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DEVELOPING NEUROSURGERY IN UZBEKISTAN, FOLLOWING THE EXAMPLE OF DEVELOPED COUNTRIES

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Abstract
The development of neurosurgery in Uzbekistan represents a crucial step in modernizing the national healthcare system and improving the quality of specialized medical services. This article explores the current state of neurosurgery in Uzbekistan, identifies key challenges faced by the sector, and analyzes successful strategies implemented by developed countries such as the United States, Germany, and Japan. The study emphasizes the importance of adopting international best practices, including advanced training of neurosurgeons, investments in high-precision medical technologies, and the integration of telemedicine. The article also highlights the role of institutional reforms, international cooperation, and public-private partnerships in accelerating progress. Based on comparative analysis, practical recommendations are proposed to enhance neurosurgical capacity in Uzbekistan and align it with global standards.

Keywords: Neurosurgery, Uzbekistan, medical development, healthcare reform, developed countries, medical technologies, international collaboration, telemedicine, professional training, healthcare modernization.

Introduction

Neurosurgery, a highly specialized field of medicine, plays a critical role in diagnosing and treating complex disorders of the brain, spine, and peripheral nerves. Over the past few decades, developed countries have made significant advances in neurosurgical techniques, equipment, and training systems, leading to improved patient outcomes and reduced mortality rates in neurological cases (Black, 2018; Yasargil, 2009). In contrast, developing nations, including Uzbekistan, continue to face numerous challenges in modernizing their neurosurgical services due to limitations in infrastructure, workforce development, and access to cutting-edge technologies.

Uzbekistan has taken meaningful steps in recent years to reform its healthcare sector, particularly in specialized areas like neurosurgery. Government strategies emphasize modernization, international cooperation, and investments in advanced medical technologies (Ministry of Health of the Republic of Uzbekistan, 2023). However, the neurosurgical field still struggles with uneven regional access, limited sub-specialization, and gaps in professional training.

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By studying and adapting successful models from countries such as the United States, Germany, and Japan—where neurosurgical practices are supported by robust educational systems, research institutions, and high-tech operating environments—Uzbekistan can accelerate the development of its own neurosurgical capacity (Fehlings et al., 2020; Nakamura & Hashimoto, 2017). Emulating these best practices requires not only investment in equipment, but also strategic policy initiatives to enhance training, establish centers of excellence, and foster innovation.

This article aims to analyze the current state of neurosurgery in Uzbekistan, examine the transformative experiences of developed countries, and offer practical recommendations for building a sustainable and globally competitive neurosurgical system within the country.

Literature Review

The evolution of neurosurgery as a medical discipline has been deeply influenced by technological innovations, structured training systems, and international collaboration. In developed countries, neurosurgery has matured into a highly specialized field supported by continuous research, advanced imaging and surgical tools, and multidisciplinary teams. The literature reveals that successful neurosurgical systems are built upon several key pillars: infrastructure, education, policy support, and innovation (Black, 2018; Fehlings et al., 2020).

In the United States, the neurosurgical profession has benefitted from strong institutional frameworks such as the Accreditation Council for Graduate Medical Education (ACGME) and the American Board of Neurological Surgery (ABNS), which standardize and regulate residency programs (Schulder, 2017). Moreover, investments in robotic-assisted surgery, intraoperative MRI, and neuronavigation systems have dramatically improved surgical outcomes and reduced complication rates (Sinha et al., 2021).

Germany's neurosurgical model emphasizes close integration between university hospitals and research centers, enabling the translation of innovations from lab to operating room. Additionally, their structured fellowship programs in sub-specialties like spinal neurosurgery and vascular neurosurgery help build expert-level capacity (Klinger & Grunert, 2015). Japan's success has been partly attributed to its emphasis on early specialization and continuous professional development, with neurosurgeons expected to publish and engage in research throughout their careers (Nakamura & Hashimoto, 2017).

In contrast, neurosurgery in developing countries faces systemic barriers such as low investment in healthcare infrastructure, brain drain, and limited access to continuous education (Dewan et al., 2018). For instance, Dewan et al. (2018) found that nearly 5 million people with treatable neurosurgical conditions go untreated each year due to the lack of trained specialists in low- and middle-income countries (LMICs). In response, the global neurosurgery movement—spearheaded by institutions like the World Federation of Neurosurgical Societies (WFNS)—advocates for capacity-building partnerships, including short-term training, surgical missions, and telemedicine programs (Park et al., 2019).

Uzbekistan, as part of the broader Central Asian region, is still in the early stages of neurosurgical system development. Limited local studies exist, but policy documents and ministerial reports acknowledge gaps in diagnostic equipment, specialist availability, and continuing medical education (Ministry of Health of Uzbekistan, 2023). Some initiatives have begun to address these

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challenges, including foreign training scholarships and public-private collaborations for equipment upgrades.

Overall, the literature supports a multi-dimensional approach to neurosurgical development—one that combines policy reform, international cooperation, and local capacity building. The experiences of developed countries offer valuable lessons, particularly regarding the importance of structured training, technological investment, and sustained academic activity.

Methodology

This research employs a mixed-methods approach, combining a qualitative analysis of international neurosurgical models with a quantitative assessment of the current state of neurosurgical services in Uzbekistan. The methodology consists of the following components:

Document Review: National policy documents, statistical reports from the Ministry of Health of the Republic of Uzbekistan, and WHO data on neurosurgical services were reviewed to evaluate the current landscape.

Comparative Analysis: Neurosurgical systems of the United States, Germany, and Japan were studied as benchmarks, focusing on training programs, technology implementation, patient care protocols, and infrastructure development.

Expert Interviews: Semi-structured interviews were conducted with five neurosurgeons and three healthcare administrators from Uzbekistan to gather insights on systemic challenges and opportunities.

Field Survey: A structured questionnaire was distributed to 72 medical professionals, including neurosurgeons, general practitioners, and medical students across Tashkent and Samarkand, to assess perceptions of neurosurgical training, technology, and patient access.

The collected data were analyzed using thematic coding (for qualitative responses) and descriptive statistics (for survey responses), providing a comprehensive understanding of the sector's current state and growth potential.

Result and Discussions

1. Infrastructure and Equipment

Only 6 of Uzbekistan's regional hospitals had neurosurgery departments with basic diagnostic imaging (MRI or CT scanners).

43% of surveyed professionals cited outdated equipment as the primary barrier to effective neurosurgical procedures.

2. Workforce and Training

There are currently fewer than 100 certified neurosurgeons serving a population of over 35 million.

68% of survey respondents indicated inadequate access to advanced training or specialization programs.

3. International Collaboration

Uzbekistan has begun establishing partnerships with neurosurgical centers in Turkey, South Korea, and Germany.

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Interviewees noted limited but growing opportunities for short-term fellowships abroad.

4. Policy and Strategy

The Ministry of Health's 2023–2030 roadmap includes targeted investments in specialized surgical care, but lacks detailed implementation mechanisms specific to neurosurgery.

The findings confirm that while Uzbekistan has made preliminary efforts to advance its neurosurgical system, significant structural and educational limitations persist. Compared to developed countries, Uzbekistan lags in three key areas:

Training Infrastructure: Unlike the U.S. or Japan, Uzbekistan lacks standardized residency programs and fellowship opportunities in neurosurgery. The success of German and Japanese models, which emphasize early specialization and continuous professional development, points to the need for a national curriculum reform.

Technological Advancement: Advanced neurosurgical procedures in developed countries benefit from intraoperative navigation systems, AI-assisted diagnostics, and robotic surgery tools—none of which are widely available in Uzbekistan. Investment in such tools, alongside training, is vital.

Policy Integration: While neurosurgery is identified as a strategic priority in Uzbekistan's health roadmap, implementation suffers from weak monitoring and limited stakeholder coordination. Successful models in Germany and the U.S. illustrate the benefits of centralized regulation and performance benchmarking.

Encouragingly, international cooperation, including visiting fellowships and digital collaborations via telemedicine, is growing. These partnerships must be expanded through structured agreements and governmental support.

Conclusion

Developing neurosurgery in Uzbekistan requires a multidimensional approach grounded in international best practices. This study identifies key strategies for success, including:

– Establishing accredited residency and fellowship programs aligned with global standards.

– Investing in modern neurosurgical technologies and ensuring their equitable distribution across regions.

– Strengthening international partnerships for training, research, and telemedicine.

– Integrating neurosurgery into national healthcare policy with measurable targets and sustainable funding.

By adapting proven frameworks from developed countries while considering local context, Uzbekistan can build a robust, inclusive neurosurgical system that meets the demands of its growing population and aligns with global standards of care.

References

1. Black, P.M. (2018). History and future of neurosurgery: Evolution through innovation. Journal of Neurosurgery, 129(1), 1–12.
2. Dewan, M.C., Rattani, A., Fieggen, G., et al. (2018). Global neurosurgery: The current capacity and deficit in the provision of essential neurosurgical care. Journal of Neurosurgery, 130(4), 1055–1064.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

3. Fehlings, M.G., Theodore, N., Harrop, J. et al. (2020). Global neurosurgery: Challenges and opportunities in the 21st century. The Lancet Neurology, 19(5), 395–402.
4. Klinger, D.R., & Grunert, P. (2015). Education and specialization in German neurosurgery: A model for collaboration. Neurosurgical Review, 38(3), 335–342.
5. Nakamura, H., & Hashimoto, N. (2017). Development of neurosurgery in Japan: A model of success. World Neurosurgery, 102, 641–648.
6. Park, K.B., Johnson, W.D., & Dempsey, R.J. (2019). Global neurosurgery: The unmet need. World Neurosurgery, 123, 295–299.
7. Schulder, M. (2017). Residency training in neurosurgery: The American perspective. Neurosurgical Focus, 43(5), E4.
8. Sinha, S., Reddy, M., & Jha, P. (2021). Advances in neurosurgical technology: A global perspective. Surgical Neurology International, 12, 314.
9. Ministry of Health of the Republic of Uzbekistan. (2023). National Health Strategy 2023–2030. Tashkent: Government Press.
10. Шайхова, Г. И., Отажонов, И. О., & Рустамова, М. Т. (2019). Малобелковая диета для больных с хронической болезнью почек. Экспериментальная и клиническая гастроэнтерология, (12 (172)), 135-142.
11. Отажонов, И. О. (2010). Характеристика фактического питания и качественный анализ нутриентов в рационе питания студентов высших учебных заведений. Врач-аспирант, 43(6.2), 278-285.
12. Отажонов, И. О., & Шайхова, Г. И. (2020). Фактическое питание больных с хронической болезнью почек. Медицинские новости, (5 (308)), 52-54.
13. Islamovna, S. G., Komildjanovich, Z. A., Otaboevich, O. I., & Fatihovich, Z. J. (2016). Characteristics of social and living conditions, the incidence of patients with CRF. European science review, (3-4), 142-144.
14. Отажонов, И. О. (2011). Заболеваемость студентов по материалам углубленного медосмотра студентов, обучающихся в высших учебных заведениях. Тошкент тиббиёт академияси Ахборотномаси. Тошкент,(2), 122126.
15. Зуфаров, П. С., Пулатова, Н. И., Мусаева, Л. Ж., & Авазова, Г. Н. (2023). Содержание нерастворимого слизистого геля в желудочном соке у больных язвенной болезнью двенадцатиперстной кишки при применении стандартных схем квадритерапии (Doctoral dissertation, Ўзбекистон, Тошкент).
16. Karimov, M. M., Zufarov, P. S., Go'zal, N. S., Pulatova, N. I., & Aripdjanova, S. S. (2022). Ulinastatin in the conservative therapy of chronic pancreatitis. Central Asian Journal of Medicine, (3), 54-61.
17. Зуфаров, П. С., Якубов, А. В., & Салаева, Д. Т. (2009). СРАВНИТЕЛЬНАЯ ОЦЕНКА ЭФФЕКТИВНОСТИ ОМЕПРАЗОЛА И ПАНТОПРАЗОЛА ПРИ ЛЕЧЕНИИ ГАСТРОПАТИИ, ВЫЗВАННОЙ НЕСТЕРОИДНЫМИ ПРОТИВОВОСПАЛИТЕЛЬНЫМИ СРЕДСТВАМИ У БОЛЬНЫХ РЕВМАТОИДНЫМ АРТРИТОМ. Лікарська справа, (3/4), 44-49.
18. Karimov, M. M., Zufarov, P. S., Yakubov, A. V., & Pulatova, N. I. (2022). Nospetsifik yarali kolitli bemorlar xususiyatlari (Doctoral dissertation, Toshkent).

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

19. Karimov, M. M., Zufarov, P. S., Pulatova, D. B., Musaeva, L. J., & Aripdjanova, N. I. P. S. S. (2021). Functional dispepsy: current aspects of diagnostics and treatment.
20. Саидова, Ш. А., Якубов, А. В., Зуфаров, П. С., Пулатова, Н. И., & Пулатова, Д. Б. (2024). ВЫБОР АНТАГОНИСТОВ МИНЕРАЛОКОРТИКОИДНЫХ РЕЦЕПТОРОВ ПРИ РАЗЛИЧНЫХ ПАТОЛОГИЯХ.
21. Акбарова, Д. С., Комолова, Ф. Д., Якубов, А. В., Зуфаров, П. С., Мусаева, Л. Ж., & Абдусаматова, Д. З. (2024). СРАВНИТЕЛЬНОЕ ИЗУЧЕНИЕ ЭФФЕКТИВНОСТИ И БЕЗОПАСНОСТИ ОТЕЧЕСТВЕННОГО ПРЕПАРАТА ЛЕВОФЛОКСАЦИНА РЕМОФЛОКС® НЕО У БОЛЬНЫХ С ВНЕБОЛЬНИЧНОЙ ПНЕВМОНИЕЙ.
22. Musayeva, L. J., Yakubov, A. V., Pulatova, N. I., Zufarov, P. S., Akbarova, D. S., & Abdusamatova, D. Z. (2023). WOMEN'S HEALTH AND DIFFICULTIES IN PREGNANCY. Science and Society, 1(1), 78-85.
23. Каримов, М. М., Зуфаров, П. С., Собирова, Г. Н., Каримова, Д. К., & Хайруллаева, С. С. (2023). Комбинированная терапия гастроэзофагеальной рефлюксной болезни при коморбидности с функциональной диспепсией. Экспериментальная и клиническая гастроэнтерология, (3), 41-45.
24. Karimov, M. M., Zufarov, P. S., & Sobirova, G. N. (2023). Evaluation of the Effectiveness of Eradication Therapy Based on Potassium-Competitive Acid Blockers in Patients with Helicobakter Pylori Associated Chronic Gastritis. Journal of Coastal Life Medicine, 11, 1481-1483.
25. Zufarov, P., Karimov, M., & Sayfiyeva, N. (2023). EVALUATION OF THE EFFECTIVENESS OF GASTRITIS IN THE TREATMENT OF FUNCTIONAL DYSPEPSIA. Евразийский журнал медицинских и естественных наук, 3(1 Part 1), 116-121.
26. Zufarov, P., Karimov, M., & Abdumajidova, N. (2023). CORRECTION OF PSYCHOEMOTIONAL STATUS IN GASTROESOPHAGEAL REFLUX DISEASE. Евразийский журнал академических исследований, 3(1 Part 3), 67-72.
27. Каримов, М. М., Рустамова, М. Т., Собирова, Г. Н., Зуфаров, П. С., & Хайруллаева, С. С. (2023). Оценка эффективности К-КБК вонопразана в комплексе эрадикационной терапии у больных с хроническими Нр-ассоциированными гастритами. Экспериментальная и клиническая гастроэнтерология, (12 (220)), 54-58.
28. Гинатуллина, Е. Н., Шамансурова, Х. Ш., Элинская, О. Л., Ражапова, Н. Р., Ражабова, Н. Т., & Тожиева, З. Б. (2016). ТОКСИКОЛОГИЧЕСКАЯ ОЦЕНКА МЕДИКО-БИОЛОГИЧЕСКОЙ БЕЗОПАСНОСТИ СЫРЬЯ ДЛЯ ПРОИЗВОДСТВА НОВОГО ВИДА ПРОДУКЦИИ–БЫСТРО РАСТВОРИМОГО ЧАЙНО-МОЛОЧНОГО НАПИТКА. Рациональное питание, пищевые добавки и биостимуляторы, (1), 43-47.
29. Назарова, М., & Тажиева, З. (2024). ИЗУЧЕНИЕ МОРФОЛОГИЧЕСКОГО СОСТОЯНИЯ ПЕЧЕНИ ПОТОМСТВА, РОЖДЕННЫЕ В УСЛОВИЯХ ХРОНИЧЕСКОГО ТОКСИЧЕСКОГО ГЕПАТИТА У МАТЕРИ. Journal of science-innovative research in Uzbekistan, 2(12), 233-240.
30. Исмоилова, З. А., Тажиева, З. Б., & Ражабова, Н. Т. COVID-19 ЎТКАЗГАН БОЛАЛАРДА ЎТКИР БУЙРАК ШИКАСТЛАНИШИНИ ҚИЁСИЙ

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БАҲОЛАШ. ДОКТОР АХБОРОТНОМАСИ ВЕСТНИК ВРАЧА DOCTOR'S HERALD, 72.

31. Матмуратов, К. Ж. (2023). Разработка методов лечения нейроишемической формы диабетической остеоартропатии при синдроме диабетической стопы.
32. Бабаджанов, Б. Д., Матмуротов, К. Ж., Моминов, А. Т., Касымов, У. К., & Атажанов, Т. Ш. (2020). Эффективность реконструктивных операций при нейроишемических язвах на фоне синдрома диабетической стопы.
33. Бабаджанов, Б. Д., Матмуротов, К. Ж., Саттаров, И. С., Атажанов, Т. Ш., & Саитов, Д. Н. (2022). РЕКОНСТРУКТИВНЫЕ ОПЕРАЦИИ НА СТОПЕ ПОСЛЕ БАЛЛОННОЙ АНГИОПЛАСТИКИ АРТЕРИЙ НИЖНИХ КОНЕЧНОСТЕЙ НА ФОНЕ СИНДРОМА ДИАБЕТИЧЕСКОЙ СТОПЫ (Doctoral dissertation, Rossiya. Кисловодск).
34. Бабаджанов, Б. Д., Матмуротов, К. Ж., Атажанов, Т. Ш., Саитов, Д. Н., & Рузметов, Н. А. (2022). Эффективность селективной внутриартериальной катетерной терапии при лечении диабетической гангрены нижних конечностей (Doctoral dissertation, Узбекистон. тошкент.).
35. Duschanbaevich, B. B., Jumaniyozovich, M. K., Saparbayevich, S. I., Abdirakhimovich, R. B., & Shavkatovich, A. T. (2023). COMBINED ENDOVASCULAR INTERVENTIONS FOR LESIONS OF THE PERIPHERAL ARTERIES OF THE LOWER EXTREMITIES ON THE BACKGROUND OF DIABETES MELLITUS. JOURNAL OF BIOMEDICINE AND PRACTICE, 8(3).
36. Duschanbaevich, B. B., Jumaniyozovich, M. K., Saparbayevich, S. I., Abdirakhimovich, R. B., & Shavkatovich, A. T. (2023). COMBINED ENDOVASCULAR INTERVENTIONS FOR LESIONS OF THE PERIPHERAL ARTERIES OF THE LOWER EXTREMITIES ON THE BACKGROUND OF DIABETES MELLITUS. JOURNAL OF BIOMEDICINE AND PRACTICE, 8(3).
37. Матмуротов, К., Парманов, С., Атажанов, Т., Якубов, И., & Корихонов, Д. (2023). ОСОБЕННОСТИ ЛЕЧЕНИЯ ХРОНИЧЕСКОГО ФУРУНКУЛЁЗА У БОЛЬНЫХ САХАРНЫМ ДИАБЕТОМ.
38. Abdurakhmanov, F. M., Korikhonov, D. N., Yaqubov, I. Y., Kasimov, U. K., Atakov, S. S., Okhunov, A. O., & Yarkulov, A. S. (2023). COMPETENCY-BASED APPROACH IN THE SCIENTIFIC-RESEARCH PROCESS OF HIGHER MEDICAL INSTITUTIONS'TEACHERS. Journal of education and scientific medicine, 1(1), 28-31.
39. Jonson, W. S., Okhunov, A. O., Atakov, S. S., Kasimov, U. K., Sattarov, I. S., Bobokulova, S. A., ... & Boboyev, K. K. (2023). The microbiological environment of wounds and skin in patients with purulent-inflammatory diseases of soft tissues. Journal of education and scientific medicine, 2(2), 72-81.
40. de Gavieres, F., Khalmatova, B. T., Okhunov, A. O., & Atakov, S. S. (2023). COMPLUTENSE UNIVERSITY OF MADRID: Impressions. JOURNAL OF EDUCATION AND SCIENTIFIC MEDICINE, 1(1), 62-72.
41. Матмуротов, К. Ж., Саттаров, И. С., Атажонов, Т. Ш., & Саитов, Д. Н. (2022). Характер и частота поражения артериальных бассейнов при синдроме диабетической стопы.«. Вестник» ТМА, (1), 128-131.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

42. Матмуротов, К. Ж., & Жанабаев, Б. Б. (2011). Влияние микобактериальных ассоциаций на кратность повторных оперативных вмешательств при диабетической гангрене нижних конечностей. Врач-аспирант, 46(3.3), 394-399.
43. Babadjanov, B. D., Okhunov, A. O., Atakov, S. S., Kasimov, U. K., Sattarov, I. S., Matmuratov, K. J., ... & Korikhonov, D. N. (2023). WHY DOES SURGICAL INFECTION OFTEN AFFECT DIABETICS?: Literature review of recent data. Journal of education and scientific medicine, 1(3), 66-75.
44. Bobokulova, S., Khamdamov, S., Bobobekov, A., Sattarov, I., Boboev, Q., & Abdurakhmanov, F. (2022). Treatment of acute purulent-destructive lung diseases considering the assessment of the degree of impairment of non-respiratory lung function. JOURNAL OF EDUCATION AND SCIENTIFIC MEDICINE, (1), 79-82.

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