PubMed-indexed neurosurgical research productivity of Iraq-based neurosurgeons

Samer S. Hoz1, Zahraa F. Al-Sharshahi1, Ignatius N. Esene1, Ali A. Dolachee1, Ali M. Neamah1, Aktham O. Al-Khafaji1, Mohammed A. Al-Dhahir1, Hatem Sadik4

1Department of Neurosurgery, Neurosurgery Teaching Hospital, Baghdad, Iraq, 2Department of Neurosurgery, Division of Neurosurgery, Faculty of Health Sciences, University of Bamenda, Bamenda, Cameroon, 3Department of Neurosurgery, Strong Memorial Hospital University, Rochester, New York, United States, 4Department of Intensive Care, Hammersmith Hospital, Imperial College Healthcare NHS Trust, London, United Kingdom.

E-mail: Samer S. Hoz - hozsamer2055@gmail.com; *Zahraa F. Al-Sharshahi - zahraaalsharshahi@rcsi.com; Ignatius N. Esene - ignatiusesene@yahoo.com; Ali A. Dolachee - ignatiusesene@yahoo.com; Ali M. Neamah - Ali.moh.neamah@gmail.com; Aktham O. Al-Khafaji - akthamalkhafaji@gmail.com; Mohammed A. Al-Dhahir - dr.mohammed.aldhahir@gmail.com; Hatem Sadik - hatemsadik@gmail.com

INTRODUCTION

Clinical research is attracting growing attention worldwide, with a staggering number of studies continuously fuelling the literature. Each year, approximately 800,000 papers are added to PubMed, the comprehensive database of medical articles compiled by the US National Library of Medicine. Neurosurgery is one of the fields that have witnessed...
substantial growth over the past few decades, with a proportionate rise in the number of landmark studies published each year.\(^6\)

In Iraq, contemporary neurosurgery was founded in 1966. Over the past few decades, the population demands for neurosurgical care has increased enormously, in conjunction with the ongoing war and armed conflict in the region. This review was designed with the following questions in mind: (1) what is the current status of neurosurgery publications from Iraq? (2) What are the current trends? (3) What is the most common type of neurosurgical research conducted in Iraq (design and topic wise)? (4) Are there regional disparities in the output of neurosurgery research? (5) Are there differences in research productivity between neurosurgery centers around the country?

To the best of our knowledge, this is the first paper on this topic. Our purpose is not only to estimate the academic productivity of neurosurgeons in Iraq over the past two decades but also to underline the current challenges facing clinical research in general and neurosurgical research in particular in Iraq and to suggest potential solutions.

**MATERIALS AND METHODS**

An online PubMed Medline database search was conducted by the first and second authors of the paper using various combinations of the following keywords: “Neurosurgery” “Neurosurgeon” “Neurological surgery” “Iraq,” “Iraqi.” The search results were filtered to include only studies published between May 2003 and October 2021. Next, a PubMed search by author name was done for all neurosurgeons and neurosurgery residents practicing in Iraq, based on the registry data available from the Iraqi association of neurological surgeons, to retrieve further studies not covered by the search terms.

The inclusion criteria were (1) papers describing neurosurgery research (2) research conducted in Iraq-based neurosurgery services, and (2) papers with, at least, one of the coauthors being a neurosurgeon practicing in Iraq.

The exclusion criteria were (1) research conducted on non-Iraqi patients, and (2) commentaries, and news accounts. A search for the specialty and affiliation of all coauthors was then carried out to account for Iraq-based coauthors, including neurosurgeons, neurosurgery residents, and medical students [Figure 1]. Information was extracted in relation to the following parameters: authors, year of publication, author’s affiliation, author’s specialty, type of article, article type, article citation, journal name, journal impact factor, and topic. This data was then tabulated and analyzed.

**RESULTS**

Between 2003 and 2021, a total of 52 PubMed indexed papers were published from Iraq.\(^1,2,4-10,35-17,20,24,26-64,21-34\) All publications have been clustered in the period of 2012–2021. From 2012 to 2016, only four papers were published, one per year. The number of publications increased from 2017 to 2021, with an average of seven papers per year.

The most common type of articles was “case report” (\(n = 14\)), followed by “letter-to-editor,” (\(n = 13\)), “prospective cohort” (\(n = 4\)), “case series” (\(n = 4\)), and “case-control studies” (\(n = 4\)). Only one randomized controlled trial has been published.

Neurotrauma (\(n = 10\)) and vascular neurosurgery (\(n = 10\)) were the two most common topics followed by general neurosurgery (\(n = 8\)), cranial/tumor (\(n = 6\)), and spine (\(n = 6\)). Four papers on neuroimaging and endoscopic neurosurgery were written, each with two publications. A paper was published on each of the following topics: functional neurosurgery, radiosurgery, stem cell research, and neurosurgery applications for gene therapy [Table 1].

The 40 papers were produced by a total of 30 authors, including three neurosurgery residents. The number of publications per author ranged between 1 and 21 (median = 1). Most of the studies came from the city of Bagdad (\(n = 46\)), with just nine studies coming from peripheral governorates. The Neurosurgery Teaching Hospital in Bagdad was the neurosurgery center with the highest research output (\(n = 38\)).

**DISCUSSION**

This review is the first to assess the academic productivity of neurosurgeons and neurosurgery residents in Iraq from 2003 to 2021. It focuses on neurosurgical research but also seeks to shed light on the disadvantaged place of clinical research in...
Table 1: PubMed-indexed Neurosurgery papers published by Iraq-based neurosurgeons between 2003 and 2020.

| S. No. | Article                          | Year | Study type          | Neurosurgical topic               | Journal                          | Impact factor | Citations |
|-------|---------------------------------|------|---------------------|-----------------------------------|----------------------------------|---------------|-----------|
| 1     | Hammadi et al. [32]             | 2012 | Prospective         | Stem cells research               | Int J Stem Cells                 | 2.020         | 6         |
| 2     | Shamran et al. [34]             | 2014 | Case control        | Gene therapy                      | Int J Med Sci                    | 2.399         | 10        |
| 3     | Shamran et al. [35]             | 2015 | Case-control        | Gene therapy                      | Int J Med Sci                    | 2.399         | 8         |
| 4     | Khazendar et al. [37]           | 2016 | Case report         | Spine                             | World Neurosurg                  | 1.723         | 4         |
| 5     | Al-Baldawi [3]                  | 2017 | Technical note      | Cranial/endoscopic                | Acta Neurochir (Wien)            | 2.122         | 0         |
| 6     | Al-Tameemi et al. [14]          | 2017 | Cross-sectional     | Neuroimaging/Spine                | Asian Spine Journal              | 1.300         | 3         |
| 7     | Baba-Rasul et al. [17]          | 2017 | Case report         | Pediatrics                        | World Neurosurg                  | 2.399         | 3         |
| 8     | Hoz et al. [36]                 | 2017 | Letter              | Neurotrauma                       | J Neurosci Rural Pract           | 0.740         | 10        |
| 9     | Satyarthee et al. [38]          | 2017 | Case report         | Pediatric                         | J Pediatr Neurosci               | 0.52          | 3         |
| 10    | Abdali et al. [1]               | 2018 | Letter              | Neurotrauma                       | J Neurosci Rural Pract           | 0.740         | 2         |
| 11    | Al-Azzawi et al. [41]           | 2018 | Prospective         | Functional                        | Arab Journal of Urology          | 0.940         | 2         |
| 12    | Alhillo et al. [4]              | 2018 | Case report and     | Neurotrauma                       | J Clin Neurosci                  | 1.593         | 3         |
|       | literature review               |      |                     |                                   |                                  |               |           |
| 13    | Alhillo et al. [7]              | 2018 | Case report         | Vascular                          | BMJ Case Rep                     | 0.44          | 0         |
| 14    | Darwazeh et al. [19]            | 2018 | Retrospective       | Neuroimaging                      | World Neurosurg                  | 2.399         | 4         |
| 15    | Dimitrov et al. [20]            | 2018 | Letter              | Cranial/tumor                     | Neurol India                     | 2.708         | 0         |
| 16    | Essa et al. [24]                | 2018 | Case control        | Spine                             | J Clin Neurophysiol              | 1.982         | 2         |
| 17    | Faraj et al. [29]               | 2018 | Prospective         | Skull base/endoscopic             | Neurosciences (Riyadh, Saudi Arabia) | N/A           | 0         |
| 18    | Hoz et al. [40]                 | 2018 | Case report and     | Cranial/tumor                     | Sao Paulo Med J                  | 0.955         | 3         |
|       | literature review               |      |                     |                                   |                                  |               |           |
| 19    | Hoz et al. [41]                 | 2018 | Letter              | Vascular                          | J Neurosci Rural Pract           | 0.740         | 2         |
| 20    | Hoz et al. [50]                 | 2018 | Case report         | Cranial/Tumor                     | Bull Emerg Trauma                | 0.600         | 2         |
| 21    | Arkawazi et al. [13]            | 2019 | Prospective         | Radiosurgery                      | Open Access Maced                | 0.238         | 1         |
| 22    | Duarte-Valdivieso et al. [24]   | 2019 | Case report         | Vascular                          | Neurol India                     | 2.708         | 0         |
| 23    | Hamawandi et al. [39]           | 2019 | RCT                 | Spine                             | Pain Res Manag                   | 1.685         | 1         |
| 24    | Hoz et al. [51]                 | 2019 | Case series and     | Pediatric/Neurotrauma             | Br J Neurosurg                   | 0.960         | 5         |
|       | literature review               |      |                     |                                   |                                  |               |           |
| 25    | Aktham et al. [2]               | 2020 | Case report         | Vascular                          | Neurol India                     | 2.708         | 2         |
| 26    | Aljuboori et al. [8]            | 2020 | Case series         | Spine                             | Surg Neurol Int                  | 0.970         | 0         |
| 27    | Fahad et al. [127]              | 2020 | Case control        | Spine                             | Int J Crit Illn Inj Sci          | 0.364         | 0         |
| 28    | Hoz et al. [43]                 | 2020 | Historical vignette | General                           | World Neurosurg                  | 2.399         | 0         |
| 29    | Hoz et al. [42]                 | 2020 | Letter              | General                           | Surg Neurol Int                  | 0.970         | 1         |
| 30    | Hoz et al. [39]                 | 2020 | Case series         | Neurotrauma                       | World Neurosurg                  | 2.399         | 2         |
| 31    | Kadhim et al. [30]              | 2020 | Case series         | Neurotrauma                       | Br J Neurosurg                   | 0.960         | 0         |
| 32    | Hoz et al. [53]                 | 2020 | Retrospective       | Neurotrauma                       | World Neurosurg                  | 2.399         | 0         |
| 33    | Hoz et al. [44]                 | 2020 | Retrospective       | Neurotrauma                       | Br J Neurosurg                   | 0.960         | 0         |
| 34    | Al-Sharshahi et al. [13]        | 2020 | Review              | General                           | Chin Neurosurg J                 | 0.4           | 0         |
| 35    | Hoz et al. [47]                 | 2020 | Review              | Vascular                          | World Neurosurg                  | 2.399         | 0         |
| 36    | Al-Khaafai et al. [10]          | 2020 | Review              | Vascular                          | Surg Neurol Int                  | 0.970         | 0         |
| 37    | Hoz et al. [49]                 | 2020 | Letter              | General                           | World Neurosurg                  | 2.399         | 0         |
| 38    | Faraj et al. [29]               | 2020 | Retrospective       | Vascular                          | Surg Neurol Int                  | 0.970         | 0         |
| 39    | Hoz et al. [52]                 | 2020 | Letter              | General                           | Surg Neurol Int                  | 0.970         | 0         |
| 40    | Hoz et al. [37]                 | 2021 | Survey              | General                           | Surg Neurol Int                  | 0.970         | 0         |
| 41    | Dimitrov et al. [21]            | 2018 | Letter              | Cranial/tumor                     | Neurol India                     | 2.708         | 0         |
| 42    | Hamawandi et al. [31]           | 2020 | Retrospective       | Spine                             | BMC Musculoskelet Disord.        | 2.054         | 2         |
| 43    | Hoz et al. [46]                 | 2020 | Retrospective       | Neurotrauma                       | World Neurosurg                  | 2.399         | 0         |
| 44    | Hoz et al. [50]                 | 2020 | Letter              | General                           | World Neurosurg                  | 2.399         | 0         |
| 45    | Lafta et al. [59]               | 2020 | Case report         | Cranial/tumor                     | Int J Surg Case Rep              | 0.570         | 1         |

(Contd...)

Surgical Neurology International • 2021 • 12(223) | 3
Table 1: (Continued)

|   | First Name Last Name et al. | Year | Publication Type | Year of Publication | Journal | Impact Factor |
|---|-----------------------------|------|------------------|---------------------|---------|--------------|
| 46. | Al-Khafaji et al.⁹ | 2021 | Letter | History | Surg Neurol Int | 0.97 | 0 |
| 47. | Al-Sharshahi et al.¹² | 2021 | Letter | History | Surg Neurol Int | 0.97 | 0 |
| 48. | Arnaout et al.⁴⁶ | 2021 | Case report | General | Neurrol India | 2.708 | 0 |
| 49. | Dolachee et al.²² | 2021 | Case report | Cranial/tumor | Clin Case Rep | 0.50 | 0 |
| 50. | Hoz et al.⁴₃ | 2021 | Letter | Neurotrauma | Surg Neurol Int | 0.97 | 0 |
| 51. | Hoz et al.¹₈ | 2021 | Letter | Vascular | Br J Neurosurg | 0.96 | 0 |
| 52. | Hoz et al.¹₄ | 2021 | Case report | Vascular | Surg Neurol Int | 0.97 | 0 |

The eroded health-care system infrastructure and inadequate human resources in hospitals are two of the main challenges facing clinical research in Iraq. Decades of war, sectorial violence, terrorism, and political instability have stretched our health-care system to its limits, leaving understaffed, cash-starved, and overcrowded hospitals in conducive to establishing any sustainable clinical research activity.¹¹,⁶⁶

To address some of these challenges, health system recovery must be a top priority in the country's infrastructure repair agenda. The solution to the human resource shortage is not a straightforward one. This shortage is primarily due to the steady exodus of well-trained doctors, which may serve as the proximal cause of the system's collapse.¹¹,²³ The key driver for this trend is the security threats to health workers who are being killed, abducted, or targeted, forcing them to flee the country to safer places.⁶⁵ In an attempt to antagonize this trend and rejuvenate the field of neurosurgery, a nation-wide mentorship program aimed at attracting medical students and junior doctors to neurosurgery was established in 2018 by the primary author of this article; the long-term impact of this program and similar initiatives is yet to be seen.

The lack of comprehensive patient information systems is further compounding the situation. Non-standardized, paper-based, and hand-written clinical notes are often inaccurate, mostly illegible, and difficult to trace as they may be located in various hospital departments, making them a hazard to patient safety and a dissuasive barrier to clinical research. As such, more systematic steps need to be undertaken to standardize data collection and computerize patient records taking into account the technical difficulties, time limitations, and specifications of the local health system.

Inadequate outcome measures and follow-up systems represent another hindrance to clinical research in the country. Factors contributing to this problem include understaffing, overload, lack of detailed handover documentation, incomplete discharge plans, and
non-systemized task delegation. As such, outcomes such as infection rates, morbidity, and long-term mortality are difficult to ascertain. Addressing this problem calls for a multi-level action plan involving the participation of regulatory, administrative, and senior staff with a view to developing reliable patient follow-up systems.

Funding is another critical challenge facing clinical research. Iraq is, by definition, a resource-rich country. However, the widespread corruption in the government system ensures that little, if any, of the national funds reach their designated targets. As such, research funding has been deprioritized over the decades to further hinder any genuine research efforts. Much of the current research is being self-funded, with researchers resorting to research designs with minimal funding requirements. Our review shows that case reports and Letter-to-editor papers were collectively the most chosen research design, with only one randomized controlled trial and no systematic reviews. International partnerships and research collaborations may provide a temporary solution to this problem, besides their potential role in building research capacity, encouraging and facilitating research reporting, and providing adequate training opportunities.

On the brighter side, efforts to revive the specialty are being made by our local neurosurgeons, harnessing available resources to “do more with less.” Many examples evidence this; in 2017, the country has witnessed the birth of the first neurosurgery book to be authored by an Iraq-based neurosurgeon, the primary author of this manuscript. The book has received international recognition, inspiring further successful attempts. Another step forward is the establishment of the association of neurological surgeons in Iraq in 2013. Furthermore, as shown in this review, a previously unwitnessed involvement of junior doctors and medical students in neurosurgical research is being noticed. Despite the multitude of challenges faced by neurosurgical research in Iraq, there is a definite, although sluggish, rate of progress, relative to the previous decade. Nonetheless, critical, multi-level, and restorative steps are required to promote and enable research reporting at an internationally-comparable rate.

**Study limitations**

Many articles not published in PubMed-indexed journals were not captured in this review. Likewise, theses, dissertations, and essays were not included. The use of PubMed as the primary search engine was justified by the fact that high levels of corruption in the country could lead to the publication of several papers in predatory, temporarily-cited, or local journals. However, the study should serve as an initial guide to the current state of neurosurgical research in the country and encourage more action to invest in the field at the national and international levels.

**CONCLUSION**

The number of publications per year has been showing a, relatively, promising trend since 2012. However, to promote sustained growth in academic productivity, a strategic plan that acknowledges the political, financial, and health-system-related challenges are urgently called for.

**Declaration of patient consent**

Patient’s consent not required as patients identity is not disclosed or compromised.

**Financial support and sponsorship**

Publication of this article was made possible by the James I. and Carolyn R. Ausman Educational Foundation.

**Conflicts of interest**

There are no conflicts of interest.

**REFERENCES**

1. Abdali HA, Hoz SS, Moscote-Salazar LR. Cranial gravitational (falling) bullet injuries: Point of view. J Neurosci Rural Pract 2018;9:278-80.
2. Akham A, AbdulAzeez MM, Hoz SS. Surgical intervention of intracerebral hematoma caused by ruptured middle cerebral artery aneurysm in neurosurgery teaching hospital, Baghdad, Iraq. Neurol India 2020;68:124-31.
3. Akunjee M, Ali A. Healthcare under sanctions in Iraq: An elective experience. Med Confl Surviv 2002;18:249-57.
4. Al-Azzawi IS, Al-Tamimi MA. The first Iraqi experience in sacral neuremodulation for patients with lower urinary tract dysfunction. Arab J Urol 2018;16:391-6.
5. Al-Baldawi IA. Bi-nostril transseptal endoscopic approach to the sphenoidal gate. A new technique. Acta Neurochir (Wien) 2017;159:1247-52.
6. Alhillo HT, Arnaout MM, Radhi HS, Al-Dhahir MA, Moscote-Salazar LR, Hoz SS. Direct head injury caused by a tear gas cartridge. Questions on safety: A case report from Iraq and review of the literature. J Clin Neurosci 2018;56:179-82.
7. Alhillo HT, Sadik HA, Gheni TN, Hoz SS. Rare occurrence of a huge traumatic extradural haematoma in a patient with an ipsilateral sylvian arachnoid cyst. BMJ Case Rep 2018;11:bcr2018227525.
8. Aljuboori Z, Hoz S, Boakye M. Failure of C2-3 anterior arthrodasis for the treatment of atypical Hangman’s fractures: A three case series. Surg Neuror Int 2020:11:52.
9. Al-Khafaji A, Hoz S, Al-Awadi O, Al-Sharshahi Z. Alwiti: The father of modern neurosurgery in Iraq. Surgical Surgeology Neurol International. Int 2021;12:66.
10. Al-Khafaji AO, Al-Sharshahi ZF, Lee RP, Alsubaishawi ZA, Dolachee AA, Hoz SS. Unilateral absence of the internal carotid artery associated with anterior communicating artery aneurysms: Systematic review and a proposed management...
algorithm. Surg Neurol Int 2020;11:221.
11. Al-Khalisi N. The Iraqi medical brain drain: A cross-sectional study. Int J Tiss Serv 2013;43:363-78.
12. Al-Sharshahi Z, Al-Hemiery H, Albaqer H, Hamandi Y, Al-Awadi O, Hoz S. Following the footprints of pioneers on neurosurgery in Iraq: Abdul Hadi AL-Khalili. Surgical Neurology Neurosurg International. 2021;12:110.
13. Al-Sharshahi ZF, Hoz SS, Alrawi MA, Sabah MA, Albanaa SA, Moscote-Salazar LR. The use of non-living animals as simulation models for cranial neurosurgical procedures: A literature review. Chin Neurosurg J 2020;6:24.
14. Al-Tameeemi HN, Al-essawi S, Shukri M, Naji FK. Using magnetic resonance myelography to improve interobserver agreement in the evaluation of lumbar spinal canal stenosis and root compression. Asian Spine J 2017;11:198-203.
15. Arkawai BM, Faraj MK, Al-Attar Z, Hussien HA. Short term effectiveness of gamma knife radiosurgery in the management of brain arteriovenous malformation. Open Access Maced J Med Sci 2019;7:3221-4.
16. Arnaout MM, Hoz SS, Bessar AA, Agrawal A, AbdulAzeez MM, Moscote-Salazar LR, et al. Extrusion of a peritoneal catheter of a ventriculoperitoneal shunt from the urethra. Neurology Neurourol India. 2021;69(1):214-6.
17. Baba-Rasul I, Ameen HM, Khazendar A, Hasan SO. A rare case of isolated lower segment transverse sacral fracture in a 12-year-old girl and its management by fixation with K-wire. World Neurosurg 2017;97:758.e1-5.
18. Burnham GM, Lafta R, Doocy S. Doctors leaving 12 tertiary hospitals in Iraq, 2004-2007. Soc Sci Med 2009;69:172-7.
19. Darwazeh R, Wei M, Zhong J, Zhang Z, Lv F, Darwazeh M, et al. Significant injury of the mammillothalamic tract without hemorrhage: A retrospective diffusion tensor imaging study. World Neurosurg 2018;114:e624-30.
20. Dimitrov A, Dolachee AA, AbdulAzeez MM, Hoz SS, Narvaez-Rojas A, Satyarthi GC, et al. Dos and don'ts of virtual reality-based simulators for cranial tumor surgery. Neurol India 2018;66:1857-8.
21. Dimitrov A, Dolachee AA, AbdulAzeez MM, Hoz SS, Narvaez-Rojas A, Satyarthi GC, et al. Dos and don’ts of virtual reality-based simulators for cranial tumor surgery. Neurology India. 2018;66(6):1857-8.
22. Dolachee AA, Hoz SS, Lafta GA. Primary intraosseous osteolytic meningioma without an evidence of soft tissue invasion. Clinical Clin Case Reports. 2021;9(2):845-7.
23. Doocy S, Malik S, Burnham G. Experiences of Iraqi doctors in Jordan during conflict and factors associated with migration. Am J Disaster Med 2010;5:41-7.
24. Duarte-Valdivieso NC, Wong HF, Moscote-Salazar LR, Hoz SS, Calderon-Miranda WG, Lee A, et al. Left persistent primitive trigeminal artery with a large wide-neck aneurysm presenting as oculomotor syndrome. Neurol India 2019;67:315-6.
25. Dyer O. Iraqi healthcare system still crippled five years after invasion, says report. BMJ 2008;336:113.
26. Essa ZM, Al-Hashimi AF, Nema IS. Dermatovascular versus mixed somatosensory evoked potentials in the diagnosis of lumbosacral spinal canal stenosis. J Clin Neurophysiol 2018;35:388-98.
27. Fahad EM, Hashmi ZM, Nema IM. Cervical spinal stenosis and risk of pulmonary dysfunction. Int J Crit Illn Inj Sci 2020;10:16-9.
28. Faraj MK, Hoz SS, Mohammad AJ. The use of three-dimensional anatomical patient-specific printed models in surgical clipping of intracranial aneurysm: A pilot study. Surg Neurol Int 2020;11:381.
29. Faraj MK, Sagban WJ. Endoscopic transsphenoidal approach to skull base lesions. A clinical prospective study. Neurosciences (Riyadh) 2018;23:35-8.
30. Hamawandi SA, Sulaiman II, Al-Humairi AK. Microdecompression versus open laminectomy and posterior stabilization for multilevel lumbar spine stenosis: A randomized controlled trial. Pain Res Manag 2019;2019:7214129.
31. Hamawandi SA, Sulaiman II, Al-Humairi AK. Open fenestration discectomy versus microscopic fenestration discectomy for lumbar disc herniation: A randomized controlled trial. BMC Musculoskelet DisordMusculoskeletal Disorders. 2020;21(1):384.
32. Hammad AA, Marino A, Farhan S. Clinical response of 277 patients with spinal cord injury to stem cell therapy in Iraq. Int J Stem Cells 2012;5:76-8.
33. Howard BM. Vascular neurosurgery: In multiple-choice questions. Neurosurgery 2018;82:E123-4.
34. Hoz S, Aljuboori Z, Albanaa S, Al-Sharshahi Z, Alrawi M, Neamah A A, et al. Ruptured giant aneurysm of a cortical middle cerebral artery: A case report. Surgical Surg Neurology Neurol International. 2021;12:95.
35. Hoz S, Dolachee AA, Salih HR, Aljuboori ZS, Selbi WD, Al-Dayri G, et al. Pineal Neurosurgery. 1st ed. Berlin: Springer International Publishing; 2020.
36. Hoz S, Moscote-Salazar LR. Prevention of neurotrauma: An evolving matter. J Neurosci Rural Pract 2017;8 Suppl 1:S141-3.
37. Hoz S, Aktham AA, Al-Sharshahi ZF, Esene IN, Mahoney D, Chaursa B, et al. The most recommended neuroanatomy resources for neurosurgeons: An international survey. Surg Neurol Int 2021;12:11.
38. Hoz S, Aljuboori Z, Al-Sharshahi ZF, Salih HR, Alrawi MA. The four-handed technique in microsurgery, a useful addition to the vascular neurosurgeon armamentarium. Br J Neurosurg. 2021;2021:1-2.
39. Hoz S, Aljuboori ZS, Dolachee AA, Al-Sharshahi ZF, Alrawi MA, Al-Smaysim AM. Fatal penetrating head injuries caused by projectile tear-gas canisters. World Neurosurg. 2020;138:e119-23.
40. Hoz S, Alkhaleeli AA, Aktham A. Prolonged survival after surgical resection of cerebral metastasis from melanoma with multisystemic metastasis already present: A case report and literature review. Sao Paulo Med J 2018;136:372-5.
41. Hoz S, Alramadan AH, Hadi AQ, Salazar LR. Cisternostomy in neurosurgery: A new proposed general classification based on mechanism and indications of the cisternostomy proper. J Neurosci Rural Pract 2018;9:650-2.
42. Hoz S, Al-Sharshahi ZF, Albanaa SA. Neurosurgery in Iraq at the time of Corona. Surg Neurol Int 2020;11:103.
Hoz, et al.: PubMed-indexed neurosurgical research productivity of Iraq-based neurosurgeons

OM. The history and current status of neurosurgery in Iraq. World Neurosurg 2020;140:353-6.
44. Hoz SS, Al-Sharshahi ZF, Al-Khafaji AO. Head injuries caused by the ritual of Tatbir: A neurosurgical perspective. Br J Neurosurg 2020;2020:1-2.
45. Hoz SS, Al-Sharshahi ZF, Alrawi MA, Al-Dahairi MA. Traumatic acute extracranial cerebral herniation: How much do we know? Surg Neurol Int. 2021;12:63.
46. Hoz SS, Al-Sharshahi ZF, Dolachee AA, Al-Smaysim AM, Matti WE, Bydon A, et al. Blast-induced traumatic brain injuries: Experience from the deadliest suicide double-car bomb attack in Iraq. World Neurosurg. 2020;2021;145:e192-201.
47. Hoz SS, Al-Sharshahi ZF, Dolachee AA, Chotai S, Salih H, Albanaa SA, et al. Transposition of vessels for microvascular decompression of posterior fossa cranial nerves: Review of literature and intraoperative decision-making scheme. World Neurosurg 2020;145:64-72.
48. Hoz SS, Al-Sharshahi ZF, Dolachee AA, Matti WE. Letter to the editor: “Beyond containment: Tracking the impact of coronavirus disease 2019 (COVID-19) on neurosurgery services in Iraq”. World Neurosurg. 2020;143:619-20.
49. Hoz SS, Al-Sharshahi ZF. Letter to the editor “neurosurgical subspecialty-tailored mentoring approaches: Current status and future demands”. World Neurosurg 2020;141:564-5.
50. Hoz SS, Baban K, Sabah M, Aktham A, Narvaez-Rojas AR, Moscote-Salazar LR. Delayed progressive intraparenchymal tension pneumocephalus after craniotomy for recurrent pituitary macroadenoma: A case report. Bull Emerg Trauma 2018;6:174-7.
51. Hoz SS, Dolachee AA, Abdali HA, Kasuya H. An enemy hides in the ceiling: pediatric traumatic brain injury caused by metallic ceiling fan: Case series and literature review. Br J Neurosurg 2019;33:360-4.
52. Hoz SS, Tamer WA, Al-Awadi OM, Al-Sharshahi ZF, Dolachee AA. Neurosurgery training in war-torn countries: A perspective from Iraq and Syria. Surg Neurol Int 2020;11:430.
53. Hoz SS. Vascular Neurosurgery in Multiple Choice Questions. Switzerland: Springer; 2017.
54. Jamjoom AA, Wiggins AN, Loan JJ, Emelifeoneu J, Foyyas IP, Brennan PM. Academic productivity of neurosurgeons working in the United Kingdom: Insights from the H-index and its variants. World Neurosurg 2016;86:287-93.
55. Kadhim AHK, Neamah MJ, Nema IS. Cranial falling bullet injuries, a series of 30 cases in Iraq. Br J Neurosurg 2020;34:135-41.
56. Kapp C. Anarchy pushes Iraqi health system to brink of collapse. Lancet 2003;361:1351.
57. Khazendar A, Ameen HM, Jabbar NI, Hasan SO, Ahmed TS, Ali AA. Upper lumbar mature cystic teratoma: A case report. World Neurosurg 2016;96:609.e7-11.
58. Kot FC. The perceived benefits of international partnerships in Africa: A case study of two public Universities in Tanzania and the democratic republic of Congo. High Educ Policy 2015;29:41-62.
59. Lafta GA, Dolachee AA. Supratentorial intracerebral hemorrhage as a complication of infratentorial tumor removal: A case report. International Int Journal of Surgery Case Reports. 2020;75:1-3.
60. Ponce FA, Lozano AM. Highly cited works in neurosurgery. Part I: The 100 top-cited papers in neurosurgical journals. J Neurosurg 2010;112:223-32.
61. Sarkiss CA, Riley KJ, Hernandez CM, Oermann EK, Ladner TR, Bederson JB, et al. Academic productivity of US neurosurgery residents as measured by H-index: Program ranking with correlation to faculty productivity. Neurosurgery 2017;80:975-84.
62. Satyarthee GD, Moscote-Salazar LR, Escobar-Hernandez N, Aquino-Matus J, Pucar-Polanco PC, Hoz SS, et al. A giant occipital encephalocele in neonate with spontaneous hemorrhage into the encephalocele sac: Surgical management. J Pediatr Neurosci 2017;12:268-70.
63. Shamran HA, Ghazi HF, Al-Salman A, Al-Juboory AA, Taub DD, Price RL, et al. Single nucleotide polymorphisms in IL-10, IL-12p40, and IL-13 genes and susceptibility to Glioma. Int J Med Sci 2015;12:790-6.
64. Shamran HA, Hamza SJ, Yaseen NY, Al-Juboory AA, Taub DD, Price RL, et al. Impact of single nucleotide polymorphism in IL-4, IL-4R genes and systemic concentration of IL-4 on the incidence of glioma in Iraqi patients. Int J Med Sci 2014;11:1147-53.
65. Webster P. Medical faculties decimated by violence in Iraq. CMAJ 2009;181:576-8.
66. Webster P. Reconstruction efforts in Iraq failing health care. Lancet 2009;373:617-20.
67. Webster PC. Iraq’s health system yet to heal from ravages of war. Lancet 2011;378:863-6.
68. Williamson PO, Minter CIJ. Exploring PubMed as a reliable resource for scholarly communications services. J Med Libr Assoc 2019;107:16-29.

How to cite this article: Hoz SS, Al-Sharshahi ZF, Esene IN, Dolachee AA, Neamah AM, Al-Khafaji AO, et al. PubMed-indexed neurosurgical research productivity of Iraq-based neurosurgeons. Surg Neurol Int 2021;12:223.