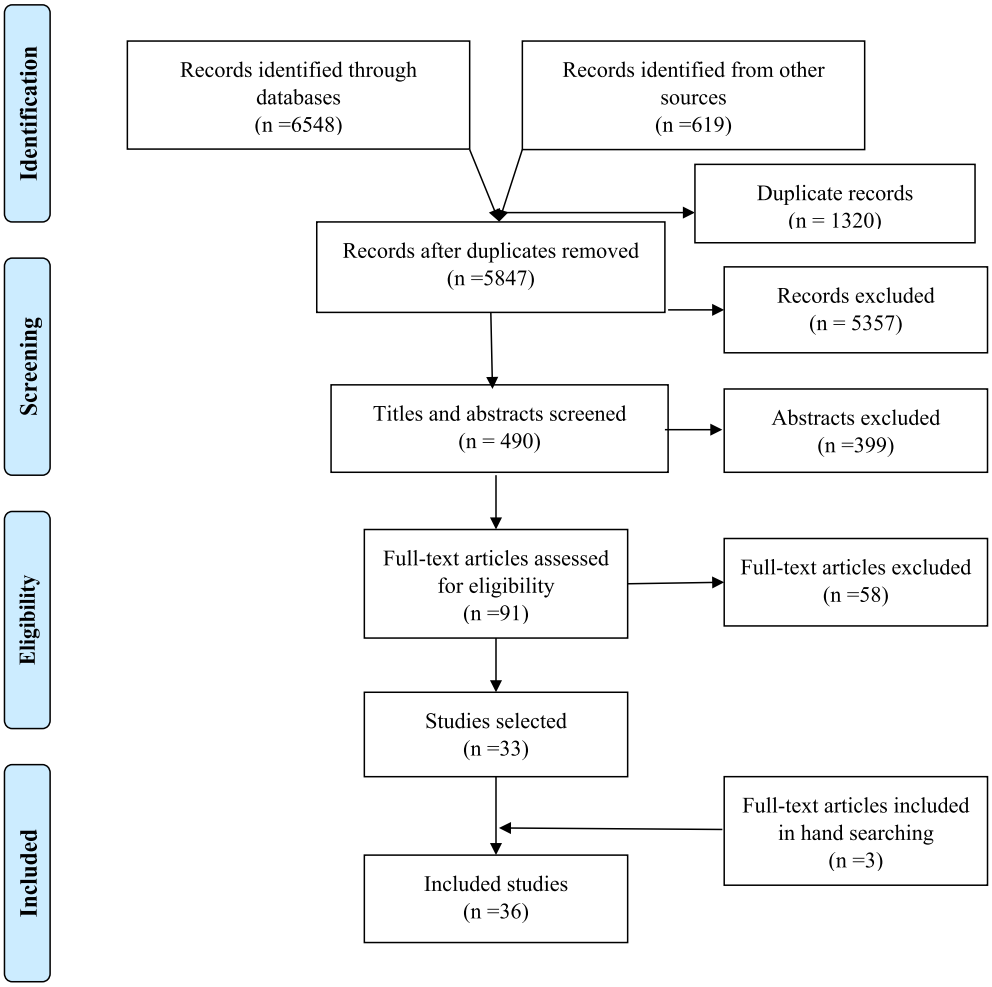

Fig. 1. Flow diagram of study screening and selection.

considered in triage as a tool for patient prioritization [6]. Prioritizing factors were categorized in medical, nonmedical and discriminatory factors. We will explore each of them in more depth.

6.1. Medical measures (MM) in patients' prioritization

Prioritization of patients based on needs and effectiveness of treatment has been widely accepted [59]. The American Medical Association (AMA) and Tabery et al. describes medical needs, possibility and duration of patient medical benefits, the impact of treatment on improving the QOL and the number of resources needed for successful treatment as therapeutic benefit measures [60,61].

Bruce states that almost all the clinicians believe that patient prioritization should be based on patient needs. With this approach, the sickest patient receives the highest priority because, if left untreated, they would face worse outcomes [31]. As a result, triage based on medical needs is ethically justifiable because it is performed without considering the consequences for the individual and community [62]. However, a criticism of this idea is that such patients may be so sick that they cannot benefit from the treatment [31]. White et al. suggests that prioritizing the sickest first is not consistent with the aim of public health ethics in disasters which is achieving the most good for the most people [53]. In some cases, the most benefit can be achieved by prioritizing patient with lesser injury but efficiently treatable needs instead of simply prioritizing the sickest patients. Therefore, to provide the most benefits for the most people, it is necessary that the treatment of the sickest patients be limited in times of scarce resources [7], particularly if that care is deemed futile, and the same resources could go to another patient more likely to survive. In this case, it is recognized that all patients still deserve the best care possible, even if it is palliative care intended to reduce suffering.

The likelihood of benefiting from treatment is another factor in MM [15,33–36,38–40,8,44,48–51]. In order to make effective use of medical resources, giving priority to patients who are likely to benefit from treatment may be necessary [60]. When the effectiveness of interventions is low, giving lower priority to the patient is a fair practice [35,36]. However, there have been discussions about how to predict results for the patients [35,49,60]. Decisions about the possible benefits of care based on clinical judgment are subjective and may be implemented differently among patients [49]. Then, the likelihood of benefit can be helpful for prioritizing patients when there are fundamental differences between the patients in this respect [60].

Enhancing the survivability of patients is the main objective of medical teams in limited-resource situations [44]. Therefore, survivability [24,34,44,47,50–53] is introduced as another factor in prioritizing patients in disaster triage. The goal of disaster triage is to redirect resources from the victims without high chances of survival or essential needs of patients with the likelihood of benefit [53]. Although survivability is a related factor, it does not lead to fair decisions on its own. Survivability should be considered along with other factors into a multi-principle system for patient's prioritization.

6.2. Nonmedical measures (NMM) in patients' prioritization

Saving larger numbers of lives [24,31,42,50,55,56] is one of the NMMs that should be considered in prioritizing the patients. Levin et al.

Table 1
Characteristics and quality assessment (QA) of the included studies.

No	Author Name	Year	Title	Country	ET	AT	QA
1	Hick, J. L.	2012	Allocating resources during a crisis…	USA	All types of disasters	Review	L*
2	Thambu, D.	2010	Allocating scarce life support…	India	All types of disasters	Commentary	L
3	Hick, J. L	2012	Allocating scarce resources in disasters…	USA	All types of disasters	Review	L
4	Powell, T	2008	Allocation of ventilators in a public…	USA	All types of disasters	Original	H
5	Levin, D.	2009	Altered standards of care during…	USA	Influenza Pandemic	Original	H
6	Vawter, D. E.	2011	Attending to social vulnerability…	USA	Pandemic	Original	L
7	Daniel, M.	2012	Bedside resource stewardship in…	USA	Earthquake	case study	L
8	Hick, J. L.	2007	Clinical review: Allocating ventilators…	USA	All types of disasters	Review	H
9	Hick, J. L.	2006	Concept of operations for triage of…	USA	Epidemic	Review	H
10	Christian, Michael D	2009	Disaster triage and allocation of…	USA	All types of disasters	Book chapter	L
11	Allen, M.B	2012	Disaster triage	USA	All types of disasters	Book chapter	L
12	Daugherty Biddison, L.	2014	Ethical considerations: care of the…	USA	Pandemic	Original article	H
13	Pena, M. E.	2009	Ethical considerations for emergency care…	USA	Pandemic	Review	L
14	Matheny Antommaria, A. H.	2011	Ethical issues in pediatric emergency…	USA	All types of disasters	Original article	H
15	O'Laughlin, D. T.	2008	Ethical issues in resource triage	USA	All types of disasters	Review	L
16	Iserson, K. V.	2003	Ethical resource distribution after…	USA	All types of disasters	Case study	L
17	Kuschner, Ware, G.	2007	Ethical triage and scarce resource…	USA	All types of disasters	Review	L
18	Li-Vollmer, M	2010	Health care decisions in disasters…	USA	Influenza pandemic	Original	H
19	Johnson, Erin Margaret	2014	Pediatric triage and allocation of…	USA	All types of disasters	Cross section	H
20	Silva, D. S.	2012	Priority setting of ICU resources in…	Canada	Pandemic	Qualitative	H
21	Bailey, T. M.	2011	Public engagement on ethical…	Canada	Pandemic	cross section	H
22	Caro, J Jaime	2011	Resource allocation after a nuclear…	USA	Nuclear detonation	Review	L
23	Burns, Jeffrey P	2011	Resource allocation and triage in…	USA	Pandemic	Book chapter	L
24	Barnett, D. J.	2009	Resource allocation on the frontlines…	USA	All types of disasters	Qualitative	H
25	White, Douglas B. M. D. M. A. S.	2009	Who should receive life support…	USA	All types of disasters	Review	L
26	Wynia, M. K.	2006	Ethics and public health emergencies…	USA	Pandemic	Review	L
27	Devnani, M.	2011	Planning and response to influenza…	India	Pandemic	Review	L
28	Sprung, Charles L.	2010	Recommendations for intensive care unit and hospital…	European countries	Pandemic	Mix method	L
29	Smith, George P	2009	Re-shaping the common good…	USA	Pandemic	Review	L
30	Challen, Kirsty	2007	Clinical review: Mass casualty triage…	USA	Pandemic	Review	L
31	Caro, J Jaime	2010	Unaltered ethical standards…	USA	Nuclear detonation	Original	H
32	Institute of Medicine Committee	2009	Guidance for establishing standards of care…	USA	All types of disasters	Original	H
33	University of Toronto Joint Centre for Bioethics	2005	Stand in guard for the ethical considerations…	Canada	Pandemic	Report	H
34	World Health Organization	2007	Ethical considerations in developing …	International	Pandemic	Report	H
35	Ram-Tiktin E	2017	Ethical consideration of triage…	Israel	Earthquake	Original	H
36	Claritza L. Rios	2015	Addressing the need, ethical decision….	USA	Explosion	Original	H

* L: Low, H: High.

emphasized that saving more lives assures that there will be equal access to similar treatments for every person. Thus, elderly and disabled people have an equal chance for treatment compared to healthy people [50]. Silve et al. believed that although resource optimization is an important aspect, based on human rights and the dignity of every individual, equal treatment of all people is more important [24].

Youngest first [15,31,36,41,42,8,44,46,49,53,54,56] is another NMM in patients prioritization in disaster triage. Saving more years of life has intuitive appeal [63]. As a result, the length of time that a patient could benefit from the services could be a suitable factor to reach a common good in disaster triage [60,63]. However, there are a handful of researchers who believe that giving priority to youth is unfair, based mostly upon concerns with equity [59,64]. Therefore, there is not any consensus on saving more lives or more years of life.

Saving better QOL is another NMM which should be considered in the prioritization of patients [15,8,44,47,56]. The benefit to patients will be maximized when they obtain the greatest improvement in their QOL given the resources applied to caring for the patient [60]. However, it is difficult to articulate a standard definition of QOL [60]. There is considerable evidence suggesting that a healthy person who self-evaluates his or her QOL will describe a significantly higher level than on evaluations conducted by people with disabilities, particularly mental disabilities. Therefore, taking into account the QOL may be biased by pre-existing conditions [65].

Protecting vulnerable groups is another NMM in the prioritization of patients [38,40,41,52,55,56]. Bruns et al. believes that disability and concurrent conditions do not affect patient prognosis. Therefore, such factors should not be considered as an obstacle to prioritizing the patients [31]. Instead, they should be supported [38,40,41,52,55,56]. Kaposy also believes that when there are patients with identical medical needs, prioritizing them based on their social vulnerability is appropriate [66]. The WHO ethical guidelines for pandemic planning states that based on the equity principle, people with disabilities should be prioritized [38]. The Minnesota Pandemic Ethics Project (MPEP) also recommends that vulnerable social groups should be involved in community engagement to identify and resolve the barriers of fair resource allocation, and to avoid marginalization and stigma among vulnerable groups [40].

Saving the function of society as a NMM has been introduced in patient prioritization in disaster triage [24,31,32,37–40,42,8,46,52,53,55,24,31,40,51,56]. Social benefits refer to the ability of a person to do special tasks that prevent social disruption or the deaths of more people during a disaster (such as medical team staff members, police, or firefighters) [53]. Then, according to the principle of reciprocity, prioritization and support of those people whose jobs expose them to morbidity and mortality is necessary [59]. However Daugherty Biddison et al. and Powell et al. believe that, in critical care units, medical staff or first responders should not have greater priority compared to others [43,49]. If they need critical care services, it is unlikely that they will recover and return to their work during a disaster response period [43,49,53]. Persad et al. believes that the accuracy of prioritizing patients based on reciprocity principle depends on the factors such as irreplaceability and sacrifice severity [63]. Therefore, the decisions about these factors need public engagement and further investigations [67].

Required resources is one of the NMMs mentioned in patient prioritization [15,31,33–35,39,41,8,47,48]. Caro et al. believe patient

Table 2
Related patient prioritization measures in disaster triage.

Category	Factors	Description	No
Medical Measures	Medical needs	Sickest first [32,33]	1
		Patients medical needs [25,32,34–40]	
		Urgency of need [22,37,41,42]	
		Risk of serious sequele [36]	
		Clinical evaluation result [43–47]	
		Victims' underlying illnesses and injuries [42,48,49]	
	Likely to benefit	Possible benefit to the patient [22,32,34,35,37,41,45,46,49–51]	2
		Maximize positive outcomes [52]	
		Medical effectiveness [36,37,39,40,53]	
	Survivability	Survivability [25,46,53–55]	3
		Medical prognosis [46,47,49]	
		Preexisting conditions [35,37,56]	
		Acute versus chronic conditions [44]	
Nonmedical Measures	Saving the most lives (Utilitarianism)	Save the most lives [25,32,43,52,57,58]	4
		Maximize the number of lives saved [52].	
	Youngest First	Lifecycle principle [32,37,39,43,47,55,58]	5
		Save the most life years [43]	
	Saving better QOL	Change in quality of life (QOL) [22,45,46,49]	6
		Save the most quality of life-years' [58]	
		Perceived QOL [53]	
	Protecting vulnerable groups	Protecting children, women, pregnant women [39,54,57,58]	7
		Greater vulnerability [42]	
		Promoting social justice [58]	
		Differences in social vulnerability [41]	
	Saving function of society	Saving first responders" health care workers, police, fire, power, water, and phone" [25,32,33,38–41,43,45,47,48,54,55,57].	8
		Public safety staff, and government decision-makers [38].	
		Irreplaceability in the critical infrastructure workforce [25,41,53]	
		Most productive people [32,58]	
	Required resources	Consideration of availability of resources [36]	9
		Requiring resources that cannot be provided [50]	
		Resource conservation [34,35,40]	
		Expected duration of resources [42,49]	
		The required resources [22,32]	
	Unbiased selection	Queuing [34,37,40]	10
		First come, first served (FCFS) [25,47,50]	
		Lottery [34,37,43,51]	

Table 3
Unrelated factors for patient prioritization in disaster triage.

No	Description	Factors
1	Sex (22, 32, 34, 36, 39, 52, 54, 59) Race and ethnicity (22, 32, 34, 36, 39, 41, 42, 52, 54, 59) Age (35, 52) Religion (34, 39, 45, 52, 59) Language, culture, citizenship, legal status (41, 59) (39, 54, 59) Socioeconomic class (32, 36, 39, 41, 42, 45, 46) Personal connections (42) Income or insurance status (41, 52) (22, 34, 59) Location of living (41) Residency status (59)	Demographic characteristics
2	QOL (37, 41, 53, 55) Disability-adjusted life years (DALY) (55) Length of life-extension (41)	Previous health status of patients
3	Past resource use (22)	
4	Disabilities (32, 45) Comorbidity unrelated to effectiveness (32, 36)	
5	Patient contribution to illness (22)	
6	Sickest first (55)	
7	Broad social worth (22, 55) Critical care for special groups (44, 51) Potential future state or utility (36)	Social Value of patients
8	First-come, first-served (FCFS) (41, 42, 54, 55)	Unbiased selection
9	Random selection (42, 54)	

need and ability to meet need are two criteria to determine patient priority [35]. If the expected ability to reduce risk of death is judged too low, it is not reasonable to allocate resources because that patient will use a disproportionate amount of resources without good result [15,35]. It is also reasonable that duration of resources needed for medical care has to be considered. For example, a trauma patient will likely need a shorter period on a ventilator than a viral pneumonia patient [15]. Patients who use fewer resources often have better chances to benefit. If more people are treated who only require resource utilization for a short period of time, it is possible that the number of people who survive can be increased [60].

Unbiased selection (first come, first served (FCFS) or random selection) is also mentioned as another NMM for the prioritization of patients [24,33,36,39,42,48,49]. When there are numerous patients with the same condition, presentation order and random selection could be used [33,36,49]. Selection based on FCFS can be easily managed and knowing one's position in the queue may give comfort to the patient and his/her family [33]. Silve et al. introduced FCFS as an applicable measure for decision-making in real time [24]. Random selection can also ensure equity among all patients and minimizes judgments based on other values [34].

6.3. Factors that should not be considered for prioritizing patients

Individual characteristics, previous health condition, unbiased selection, and the patient's social value are factors that have been stated should not be considered in prioritization (Table3). Prioritizing patients selectively based upon these criteria would be unethical and unacceptable [31,33,52].

The Minnesota Pandemic Ethics Project (MPEP) rejects prioritizing patients based on the discriminatory factors, or those that exacerbate health disparities (like socioeconomic class, ethnicity, and geography) in accessing resources [40]. Levin et al. mentioned that allocating scarce resources should be performed regardless of gender, age, race, language, religion and cultural values, socioeconomic status, income, and insurance status [50]. However, Johnson et al. also showed that despite the fact that participants prioritized children more than other patients, they believed that age should not be mentioned for prioritization among children [34].

The QOL and disability adjusted life year (DALY) were other factors that should not be considered in prioritizing patients [36,40,51,53]. Vawter et al. suggested that QOL is highly subjective and the required information to determine it, such as the views of the individual and his or her family, are not assessable in times of disaster [53]. Also, applying this factor for decision-making may lead to discrimination against people with chronic disease or disabilities [36]. Therefore, to prevent systematic unfairness or bias, these factors should not be considered in prioritizing patients [51].

Other researchers state that random prioritization or first come, first served should not be considered in patient prioritization [40,41,52,53]. First come, first served or random selection alone is not efficient in times of disasters because these selection methods do not take into consideration patient's needs, likelihood of survival, and life expectancy [8]. Some patients who use medical resources, such as a ventilator, based on unbiased selection without considering other factors may die, whereas other patients who require these resources but do not get a chance to use them may also die [41]. This could also increase the morbidity and mortality [41]. Therefore, considering these factors in decision-making would not lead to a maximized and efficient use of resources and is an unfair process [52,59].

Broad social values was another factor that should not be considered for patient prioritization. White et al. expressed that broad social value could not serve as a criterion for prioritizing patients in public health emergency, because in a morally pluralistic society, it is not possible to agree on a series of the criteria that one person necessarily has more inherent value than another [53]. Therefore, many researchers believe that this should not be a guiding factor in deciding how to prioritize patients [15,53].

Previous utilization of medical resources and medical conditions that do not have any effects on effectiveness of interventions or short-term prognosis should not be considered when assigning priority to patients [31,35,8]. Using these criteria would violate the principle of equity among the potential recipients of treatment [60]. Therefore, the use of these factors in prioritizing patients is not ethically justifiable [31].

6.4. Publication consideration

The results demonstrate that most of the included articles were from developed countries (United States, Canada, Europe and Australia). The results are in line with previous researchers [68–70]. Chee Keng Lee A and colleagues showed that 69% of published evidence about disaster management have been published by the US researchers. They also showed paucity of research evidence from low and middle income countries about disaster preparedness and response [68]. The possible reason of these differences in publication can be institutional incentives, availability of funding for research, capability and interested topics or policies [69]. Since having a better understanding from the context can improve outcome of disaster risk reduction [69]. As a result, Sendai framework emphasized on the need for strong focus on communities and indigenous people's knowledge in the design and implementation of polices, plans and standards relating to disaster risk reduction [71].

Discussion about patient prioritization and resource allocation must be transparent and reflect the cultural and ethical and moral context of the community [2]. The Institute of Medicine in guidelines for crisis standard of care declare that public engagement of community is a necessity for providing ethical policies that reflect the communities values and deserve its trust [41].

7. Limitations

In the course of conducting this study, we combined studies with different methods, and most of them were reviews. Most of the studies of this review were conducted in the United States of America and other developed countries. Although we tried to contact the authors of non-English studies whose full texts were inaccessible, they did not respond. Therefore, generalization of the results to all cultures is difficult and should be considered with caution.

8. Conclusion

Various clinical and non-clinical factors have been introduced in order to prioritize patients in a fair, just and transparent manner during the process of disaster triage. In the consideration of clinical factors, the information needed for some of the measures (effectiveness of intervention and survivability), is not likely to be readily available. Differences in approaches exist about nonclinical factors (youngest first, saving better QOL, supporting vulnerable groups, and saving social function, unbiased selection). Actually, the concern is that physicians who are not trained in triage protocols and who do not consider the issues related to scarce resource allocation actually may make arbitrary decisions. So, the point to make is to avoid making arbitrary decisions. As a result, it should be emphasized that provider engagement is critically important in order to be familiar with triage protocols. In addition, it is important to also engage in public education regarding scarce allocation decision-making, particularly with regard to being sure that the values of the community are being taken into account when resources will have to be rationed. Finally, to ensure these principles and procedures have an impact on decision-making in real situation, ongoing training and exercise is necessary. As most of the reviewed articles have low quality, there is a pressing need for high quality evidence in order to reach more accurate decisions in triage.

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Competing Interests

None.

Ethical Statement

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