RESEARCH ARTICLE / *Araştırma Makalesi*

Analysis of Publications Related to Triage in The Web of Science Database

Web of Science Veri Tabanında Triyaj ile İlgili Yayınların Analizi

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Geliş Tarihi / Received : **08.11.2021** Kabul Tarihi / Accepte: **28.02.2022**

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(Sakarya Tıp Dergisi / *Sakarya Med J* 2022, 12(1):122-131) DOI: 10.31832/smj.1020710

Abstract

Objective	The aim of this study is to make a bibliometric analysis of the publications made about the increasing triage in recent years.
Materials and Methods	The review of the articles to be included in this study was conducted on June 8, 2021 using the database of Web of Science Core Collection. Triage was written in the subject section and a search was made in the form. "Web of Science Categories: (All); Document Types: (All); Languages: (English); Timespan: (All); Indexes: (All)". During the search, no restrictions were entered regarding the dates of the publications. The data were transferred to VOSviewer software and analyzed systematically.
Results	A total of 22653 publications were descripted between 1980 and 2021. It was found that the most publications were made in the field of emergency medicine (EM) (n=3798; 16,76%). It has been observed that the most publications have been made from the United States. (n=10049; 44,36%). When Turkey's place in all fields and EM is examined; it was seen that it was in the 26th rank (n=225; 0,99%) in the all fields, and 18th in the EM field (n=50; 1,32%).
Conclusion	Studies and publications on triage have been conducted most often in the field of emergency medicine. However, Turkey's place in the current literature is far behind compared to the risks it poses. It is recommended to increase the work on this area in our country.
Keywords	Triage; Web of Science Core Collection; Emergency medicine; Turkey

Öz

Amaç	*Bu çalışmanın amacı son yıllarda artan triaj ile ilgili yapılan yayınların bibliyometrik analizini yapmaktır.*
Gereç ve Yöntemle	*Bu çalışmaya dahil edilecek makalelerin incelenmesi, Web of Science Core Collection veritabanı kullanılarak 8 Haziran 2021 tarihinde gerçekleştirilmiştir. Basic search alanından Topic bölümün "triage" terimi yazılarak; "Web Of Science Categories: (All); Document Types: (All); Languages: (English); Timespan: (All); Indexes: (All)" şeklinde arama yapılmıştır. Arama sonuçlarından elde edilen data VOSviewer yazılımına aktarılmış ve sistematik olarak analiz edilmiştir.*
Bulgular	*1980-2021 yılları arasında toplam 22653 yayın tanımlanmıştır. Yayınların en çok Acil tıp alanında yapıldığı (n=3798; 16,76%); çoğunluğunun 2020 yılına ait olduğu (n=2880; 12,71%); En çok Amerika Birleşik Devletlerinden (USA) yayın yapıldığı görülmüştür (n=10049; 44,36%). Türkiye'nin tüm alanlar ve acil tıp alanındaki yeri incelendiğinde; genel toplamda 26. sırada (n=225; 0,99%) acil tıp alanında ise 18. sırada (n=50; 1,32%) olduğu görülmüştür.*
Sonuç	*Triaj ile ilgili çalışma/yayınlar en çok acil tıp alanında yapılmıştır. Ancak Türkiye'nin mevcut literatürdeki yeri barındırdığı risklere nazaran oldukça geridedir. Ülkemizde bu alana yönelik daha fazla çalışma yapılması önerildi.*
Anahtar Kelimeler	*Triaj; Web of Science veritbanı; acil Tıp; Türkiye*

INTRODUCTION

Triage is a selection process performed by health workers aimed at determining the priority of care for the injured in mass incidents where there are a large number of injured people.[1] It is an observational practice that quickly determines the severity and need for medical attention of the injured person without a detailed examination.[1,2] It also includes the planning of the transfer of cases of terrorist attacks, wars, industrial accidents and natural disasters to appropriate centers. Various definitions are used according to the severity of patients' injuries and the priorities of medical care.[3] Triage both increases the operability of medical personnel and strengthens communication between medical personnel.[2,3] The main purpose of the triage application is to save the largest number of lives with available personnel, equipment and facilities. Although triage, which is part of basic trauma and disaster trainings, is a practice made by health professionals, there are also publications emphasizing that it is a practice that rescuers from the public should also know.[2,4]

Web of Science is a website maintained by Clarivate Analytics that provides access to multiple databases providing comprehensive citation data for many different academic disciplines.[5] Scientific data up to 1900 can be searched retrospectively.[6]

Bibliometrics is a statistical method which could quantitative analysis the research papers concerned about one special topic via mathematical ways. It could also access the quality of the studies, analysis the key areas of researches and predict the direction of future studies.[7]

Increasing the population, crowding of cities, traffic problems, natural disasters due to lack of resources, mass attacks, epidemics, as well as situations where a large number of people are affected, increase the importance of triage.[8] The aim of this study is to make a bibliometric analysis of the publications made about the increasing triage in recent years.

MATERİALS and METHODS

Database

The bibliometric of the articles to be included in this study was conducted on June 8, 2021 using the Science Citation Index Expanded (SCI-EXTENDED) database through the Web of Science Core Collection (WOSCC) provided by Thomson Reuters (Philadelphia, PA, USA). In relation to citation indexes, the Social Sciences Citation Index, it has been used Science Citation Index Expanded and Emerging Sources Citation Index. In the basic research area, Triage was written in the subject section and a search was made in the form. "Web of Science Categories: (All); Document Types: (All); Languages: (English); Timespan: (All); Indexes: (All)". During the search, no restrictions were entered regarding the dates of the publications. Year of publication of the publications reached, type of publication (original article, meta-analysis, review, book chapter, etc…) information about the field of science (emergency medicine, internal medicine, general medicine, etc…) and the country of publication was taken and transferred to an excel file. In addition to publications belonging to all fields of science of the Emergency Medicine (EM) sub-dimension was re-searched and the resulting publications were examined under a separate title. When searching, the publication type (for example: compilations, meeting abstracts, editorial materials, papers, letters, etc.) was not restricted and all publication types were included. The data was downloaded in the format (WoS) "Full record and cited references"

Data Analysis

As descriptive statistics, number and % values are given for categorical variables. Tables and graphs of the distribution of publications by fields of science, years, types and countries were made using the Microsoft Excel 2016 version. Visualization software, which has recently been frequently used in bibliometric studies, can produce node-link maps that allow us to intuitively observe the publication outputs, striking points and all other aspects of a research area. In this study, the data were transferred to VOSviewer software and analyzed systematically. VOS

viewer, which allows visualizing the creation of bibliometric networks.[1.6.10] software has been used. VOS viewer, developed by Van Eck and Waltman (www.vosviewer.com) is a literature visualization software that has the advantages of displaying cluster analysis results.[7] In information maps created using VOS viewer, elements are represented as nodes and links Nodes and their tags, such as countries, organizations, authors, citations, and keywords, are proportional to the weight of the analysis components. Publications on triage were retrieved from WOS, the data was analyzed about keywords and Countries of publication. Decoupling between nodes reflects the relationship between components. Although there are many alternative programs to the VOSviewer program for Windows, Linux and Mac, there are three most commonly used alternative programs. The best alternative is NVivo. It's not free, so if you're looking for a free alternative, you could try SciMAT and R program (package bibliometrix). In Top 100 Triage and Emergency medicine articles VOSviewer was used to analyze the Network map, Keywords.

RESULTS

A total of 22653 publications were descripted between 1980 and 2021. It was found that the most publications were made in the field of emergency medicine (n=3798; 16,76%), the majority of which belonged to the year 2020 (n=2880; 12,71%); the most original articles were published (n=17106; 75,51%). General descriptive data are given in Table 1, Table 2, Table 3. The countries where the publications were made were examined. It has been observed that the most publications have been made from the United States. (n=10049; 44,36%) (Table 3).

Publications on triage are most often made in the field of EM. These publications were published most frequently in 2020 (n=360; 9,48%), most often in the United States (n=1797; 47,32%) and most often in the form of original articles (n=3128; 82,36%). Figure 1 shows the number distributions by year. When Turkey's place in all fields and EM is examined; it was seen that it was in the 26th rank (n=225; 0,99%) in the all fields, and 18th in the EM field (n=50; 1,32%).

The size of the node on the WOS viewer maps represents the number of times the country has published or the frequency of the keyword. Larger nodes represent more influential countries; the thickness and distance of dec the nodes represent the strength of cooperative relations between countries. When Figure 2 is examined, it is seen that the United States did the most intensive work on Triage, and then Britain and Germany did it.

When it was determined that one country had at least 2 collaborations, it was seen that a total of 21 countries were in touch with each other. Accordingly, it was found that the country with the highest connection was the United States of America (36568 connections), the country following it was the United Kingdom (8914). It was determined that these two countries are the key nodes in the cooperation network. It is seen that the networks of the first countries are grouped into 3 groups. The relationship network formed in the center of the red United States is seen in the blue UK-based group and then the green group based in Germany (Figure 2).

The magnitude of the points in the WOS visual graphs also represents their frequency, and the keywords for T100 are grouped into 5 sets. The minimum number of repetitions of a keyword was determined to be 2. Of the 100 keywords included in the Triage study, 25 keywords met the threshold. The most searches were associated with the words diagnosis, treatment, emergency medical services and meta-analysis (Figure 3). When the WOS viewer graphs belonging to the Triage studies conducted in the field of emergency medicine were examined, it was found that the countries with the highest connections were again the United States and the United Kingdom (Figure 4). In these studies, the sections that are most associated with the Triage keyword are emergency department, trauma and emergency medical services (Figure 5).

Table 1. Distribution of Articles According to Main Subjects				
Science Field	All fields	%	EM*	%
Emergency Medicine	3798	16.76		
Medicine General Internal	2195	9.68	189	4.98
Surgery	1684	7.43	181	4.77
Public Environmental Occupational Health	1378	6.08	165	4.34
Critical Care Medicine	1310	5.78		
Oncology	1259	5.55		
Cardiac Cardiovascular Systems	1220	5.38	5	0.13
Nursing	1093	4.82	227	5.98
Health Care Sciences Services	997	4.4		
Radiology Nuclear Medicine Medical Imaging	989	4.36		
Obstetrics Gynecology	956	4.22		
Pediatrics	920	4.06	194	5.11
Clinical Neurology	889	3.92		
Pathology	611	2.7		
Peripheral Vascular Disease	575	2.54		
Multidisciplinary Sciences	421	1.86		
Health Policy Services	399	1.76	3	0.09
Medical Informatics	375	1.65		
Infectious Diseases	374	1.65		
Medicine Research Experimental	374	1.65		
Computer Science Information Systems	357	1.58	1	0.03
Orthopedics	339	1.5	123	3.23
Medical Laboratory Technology	320	4.42	1	0.03
Respiratory System	298	1.32		
Psychiatry	294	1.3		
* Publications collaborating with Emergency medicine, EM: Emergency Medicine				

Table 2. List of Article Document Types				
Science Field	All fields	%	EM*	%
Article	17106	75.51	3128	82.36
Proceedings Paper	1786	7.88	238	6.27
Review	1637	7.23	189	4.98
Meeting Abstract	1570	6.93	135	3.55
Editorial Material	829	3.66	175	4.61
Letter	511	2.26	140	3.69
Early Access	283	1.25	40	1.05
Book Chapter	184	0.81	15	0.4
Book Review	54	0.24	1	0.03
Correction	54	0.24	12	0.32
News Item	34	0.15	3	0.08
Note	23	0.1	6	0.16
Poetry	7	0.03		
Reprint	4	0.02		
Biographical Item	3	0.01	1	0.03
Discussion	3	0.01		
Book	2	0.01		
Data Paper	2	0.01		
Retracted Publication	2	0.01	1	0.03
Correction Addition	1	0.01		
Excerpt	1	0.01		
Fiction Creative Prose	1	0.01		
Theater Review	1	0.01		
EM: Emergency Medicine				

Table 3. Geographic of Origin of Articles

Countries/Regions	All fields	%	Countries/Regions	EM	%
Usa	10049	44.36	Usa	1797	47.32
England	2226	9.83	Canada	327	8.61
Canada	1798	7.94	Australia	302	7.95
Australia	1533	6.77	England	253	6.66
Germany	963	4.25	Germany	148	3.9
Italy	908	4.01	France	115	3.03
Netherlands	888	3.92	Spain	105	2.64
France	842	3.72	Netherlands	101	2.66
Peoples R China	781	3.45	Switzerland	86	2.26
Switzerland	541	2.39	Sweden	81	2.13
Spain	516	2.28	Iran	79	2.08
Sweden	482	2.13	Italy	77	2.03
Belgium	416	1.84	Peoples R China	67	1.76
India	402	1.77	South Africa	58	1.53
Japan	402	1.77	Norway	54	1.42
Brazil	323	1.43	Taiwan	53	1.4
Israel	322	1.42	Denmark	51	1.34
Scotland	321	1.42	Turkey	50	1.32
Denmark	311	1.37	Israel	43	1.13
South Africa	281	1.24	Japan	39	1.03
South Korea	266	1.17	South Korea	36	0.95
Taiwan	249	1.10	Belgium	32	0.84
Norway	242	1.07	Singapore	31	0.82
Ireland	239	1.06	Finland	24	0.63
Iran	228	1.01	Saudi Arabia	24	0.63
Turkey	225	0.99			
Singapore	194	0.86			
New Zealand	186	0.82			
Austria	167	0.74			
Greece	145	0.64			

EM: Emergency Medicine

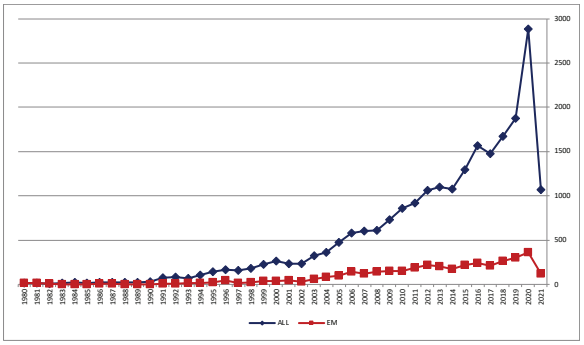

Figure 1. Number of Publications by Years

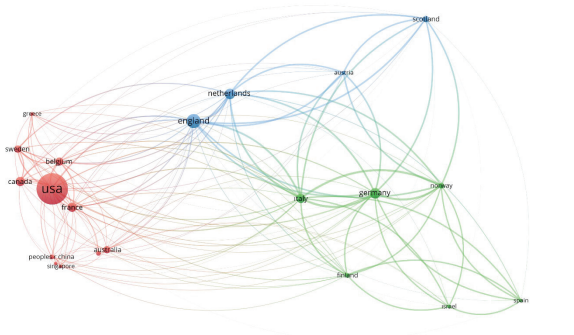

Figure 2. Network Visualization Map of Collaboration of Countries with Top 100 Triage Research

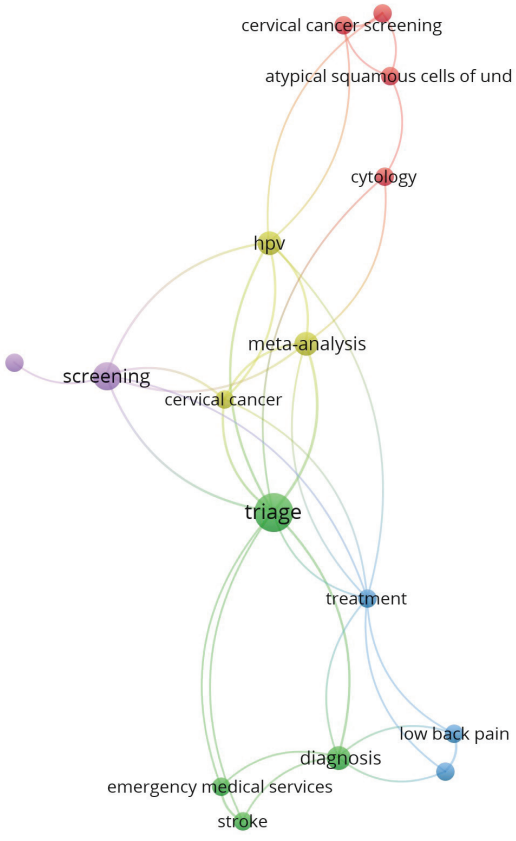

Figure 3. The Network Created by Keywords in The Triage Study in The Top 100 Triage Research

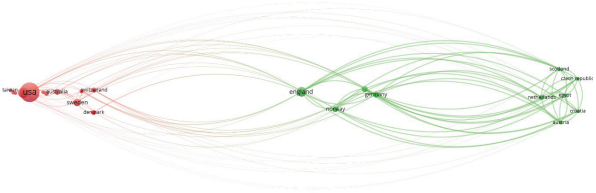

Figure 4. Network visualization map of the cooperation of countries with Triage research in Emergency Medicine

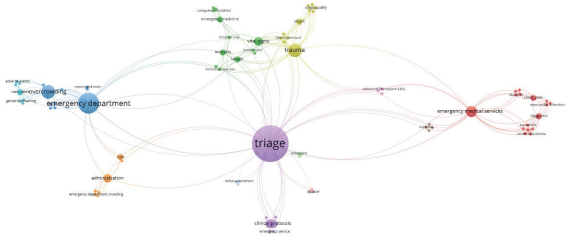

Figure 5. Network visualization map of keywords in Triage research in Emergency Medicine

DISCUSSION

Triage is a practice in which the severity of the injured and the need for medical intervention are quickly assessed in mass events where there are a large number of injured.[8] Mass attacks can be human-caused events such as terrorist attacks, wars, industrial accidents, as well as natural disasters such as earthquakes, floods, storms, tsunamis. In all cases, triage is defined as the initial assessment of cases at the scene, classification according to their severity and planning of their transfer to appropriate centers. Color codes (green, yellow, orange, red, black), scores and definitions (such as minor, moderate, major) are used to classify patients and strengthen communication between medical personnel.[9] Triage has started to be applied routinely in Emergency Departments (ED) in recent years not only in mass events, but also due to the fact that it has started to be used frequently for non-emergency reasons.[10] Triage during disasters may require making decisions that some patients will not receive treatment at all, but it is used in routine practice to determine the severity and sequence of patients' need for medical care.[11] The main purpose of triage is to save more lives in the available facilities and to make the existing team operational in cases where the patient burden far exceeds the availability of medical personnel and material resources.[12,13] Triage has started to appear as an expression that has started to be used frequently in other fields of medicine besides emergency and disaster medicine and in hospital functioning. In fact, it is an action that we often use in everyday life, but we don't name it. It is a natural behavior to always put the most urgent ones at the forefront of our job ranking when we do our daily work.[14] In addition to emergency and disaster situations, triage is used in in-hospital patient care services to decide which patient to take, in which order, and for which period.[15] Triage systems and applications applied within EM organizations are an important application in order to use the facilities at hand more effectively in such situations that exceed the possibilities of local health organizations.

The first studies on triage began in the 1980s. Due to the increase in the population, ease of access to health and the increasing concentration of emergency services, in-hospital triage practices have been implemented in many countries, including our country. Our data "triage" with the keyword "trauma" and "emergency medical services" are words related; most of triage in the ED is related to the fact that is being done. This also indicates that EM has an important role in the development of triage. Dozens of mass incidents occur in our country every year. Some of them climatic and geographical reasons for floods, earthquakes, landslides, natural fire, natural disasters such as storm, while a portion terrorism, bombings, arson, and industrial accidents, such as human induced events. There were 47 suicide attacks in our country between 1996 and 2016, hundreds of people were killed and thousands were injured in these attacks.[16,17] In 2016 alone, there were 16 suicide attacks. Hundreds of earthquakes occur every year in our country, which is located in the active earthquake belt. Earthquakes occur almost every year in which there are casualties.[18] Floods causing loss of life are observed in the northern parts of the country every year.[19] In the light of this information, it should be expected that in our country, where the capacity of local health services is often exceeded, ways to effectively use the available facilities should be investigated. However, when we look at the data we have, our country is 26th in the ranking of countries broadcasting in the field of triage next up is the 18th in the field of emergency medicine it is seen that it is next. Studies on triage were first made in 1993 in Turkey. More than half of the studies were carried out after 2016. Although increasing social events have increased the importance of triage, it has been observed that only Israel has had an important contribution, while the contribution of Middle Eastern countries where there have been intense disasters has been small. This may be related to the possibilities of access to health.

CONCLUSION

Studies and publications on triage have been conducted most often in the field of emergency medicine. However,

Turkey's place in the current literature is far behind compared to the risks it poses. It is recommended to increase the work on this area in our country.

References

1. *American College of Surgeons Committee on Trauma. Prehospital trauma care. In: Resources for Optimal Care of the Injured Patient. American College of Surgeons California, 2006:8-116.*
2. *Demirel ME, Ali İH, Boğan M. Emergency service experience following the terrorist attack in Mogadishu, 14 October 2017, a scene of lay rescuer triage. Am J Emerg Med 2021;40:6-10.*
3. *Saser MS. Guidelines for Field Triage of Injured Patients: Recommendations of the National Expert Panel on Field. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention 2009:12-34*
4. *Nordberg M, Castrén M, Lindström V. Primary trauma triage performed by bystanders: An observation study. Prehosp Disaster Med 2016;31(4):353-57.*
5. *Mongeon P, Paul-Hus A. The journal coverage of Web of Science and Scopus: a comparative analysis. Scientometrics 2016;106:213–228.*
6. *Wikipedia.org [homepage on the internet]. Web of Science [cited 10 February 2021]. https://tr.wikipedia.org/wiki/Web_of_Science*
7. *Van Eck NJ, Waltman L. Software survey: VOSviewer, a computerprogram for bibliometric mapping. Scientometrics 2010;84:523–38.*
8. *Boffard KD. Manual of Definiteve Surgical Trauma Care 3E. Toylar & Francis, 2011:176-235*
9. *Adaş, G, Turgut, N, Akçakaya A. Büyük Afetlerde Sağlık Hizmetlerinin Planlanması Organizasyonu ve Triaj. Okmeydanı Tıp Dergisi 2012;28(2):124-34.*
10. *Salvi F, Morichi V, Vita D, Fallani M, Fulgheri P. Older adults use the emergency department appropriately. Intern Emerg Med 2009;4:93–94*
11. *Petrini, C. Triage in public health emergencies: ethical issues. Intern Emerg Med 2010;5(2): 137-144.*
12. *Gostin LO. Public health and civil liberties in conflict. In: Gostin LO (ed) Public Health law. Power, duty, restraint. University of California Press, 2008:287–488*
13. *Demir MC, Ilhan B. Performance of the Pandemic Medical Early Warning Score (PMEWS), Simple Triage Scoring System (STSS) and Confusion, Uremia, Respiratory rate, Blood pressure and age≥ 65 (CURB-65) score among patients with COVID-19 pneumonia in an emergency department triage setting: a retrospective study. Sao Paulo Med J. 2021;139: 170-77.*
14. *Albrecht C, Neuhold S, Hülsmann M, Strunk G, Ehmsen U, Scholten C, et al. NT-proBNP as a means of triage for the risk of hospitalisation in primary care. Eur J Prev Cardiol 2012;19(1):55–61*
15. *Subbe, CP, Kellett J, Whitaker CJ, Jishi F, White A, Price, S, et. al. A pragmatic triage system to reduce length of stay in medical emergency admission: feasibility study and health economic analysis. Eur J Intern Med 2014;25(9):815-20.*
16. *Wikipedia.org [homepage on the internet]. Disaster [cited 16 May 2021]. Available from: https://en.wikipedia.org/wiki/Disaster*
17. *Wikipedia.org [homepage on the internet]. İntihar saldırıları [cited 05 July 2021]. https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27deki_intihar_sald%C4%B1r%C4%B1lar%C4%B1_listesi*
18. *Raiter Y, Farfel A, Lehavi O, Goren OB, Shamiss A, Priel Z, et al. Mass casualty incident management, triage, injury distribution of casualties and rate of arrival of casualties at the hospitals: lessons from a suicide bomber attack in downtown Tel Aviv. Emerg Med 2008;25(4): 225-29*
19. *Wikinews.org [homepage on the internet]. Sel felaketi [cited 21 Apr 2021]. https://tr.wikinews.org/wiki/T%C3%BCrkiye%27de_sel_felaketi*