# **BIBLIOMETRIC ANALYSIS OF EMERGENCY MEDICINE**

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# ABSTRACT

Emergency medicine is a popular and new medical sub-specialty that provides rapid management of acute critical illness and injuries. In this study, it is aimed to perform bibliometric analysis of the articles about Emergency Medicine using the scientific mapping method. The Web of Science Core Collection (WoS) database was examined within the scope of this study and 3595 articles matching the search criteria were included in the research. For the analysis, the "bibliometrix 3.0" program which was developed in the R environment and "biblioshiny" web interface provider, which was developed for the use and visualization of this

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program, were used. It was found that the first article in the field of emergency medicine was published in 1980. It was also found that there was a significant increase in the number of articles after 1995 and peaked in 2021. Academic Emergency Medicine, Annals of Emergency Medicine and Journal of Emergency Medicine are the most influential journals in terms of publication and citation numbers and indexes. Professor Michelle Lin from the University of California, Professor Wendy C Coates from the UCLA Geffen School of Medicine, and Professor Gregory Luke Larkin from the Yale University School of Medicine are the most influential researchers in this field. Emory University, Michigan University, Brown University, which are American universities, are the most competent institutions in the field of emergency medicine. Recently "leadership", "internsip" and "malpractice" issues are beginning to emerge. USA, Canada and United Kingdom are the leading countries in total number of publications, single-country and multi-country publications. It is considered that the research is original and its results will contribute to the relevant researchers about the publications in the field of emergency medicines in the field of emergency medicines in the field of emergency medicine.

Keywords: Emergency medicine, Bibliometric, Bibliometric analysis, Science mapping.

# **INTRODUCTION**

Emergency medicine is an emergency health service that covers all applications for the fastest return to normal in cases where human health is vitally affected. It is a relatively new medical specialty that provides rapid management of acute critical illness and injuries. Emergency medicine services are provided in the emergency services of hospitals and/or outside the hospital by mobile teams (1).

The basis of the understanding of emergency medicine known today were first laid in the 1960s. In an article published by the American National Academy of Sciences in 1966, it was mentioned that a soldier wounded in Vietnam had a better chance of survival than a civilian shot in New York. Emergency medicine services were reconsidered after this article and the Department of Emergency Medicine was established at the University of Cincinnati in 1970 and the first emergency medicine specialists were trained (2).

Emergency medicine was accepted as a separate

speciality in Turkey after publishing in the Official Gazette in 1993. American emergency medicine specialist Dr. John Fowler's mentorship at Dokuz Eylül University had a great impact on this process. Emergency medicine department has been established and developed in many universities in the period since the first assistant physician started specialization in 1994 (3-5).

The knowledge obtained today continues to increase exponentially every day. It is very difficult to draw meaningful conclusions from this heap of information. Scientific disciplines are intertwined with the increasing knowledge and the situation becomes more complex. New techniques are needed to be able to evaluate among such a large amount of information. One of these techniques is bibliometrics and the science mapping technique, which is a modern bibliometric method (6,7).

Campbell produced the first bibliometric study using statistical methods to quantify the topics as a whole in

The access date to the database was 21.10.2022, and the articles dated 2022 were excluded since the year 2022 was still in progress while data were being collected from the database. As a result of filtering, 3595 articles published between 1980-2021 were analyzed.

Third and final step, is to perform bibliometric analysis of the articles reached as a result of filtering. At this step, the "bibliometrix 3.0" program which was developed in the R environment and "biblioshiny" web interface provider, which was developed for the use and visualization of this program, were used.

Bibliometrix is one of the newest free-to-use software running in the R environment to systematically perform scientific resource mapping (15). In our study, articles about Emergency Medicine were subjected to General Structure Analysis including Data Set, Resources, Authors, Documents, and Intellectual Structure Analysis including Conceptual Networks and Social Networks headings by using bibliometric analysis and cooperation networks were visualized.

### RESULTS

It is seen that the first study on the Emergency Medicine study was conducted in 1980. The number of authors mentioned in 3595 articles examined for the years 1980-2021 is 11,666 and the number of studies with a single author is 304. While the annual production of articles in the field of Emergency Medicine between 1980-1994 was limited to 0-20, it has increased since 1995 and the annual number of 353 articles has been reached in 2021.

As can be seen in Figure 3, a trend line has been added to the Annual Scientific Production Amounts graph. Together with the trend line, the R<sup>2</sup>-Confidence coefficient and the trend line equation were found. It can be said that the closer R<sup>2</sup> value to the number 1 can be accepted as a better representation of the trendline data values. In our study, the R<sup>2</sup> value was very close to 1 as 0.93, so it represented the values well. The equation representing the trend line is presented on the graph.

The publications in 2019 received the most annual average citations, with an average of 2.1 citations regarding the annual average citations of each publication.

From 1980 to 2019, there has been an increasing trend



Fig 3. Annual Scientific Production ve Average Citations Per Year

publications (8). Although Otlet used the word "bibliometric" in 1934 (9), Pritchard explained bibliometrics as the application of statistical methods to publications (10,11). The data obtained as a result of the bibliometric analysis provides a solid roadmap for further investigation in the area in question (12).

In this study, it is aimed to perform bibliometric analysis of the articles about Emergency Medicine using the scientific mapping method.

# MATERIALS AND METHODS

The steps followed while investigating the Emergency Medicine issue are shown in Figure 1 as a flow chart. The first step in science mapping articles is to select a database with the best quality data about the research topic. The data of this study was obtained from the Web of Science Core Collection (WoS) database, which is generally accepted and includes high quality academic articles. WoS, covers all article types. It keeps records of all authors, institutional addresses and bibliographic references for each publication (13).

The second step is to extract and filter the influential articles in the database. The widely used Salsa (Search, Appraisal, Synthesis and Analysis) method has been applied in order to collect accurate data in the WoS database. There are four basic steps in the article search method: search (defining the search string and database types), evaluation (predefined literature inclusion and exclusion and quality assessment criteria), synthesis (extracting and categorizing data) and analysis (describe the result and finally come to a conclusion) (SALSA) (14). In order to make an accurate and realistic data analysis according to the Salsa Method, the WoS database was searched using the parameters in Figure 2. Thus, the publications related to Emergency Medicine, which is the subject of the article, were reached.



in the annual average of citations received by articles. The high number of citations of the articles in recent years and the high number of citations in a short time show that these articles are influential articles in the field. Because time is needed for articles to be cited.

#### Sources

Journals that publish the most articles in the field of Emergency Medicine are Academic Emergency Medicine (NP:533), Annals of Emergency Medicine (NP:337) and Journal of Emergency Medicine (NP:200). Journals with the highest H index are Academic Emergency Medicine (h:53), Annals of Emergency Medicine (h:38) and Journal of Emergency Medicine (h:28). Although the Western Journal of Emergency Medicine is in the 7th place according to the h index, it draws attention by publishing 177 articles (Figure 4).

Table 1 shows the top 20 journals (Source Local Impact) ranked by the total number of publications. 60.63% (2180/3595) of the total articles were published in these top 20 journals. Academic Emergency Medicine Journal and Annals of Emergency Medicine Journal represent 14.82% (533/3595) and 9.37% (337/3595) of all articles, respectively. The most cited journal on Emergency Medicine is Academic Emergency Medicine with 12791 citations.



Source	NP	TC	TC/NP	h_index	PY_start
Academic Emergency Medicine	533	12791	24	53	1994
Annals Of Emergency Medicine	337	7721	23	38	1980
Journal Of Emergency Medicine	200	2860	14	28	1999
Western Journal Of Emergency Medicine	177	1635	9	19	2008
Aem Education And Training	136	736	5	13	2017
Pediatric Emergency Care	106	1317	12	20	1992
Emergency Medicine Journal	103	1709	17	22	2001
Canadian Journal Of Emergency Medicine	99	1050	11	17	2007

# Table 1: Source Local Impact

American Journal Of Emergency Medicine	97	1244	13	19	1985
Emergency Medicine Australasia	96	836	9	15	2007
Emergency Medicine Clinics Of North America	56	632	11	13	1999
International Journal Of Emergency Medicine	53	514	10	13	2008
European Journal Of Emergency Medicine	45	698	16	14	2003
Cureus	35	129	4	6	2015
Clinical Pediatric Emergency Medicine	23	138	6	6	2008
African Journal Of Emergency Medicine	21	162	8	7	2011
BMC Emergency Medicine	16	209	13	8	2009
Journal Of Accident & Emergency Medicine	16	267	17	5	1994
Resuscitation	16	358	22	10	1984
Academic Medicine	15	371	25	10	1990

#### Table 1: Source Local Impact

NP = Number of publications, TC = Total citations, TC/NP = Citations per paper, PY\_start = Publication year starting.

Academic Medicine (TC/NP:25), Academic Emergency Medicine (TC/NP:24) ve Annals Emergency Medicine (TC/NP:23) journals have the highest average citation value per article. When evaluated according to publication year, AEM Education and Training Journal obtained high NP, TC, TC/NP and h-index statistics, although it started its publication life in 2017.

Journal clustering analysis was performed using the Bradford's Law tab in the Bibliometrix software in order to identify the most influential journals on Emergency Medicine from a different perspective.

Bradford's Law was first defined in 1934 by S.C. Bradford. According to this law, only a few journals contain the largest proportion of literature for any scientific field. The remainder of the literature is published in different journals, each of which may contain only one or a few articles. According to Bradford's Law, the sources in the first region (Zone 1) constitute the core of the literature and first region can be calculated to identify the most influential journals in the field (16).

According to this interpretation, called Bradford's Law, articles in a certain field are neither perfectly concentrated in the core sources, nor showed a completely random distribution, moving away from the scientific ground (17).

Our analysis according to Bradford's Law is presented in Figure 5. According to this law, 4 journals are in the core journal (Zone 1) region and are the most effective resources in this regard. Apart from these, 11 journals are in Zone 2 and 461 journals are in Zone 3. While the journals in Zone 1 occupy 0.8% of all journals, they contain 37.6% of all publications. The first 4 magazines are shown on the figure.



Fig. 5: Bradford's law

CHINA	59	51	8	0,14
IRAN	55	49	6	0,11
GERMANY	47	38	9	0,19
FRANCE	36	27	9	0,25
ITALY	28	22	6	0,21
NEW ZEALAND	19	16	3	0,16
KOREA	18	17	1	0,06
SWITZERLAND	18	12	6	0,33
ISRAEL	17	11	6	0,35
NETHERLANDS	17	11	6	0,35
SOUTH AFRICA	17	11	6	0,35
INDIA	16	14	2	0,13
JAPAN	15	11	4	0,27
SINGAPORE	15	12	3	0,20
SPAIN	15	9	6	0,40

### Cont. Table 3: Corresponding Author's Country

 $SPAIN15960,40TPC = Total number of publications by the corresponding author's country, SCP = Single country publications, MCP = Multiple country publications, MCP_Ratio=MCP/TCP.$ 



### Authors

An author's h-index is the maximum number of publications that person has at least the same number of citations. The number "h", which is the value of this indicator, shows that an academic has at least "h" publications that have received "h" citations. The H-index measures how consistent the citations are, which is more important than the total number of citations. The author with the highest H-index is LIN M (h:13).

The G-index was determined for the performance of the author's most read articles. The author with the highest G-index is also LIN M (g:26). It generally takes more than 5 years for publications to be cited. One way to compare academics with academic careers in different time periods is to divide the h-index by the number of years they have been academically active. This index is defined as the m-index (18). The author with the highest m-index is SANTEN S (m:1). SANTEN S and CHAN TM are the authors who are among the top 20 influential authors and have started their publication life most recently -2012 (Table 2).

Corresponding Author's Country of the first 20 relevant authors is presented in Table 3. In Table 4, it is seen that the USA, Canada, England, Australia and Turkey are dominant in the field of Emergency Medicine and are among the leading countries in terms of related authors. The USA has the highest number of publications in the total number of articles (TPC:2171), the number of single country publications (SCP:2008) and the number of multi-country publication (MCP:163). The highest ratio for multi-country publication belongs to Spain (0.40).

Author	h_index	g_index	m_index	ТС	NP	PY_start
Lin M	13	26	0,867	692	31	2008
Coates WC	12	17	0,545	346	26	2001
Larkin GL	12	15	0,48	477	15	1998
Marco CA	12	22	0,522	563	35	2000
Perina DG	12	21	0,462	555	21	1997
Sanders AB	12	18	0,308	497	18	1984
Bandiera G	11	17	0,55	328	23	2003
Beeson MS	11	22	0,524	494	26	2002
Carpenter CR	11	16	0,647	551	16	2006
Hobgood C	11	19	0,524	374	19	2002
Santen SA	11	16	1	290	21	2012
Chan TM	10	20	0,909	466	20	2012
Holliman CJ	10	14	0,323	256	14	1992
Khandelwal S	10	16	0,833	274	18	2011
Pines JM	10	19	0,526	413	19	2004
Sklar DP	10	17	0,323	464	17	1992
Vanrooyen MJ	10	12	0,37	232	12	1996
Yarris LM	10	13	0,714	226	23	2009
Binder LS	9	11	0,273	493	11	1990
Counselman FL	9	19	0,36	378	22	1998

#### Table 2: Author Impact

NP = Number of publications, TC = Total citations, PY\_start = Publication year starting.

Country	ТРС	SCP	МСР	MCP_Ratio
USA	2171	2008	163	0,08
CANADA	244	185	59	0,24
UNITED				
KINGDOM	143	124	19	0,13
AUSTRALIA	131	109	22	0,17
TURKEY	70	69	1	0,01

Table 3: Corresponding Author's Country

According to Lotka Law, 60%, 15% and 7% of authors contribute to a single article, 2 articles, and 3 articles in the field of study, respectively (19). When the articles and authors are examined within the framework of Lotka law, the ratio of affect of contributing authors on the Emergency Medicine study field with a single article, two articles, three articles, four articles and five articles is 76.5%, 13.1%, 4.2%, 2.4% and 1,2%, respectively. It was seen that the results of the study did not comply with the Lotka law (Figure 6).

### Documents

Authors choose their keywords to best express their article. Assuming that keywords represent the article content; it would be correct to determine the current topics and themes of a research topic by taking keyword analysis as the basis. Bibliometrix was used to obtain data on the keyword frequency (repeat count) of the Emergency Medicine research topic. The word cloud (Word Cloud) of the keywords obtained using Bibliometrix is visualized in Figure 7.

The word cloud visualizes current issues in the Emergency Medicine research field and the first 50 words are presented in a pictorial and tabular form according to the Author's Keywords option, which is one of the Bibliometrix sub-tabs. The size of the words in the word cloud is directly proportional to the frequency of their appearance in the data set.

Five most common keywords according to the Author's Keywords option are Emergency Medicine, Education, Medical Education, Emergency Department ve Curriculum.



Fig. 6: Lotka's Law



Fig. 7: Word Cloud

The four-term Thematic Evolution Map presented in Figure 10 was conducted to evaluate how the Emergency Medicine themes developed historically. The first 200 author keywords, which are used jointly at least 5 times, were used as a base value in the Bibliometrix program (20).

The thematic development of Emergency Medicine research between 1980 and 2021 has been tried to be analyzed from a dynamic perspective. The research period (1980-2021) was divided into three successive sub-periods by considering the number of articles and the time period.

In the first time periods, the time was kept longer, and the time between the years was narrowed as we approached the present day. In this way, the development of Emergency Medicine, especially in recent years, will be seen more clearly. As a result, the entire research period (1980-2021) was divided into four successive subperiods (1980:2005-26 years, 2006:2014-9 years, 2015:2018-4 years, 2019:2021-3 years).

Our main theme, Emergency Medicine, is available from the first period to the last one, however it was supported by different sub-themes in each period. While Legal Briefs and Emergency Department came to the fore in the 1980-2005 period, Emergency Department and Education themes came to the fore in the 2019-2021 period. It is noteworthy that the Leadership theme has emerged recently. Emergency Medicine theme during this period is supported by Emergency Medical Services, Emergency Medicine, Malpractice, and Internship and Residency sub-themes.

#### **Social Structure**

The results of the author's collaboration analysis (Authors Collaboration Network) are given in Figure 11. The analysis was based on 50 circles. Each circle in the figure represents an author.



Fig. 10: Thematic Evoluation (1980–2021)



Fig. 11: Authors collaboration network

In order to better understand the variation of the study subject in different time periods (Word Dynamics), Author Keyword frequencies, which include a 21-year time interval from 1991 to 2021, are divided into 8 time periods, the first of which is 3 and the others are 4 years.

The results obtained from Bibliometrix on Emergency Medicine for the change of the Top 10 Keyword Frequency by Years is visualized in figure 8. It is seen that the word Emergency Medicine has been in a constant increasing trend since 1991 and the frequency of use has increased considerably in recent years. The frequency of use reached 2735 between 2018 and 2021. It is seen that the keyword Education is increasingly used together with the Emergency Medicine keyword.

#### **Citation Analysis**

An article written by HOCKBERGER RS in 2001 and another article written by OLSSON T in 2004 are the most prominent articles with local citation (LC):58 and global citation (GC):193 values, respectively. In Table 4, the most cited article in recent years is COUNSELMAN FL/2017 with LC:31 and GC:73 values.

The article with the highest LC/YYP (7.750) value is COUNSELMAN FL/ 2017 and the article with the highest GC/YYP (365.33) value is CADOGAN M/ 2014. These two articles can be stated as the most influential articles about Emergency Medicine research with their contents. According to the percentage of LC, the most effective article is MACY J (1995) and KIRSCH TD (1997) with 64.10%.



Fig. 8: Word Dinamics

Document	YP	LC	LC/YYP	GC	GC/YYP	Local Citations %(LC/GC)
HOCKBERGER RS, 2001, ANN EMERG MED	2001	58	2,900	153	7,650	37,91
MANTHEY DE, 2010, ACAD EMERG MED	2010	37	3,364	60	5,455	61,67
ARNOLD JL, 1999, ANN EMERG MED	1999	36	1,636	112	5,091	32,14
COUNSELMAN FL, 2017, J EMERG MED	2017	31	7,750	73	18,250	42,47
CRANE JT, 2000, ACAD EMERG MED	2000	30	1,429	103	4,905	29,13
BEESON MS, 2013, ACAD EMERG MED	2013	28	3,500	72	9,000	38,89
CADOGAN M, 2014, EMERG MED J	2014	28	4,000	177	25,286	15,82
MACY J, 1995, ANN EMERG MED	1995	25	0,962	39	1,500	64,10

#### Table 4: Most Local Cited Document

KIRSCH TD, 1997, ACAD EMERG MED	1997	25	1,042	39	1,625	64,10
WALD DA, 2007, ACAD EMERG MED	2007	25	1,786	41	2,929	60,98
CHAPMAN DM, 2004, ANN EMERG MED	2004	24	1,412	65	3,824	36,92
CYDULKA RK, 2008, ANN EMERG MED	2008	24	1,846	93	7,154	25,81
TAKAYESU JK, 2014, ACAD EMERG MED	2014	24	3,429	122	17,429	19,67
COATES WC, 2004, ACAD EMERG MED	2004	23	1,353	40	2,353	57,50
MOORHEAD JC, 1998, ANN EMERG MED	1998	22	0,957	56	2,435	39,29
OLSSON T, 2004, J INTERN MED	2004	22	1,294	193	11,353	11,40
HAYDEN SR, 2005, ACAD EMERG MED	2005	22	1,375	46	2,875	47,83
BURDICK WP, 1998, ACAD EMERG MED	1998	21	0,913	38	1,652	55,26
KUHN G, 2009, ANN EMERG MED	2009	21	1,750	115	9,583	18,26
AKHTAR S, 2009, ACAD EMERG MED	2009	21	1,750	130	10,833	16,15

Cont. Table 4: Most Local Cited Document

#### **Conceptual Structure**

The co-occurrence network of the Keywords of the Authors (Author's Co-occurrence Network) is shown in Figure 9. Emergency Medicine articles are divided into 4 node clusters consisting of circles, and each circle in the clusters represents an author keyword.

The connecting lines between the circles mean that there is a relationship between the circles to which they are connected. The thickness of the lines is directly proportional to the intensity of the relationship.

The red cluster with the word Emergency Medicine is the cluster with high centrality. The blue, green and purple clusters are linked to the red cluster in terms of themes. The keywords Emergency Medicine, Education and Medical Education predominantly represent the red cluster. The blue cluster is represented by Research, Emergency, Emergency Department and Pediatric Emergency Medicine. The keywords Simulation, Resident Education, Resuscitation, Critical Care, Assesment make up the green cluster, and Malpractice, Lawsuit, and Legal Briefs keywords form the purple cluster. The strongest network is between Emergency Medicine-Education and Emergency Medicine-Medical Education pairs. It is possible to say that the bond is strong due to the thickness of the line between them.



Fig. 9: Co-occurence Network

It is seen that the first 50 authors working on Emergency Medicine are gathered in 5 clusters. The red, blue, purple, green and orange cluster consists of 12, 12, 11, 4 and 2 authors, respectively. In the red cluster Marco CA has the largest number of articles and has strong collaboration within the cluster. While Lin M has the largest number of articles in the blue cluster, Coates WC has the strongest collaboration within the cluster. Authors in the Purple, Green, and Orange clusters are not superior to each other in terms of number of articles.

It is possible to say that the strongest network connection is between Marco CA - Counselman FL in the red cluster. There is strong collaboration between Coates WC - Yarris LM in the blue cluster and Perina DG - Thomas HA in the purple cluster. We can understand this situation from the thickness of the line between them.

When analyzing the inter-institutional cooperation analysis, 50 nodes were taken as basis and Louvain Algorithm was used. Each node represents an institution. At least 2 common relations are taken as basis for the node. It is found that institutions are aggregated in 3 clusters in the Emergency Medicine literature. The red, green and blue cluster consists of 25, 16 and 9 institutions, respectively. The institution with the largest number of publications is Emory University in the green cluster. This institution is followed by Michigan and Brown Universities in the red cluster. It is possible to evaluate this from the size of the font. The strongest network connection is between Univ Toronto and Mcmaster Univ in the blue cluster. There is a strong collaboration between Massachusetts Gen Hos - Bringham and Womens Hosp - Harvard Univ - Harvard Med Sch in the green cluster. In the red cluster, there is a strong collaboration between Brow University and Yale University.

When analyzing the Cross-Country Collaboration Network, 50 node points were taken as basis and Louvain Algorithm was used. Each ellipse represents a country. Regarding the Emergency Medicine literature, it is found that there are 3 clusters on the basis of countries. The red cluster consists of 21 countries, the blue cluster consists of 20 and the green cluster consists of 3 countries. Other countries are not in any cluster. The red cluster is the cluster with the centrality, and the USA is at the center of cross-country Collaboration. Countries other than the USA do not dominate the number of publications. When the blue and green clusters are examined, it is seen that the cooperation between countries is made with neighboring countries. The strongest cooperation is between the USA and Canada.

# DISCUSSION

In our study, studies on "Emergency Medicine" were examined in the WoS database and 3595 articles were identified, the first of which was published in 1980. It was observed that the production of articles was low until 1994, showed an increasing momentum since 1995 and peaked in 2021. Two developments in 1979 played an important role in the structuring of emergency medicine services. One of them is that the American Board of Medical Specialists has accepted Emergency Medicine as the 23rd Medicine discipline. The other is the meeting on "Planning and Organization of Emergency Medical Services" held by the World Health Organization in France (21). It is considered that these developments were effective in the publication of the first article in 1980 led to a significant increase in academic publications due to the spread and development of the emergency medicine branch.

When the most influential journals in the field of Emergency Medicine are examined in terms of the number of articles published the number of citations and h indexes; it was found that the "Academic Emergency Medicine" journal was in the first place with 533 articles, 12,791 citations and 53 h index. This journal is the official publication of the Society for Academic Emergency Medicine (SAEM) and publishes information on emergency medicine practices, education and research. "Annals of Emergency Medicine" ranked second with 337 articles, 7,721 citations and 38 h index. It is the official publication of the American College of Emergency Physicians and is a journal covering all aspects of emergency medical care. The third most influential journal is the "Journal of Emergency Medicine" with 200 articles, 2860 citations and an h index of 28, and is the official publication of the American Academy of Emergency Medicine. It covers the training of emergency physicians and studies on emergency medicine practices. Although it started its publication life in 2017, "AEM Education and Training" magazine, which has a very high number of publications and citations, is another official publication of SAEM. It has been getting a lot of attention lately. It is thought that being official publications of leading professional societies in the field of emergency and high impact factor play a role in being an influential journal.

In terms of countries, USA, Canada and United Kingdom are the countries with the highest number of publications in the field of emergency medicine. The USA ranks first in the total number of publications, single-country and multi-country publications. Emergency medicine is a popular specialty in the USA and there are 154 institutions that train emergency physicians (22). The aim of emergency medicine education in the USA is to develop leadership skills to carry out academic and administrative duties as well as to train doctors who will deal with all acute clinic situations. There is also a strong focus on research and publication as part of education (23).

When researchers are evaluated in terms of h indices; Professor Michelle Lin, who works at the Department of Emergency Medicine, University of California, was found to be the most influential person in the field of emergency medicine, with 31 publications and 692 citations. Wendy C Coates, professor of emergency medicine at the UCLA Geffen School of Medicine, has 26 publications and 346 citations. Professor Gregory Luke Larkin of the Department of Emergency Medicine, Yale University School of Medicine, is the third most influential researcher with 15 publications and 477 citations. Sally A. Santen, who works as an Associate Professor in the emergency medicine department at The University of Cincinnati College of Medicine, is an academically remarkable researcher with 21 publications and 290 citations, although she started her publication life in 2012. Another researcher who made the first publication on emergency medicine in 2012 and succeeded in a short time is Associate Professor Teresa M. Chan, who works in emergency medicine department of Canada McMaster University. The most influential authors are predominantly American and female.

When the keywords in emergency medicine are examined, "emergency medicine" is the most commonly used word. "Education" and "medical education" are in the second and third place, and their usage trends are increasing every year. Medical education has an evidence-based approach to train the doctors of the future (24). For this reason, educational studies are thought to be a popular subject in emergency medicine, which is considered as a new field of science.

It has been found that the most effective study in the field of emergency medicine in terms of local citation was the study titled "The model of the clinical practice of emergency medicine" which was published by Hockberger RS et al., in 2001 in Ann Emerg Med journal. In this study, basic approaches about common cases, symptoms and practices in emergency medicine are explained (25). When evaluated in terms of general citation, it was found that the most cited study was "Rapid Emergency Medicine score: a new prognostic tool for in-hospital mortality in nonsurgical emergency department patients" titled study which was published in J Intern Med in 2004 by Olsson T et al. In this study, a scoring system was developed as a strong predictor of in-hospital mortality in non-surgical patients admitted to the emergency department (26). The study that attracts attention due to the high number of citations despite of publishing in recent years is the study titled "The 2016 model of the clinical practice of emergency medicine" published in J Emerg Med magazine in 2017 by Counselman FL et al. This study is the updated version of the most locally cited study (25,27).

# CONCLUSION

As a result, since the issue of emergency medicine is of vital importance, the number of articles published in this field is increasing day by day. With this study, a missing issue in the literature was eliminated and bibliometric analyzes of the articles in the WoS database on emergency medicine were made, and the process from 1980, when the first study was made, until this time, was revealed in all aspects. It is considered that the research is original and its results will contribute to the relevant researchers about the publications in the field of emergency medicine. It is recommended to plan similar studies in other databases in future studies.

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