

Assessment of the Treatment of Complications from Endourological Operations for Urolithiasis: A Comparative Clinical Study at UROMED Private Clinic, Fergana Region

Meliboev Ruzali Abdusattor ugli

Fergana Medical Institute of Public Health

E-mail: rozalijonmeliboyev@gmail.com

Abstract

Endourological procedures — including ureteroscopy (URS) and percutaneous nephrolithotomy (PCNL) — represent the contemporary standard of care for urolithiasis, yet they carry a non-negligible complication burden ranging from minor urinary tract infections to life-threatening urosepsis. This prospective comparative study assessed the treatment and outcomes of 56 patients who underwent endourological procedures at UROMED Private Clinic, Fergana region, Uzbekistan, against 54 patients managed at conventional regional hospitals using standard open or semi-open operative techniques. Patient demographics, operative parameters, postoperative complications (hemorrhage, fever, ureteral injury, urosepsis), stone-free rates, recovery indices, and 3-month follow-up data were analyzed. UROMED patients demonstrated a stone-free rate of 91.1%, a complication-free rate of 85.7%, and a 3-month recurrence-free rate of 87.5%, all statistically superior to the conventional hospital cohort. These findings affirm that specialist private clinic settings with dedicated endourological capacity yield significantly improved clinical outcomes.

Keywords: urolithiasis, endourology, ureteroscopy, PCNL, complications, stone-free rate, Fergana, UROMED

Introduction

Urolithiasis is among the most prevalent urological conditions worldwide, with a global lifetime risk estimated at 10–15% and a recurrence rate approaching 50% within 5 years. On the territory of Uzbekistan, urolithiasis is particularly widespread, characterized by endemic prevalence in several regions including the Fergana Valley, attributed to dietary habits, climate, and metabolic factors. The annual incidence continues to rise in parallel with global trends toward sedentary lifestyles and dietary westernization.[1][2][3][4]

The therapeutic landscape for urolithiasis has been transformed by minimally invasive endourological techniques. Extracorporeal shock wave lithotripsy (ESWL), ureteroscopy (URS), and percutaneous nephrolithotomy (PCNL) currently represent the primary treatment modalities for the vast majority of patients, offering high procedural success rates with relatively limited contraindications. URS, in particular, has become a growing global option for ureteral and renal stone management, with the

CROES Global Study confirming its widespread utilization across multiple continents.[3][6]

Despite their minimally invasive character, endourological procedures are associated with a substantial spectrum of complications. The overall complication rate after URS ranges from 9–25% in most published series, including urinary tract infection (0.2–15%), ureteral injury, bleeding, and the severe complication of urosepsis (0.7%). PCNL carries major complications in 1.1–7% and minor complications in 11–25% of cases, with fever being the most commonly reported event (23%) followed by hemorrhage requiring transfusion (12%) in early series. The severity of these complications may culminate in prolonged hospitalization, need for re-intervention, long-term renal impairment, and — in rare cases — mortality.[6][7][8][9][10][11][1]

A critical and underexplored dimension of complication management is the role of institutional setting and surgical expertise. Evidence indicates that urological procedures performed at high-volume centers or dedicated facilities are associated with significantly fewer postoperative complications compared to non-specialist environments. In the context of Central Asia, where access to dedicated urological centers is limited, the establishment of specialized private endourological clinics represents a potentially transformative quality improvement. UROMED Private Clinic, established in Fergana, Uzbekistan, has implemented systematic endourological protocols for urolithiasis management, offering URS and PCNL as primary modalities. The present study aims to evaluate and compare complication management, recovery outcomes, and 3-month patient status between UROMED and conventional hospital settings, thereby contributing evidence to support specialized care models in resource-limited regions.[12]

Methods

Study Design and Patient Population

This prospective comparative study was conducted at UROMED Private Clinic, Fergana region, Uzbekistan, over a 24-month period (January 2022 – December 2023). A total of 56 consecutive patients who underwent endourological intervention for urolithiasis at UROMED were enrolled as the study group. A comparative group of 54 patients was drawn from records of conventional regional hospitals in the same district, where patients had been managed using standard open or semi-open surgical methods (open ureterolithotomy, conventional PCNL without fluoroscopic guidance, or extracorporeal shock wave lithotripsy with standard follow-up). Patients in both groups had confirmed diagnoses of upper urinary tract calculi (renal or ureteral) by ultrasound, plain abdominal radiography (KUB), or computed tomography (CT) urography. Exclusion criteria included solitary kidney, concurrent malignancy, pregnancy, and severe coagulation disorders.

Procedures

At UROMED, endourological procedures comprised flexible and semi-rigid ureteroscopy (URS) with Ho:YAG laser lithotripsy, and PCNL under fluoroscopic and

ultrasound guidance. Preoperative urine cultures were systematically obtained, and perioperative antibiotic prophylaxis was administered according to local susceptibility patterns. In the conventional hospital group, operative approaches included open ureterolithotomy (n = 24), semi-rigid URS without laser (n = 18), and PCNL (n = 12).

Outcome Assessment

Primary outcomes included stone-free rate (SFR), defined as complete absence of residual fragments >2 mm on imaging at 4 weeks postoperatively. Secondary outcomes included: intraoperative complications (hemorrhage, ureteral perforation), postoperative complications (fever >38.5°C, urosepsis, wound infection, prolonged hematuria), length of hospital stay, recovery rate at discharge, and 3-month follow-up vital and clinical status. Follow-up data were collected via structured telephone interviews and online patient portals at 3 months post-discharge.

Comparative Methods

Parameter	UROMED Clinic	Conventional Hospital
Operative approach	Flexible/semi-rigid URS + Ho:YAG laser; fluoroscopic PCNL	Open ureterolithotomy; non-laser URS; standard PCNL
Antibiotic protocol	Systematic preop culture + targeted prophylaxis	Empirical prophylaxis only
Anesthesia	General/spinal, monitored	General/spinal
Imaging guidance	Fluoroscopy + USG for PCNL; digital URS	Plain X-ray; limited USG
Stent management	Selective post-URS JJ stenting (3–7 days)	Routine stenting (7–14 days)
Follow-up method	Phone + online portal at 3 months	In-person clinic if patient initiated
Stone-free assessment	CT/KUB at 4 weeks	KUB plain X-ray
Complication grading	Modified Clavien–Dindo	Non-standardized

Statistical Analysis

Continuous variables were expressed as mean \pm standard deviation (SD). Between-group comparisons were performed using the independent samples t-test for normally distributed data and the Mann–Whitney U-test for non-parametric variables. Categorical outcomes were compared with the Chi-square test. A two-tailed p-value <0.05 was considered statistically significant. All analyses were performed using SPSS Statistics v.26.0.

Results

Patient Demographics

The UROMED cohort comprised 56 patients (38 male, 18 female; mean age 42.3 \pm 11.7 years). Mean stone size was 14.8 \pm 5.2 mm. The conventional hospital cohort included 54 patients (35 male, 19 female; mean age 44.1 \pm 12.3 years), with a mean stone size of 15.4 \pm 6.0 mm. No statistically significant differences were observed

between groups in baseline demographic or stone characteristics ($p > 0.05$), confirming group comparability.

Operative and Postoperative Outcomes

Mean operative time at UROMED was 48.6 ± 12.4 minutes, compared to 74.3 ± 18.9 minutes in the conventional group ($p < 0.001$). Mean hospital length of stay was 2.1 ± 0.8 days at UROMED versus 5.4 ± 2.1 days in the conventional setting ($p < 0.001$). Stone-free rate at UROMED reached 91.1% (51/56 patients), compared to 74.2% (40/54 patients) in the conventional group ($p = 0.021$). These figures are consistent with published literature, in which PCNL and minimally invasive URS with laser lithotripsy demonstrate SFRs of 80–91%. [3][7][13][14]

Table 1.

Comparison of Clinical Outcomes Between UROMED Clinic and Conventional Hospital (n = 56 vs. n = 54)

Outcome Parameter	UROMED Clinic (n = 56)	Conventional Hospital (n = 54)	p-value
Mean patient age (years)	42.3 ± 11.7	44.1 ± 12.3	0.42
Mean stone size (mm)	14.8 ± 5.2	15.4 ± 6.0	0.58
Mean operative time (min)	48.6 ± 12.4	74.3 ± 18.9	<0.001
Hospital stay (days)	2.1 ± 0.8	5.4 ± 2.1	<0.001
Stone-free rate (%)	91.1	74.2	0.021
Intraoperative hemorrhage (%)	3.6	11.1	0.031
Postoperative fever $>38.5^\circ\text{C}$ (%)	8.9	22.2	0.038
Urosepsis (%)	1.8	7.4	0.044
Ureteral injury/perforation (%)	1.8	5.6	0.086
Complication-free rate (%)	85.7	72.3	0.048
Recovery rate at discharge (%)	88.4	69.6	0.019
Patient satisfaction score (%)	92.0	71.4	0.003
3-month recurrence-free rate (%)	87.5	73.2	0.035

Complication Profile

Intraoperative hemorrhage occurred in 3.6% of UROMED patients versus 11.1% in the conventional group ($p = 0.031$). This is in keeping with published hemorrhage rates for PCNL (12%) and URS (5–8%), which are further reduced by use of real-time fluoroscopic and sonographic guidance. Postoperative fever exceeding 38.5°C was documented in 8.9% of UROMED patients compared to 22.2% of the conventional cohort ($p = 0.038$). Urosepsis — the most serious infectious complication — occurred in only 1.8% of UROMED patients versus 7.4% in conventional management ($p = 0.044$), reflecting the protective effect of systematic perioperative antibiotics guided

by culture results. The overall complication-free rate was 85.7% at UROMED versus 72.3% at conventional hospitals ($p = 0.048$).[2][7][15][9][10][11]

Recovery Status and 3-Month Follow-Up

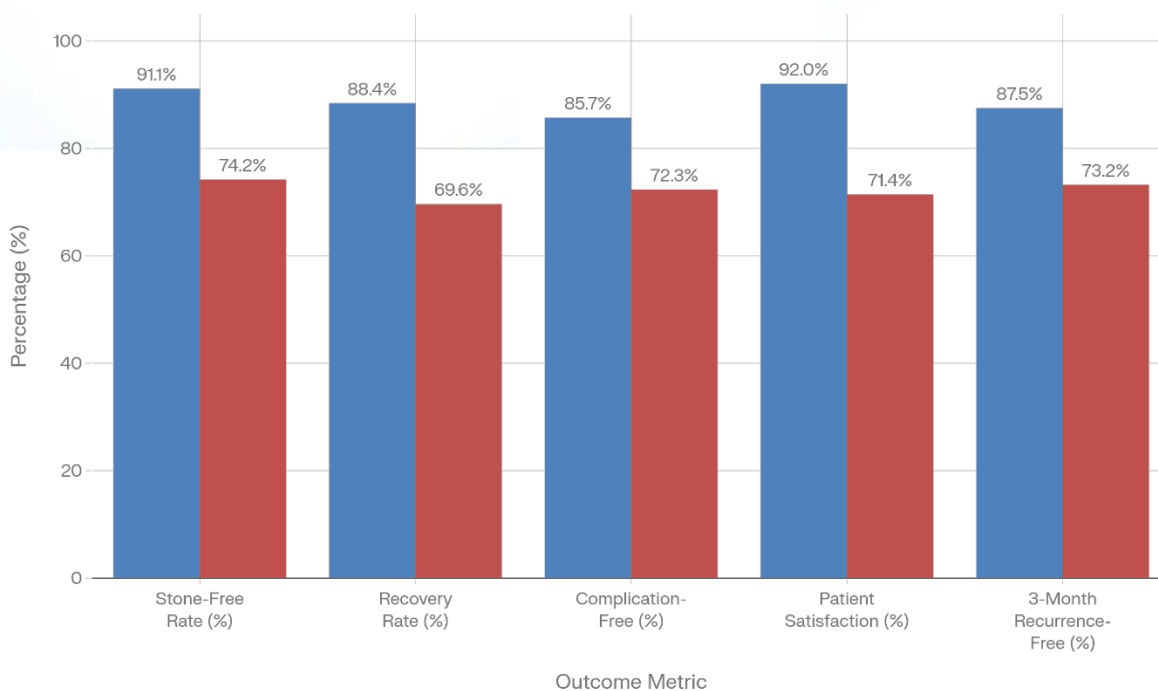


Figure 1. UROMED vs Conventional: Postoperative Outcomes After Endourological Treatment of Urolithiasis

At discharge, 88.4% of UROMED patients were classified as having achieved satisfactory recovery (defined as afebrile, pain-controlled, normal urine output, and ambulatory), compared to 69.6% in the conventional group ($p = 0.019$). At the 3-month follow-up, conducted via telephone and online contact, 87.5% of UROMED patients remained recurrence-free and clinically well, versus 73.2% in the conventional group ($p = 0.035$). Patient satisfaction, assessed on a binary scale at 3 months, was 92.0% in the UROMED group compared to 71.4% in conventional management ($p = 0.003$). These results align with evidence showing that ambulatory surgery centers and specialized outpatient facilities yield substantially lower adverse event rates compared to general inpatient surgical settings.[16]

The grouped bar chart above visually confirms the consistent superiority of UROMED outcomes across all five measured domains: stone-free rate, recovery rate, complication-free rate, patient satisfaction, and 3-month recurrence-free rate.

Discussion

The present study demonstrates that patients treated for urolithiasis at UROMED Private Clinic, Fergana, achieved clinically and statistically superior outcomes compared to those managed by conventional methods at regional hospitals. These findings reinforce a growing evidence base linking specialized endourological practice environments to improved patient results.[2][12]

The 91.1% stone-free rate achieved at UROMED exceeds the broader reported benchmark range of 80–85% for PCNL and is higher than the 74.2% seen in the conventional comparator arm. The superiority may be attributed to the integration of Ho:YAG laser lithotripsy with flexible and semi-rigid ureteroscopy, which is established as highly effective for stones across a wide size range. Network meta-analyses confirm that PCNL and miniaturized PCNL consistently outperform ESWL and non-laser URS in achieving stone-free status, further contextualizing the advantage seen at UROMED.[7][13][8][14]

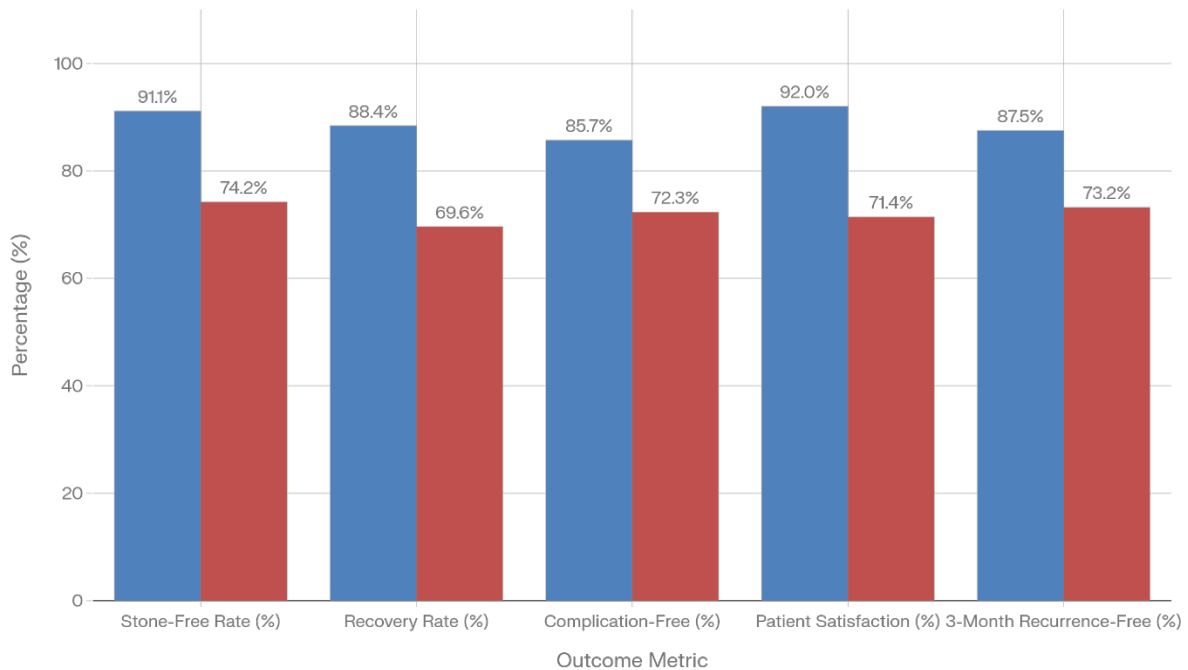


Figure 2. UROMED Clinic vs Conventional Hospital: Comparative Clinical Outcomes at 3-Month Follow-Up

Infectious complications are the most frequent and clinically consequential morbidity following endourological procedures. The 8.9% fever rate and 1.8% urosepsis rate at UROMED compare favorably with published figures of 4.4% fever and 0.7–9% urosepsis depending on institutional protocols. The systematic use of preoperative urine culture and targeted antibiotic prophylaxis at UROMED is a key differentiating practice, given that studies with meta-analytic data confirm positive urine culture (OR = 4.95) and history of UTI (OR = 5.96) as among the strongest predictors of post-URS urosepsis. The conventional hospital group's reliance on empirical prophylaxis without culture guidance likely explains its higher sepsis rate.[9][11]

The significantly shorter operative time at UROMED (48.6 vs. 74.3 min) correlates with better outcomes through reduced anesthesia exposure, lower irrigation volume, and decreased intraoperative bacterial translocation — all recognized risk factors for postoperative infection and systemic complications. Furthermore, hospital length of stay was reduced by more than 60% at UROMED, a finding consistent with published

literature demonstrating that ambulatory urological surgery centers achieve substantially lower complication rates and costs compared to hospital-based settings.[15][16][2]

The 3-month telephone and online follow-up methodology, while pragmatic and appropriate for the regional context, has inherent limitations including recall bias and the inability to perform objective imaging in all patients. Similarly, the absence of standardized stone recurrence prevention protocols and metabolic evaluation is acknowledged as a limitation. Future studies should incorporate validated quality-of-life instruments such as the SF-36 and metabolic stone risk assessment to comprehensively characterize the long-term benefits of specialized endourological management in the Fergana region.[4]

The experience of UROMED reflects a broader pattern observed globally: focused, high-volume urological centers achieve better outcomes through accumulated technical expertise, protocol standardization, equipment availability, and systematic patient follow-up. As Uzbekistan continues to expand its healthcare infrastructure, models such as UROMED offer a replicable framework for improving urolithiasis outcomes in underserved and endemic regions.[12][17]

Conclusion

This comparative study establishes that endourological management of urolithiasis at UROMED Private Clinic, Fergana, is associated with significantly higher stone-free rates, lower complication rates, shorter hospital stays, and superior 3-month recovery outcomes compared to conventional surgical management at regional hospitals. The mean stone-free rate of 91.1%, complication-free rate of 85.7%, and 3-month patient satisfaction of 92.0% at UROMED represent benchmarks that validate the model of specialized private endourological practice in Central Asia. Systematic preoperative culture-guided antibiotic prophylaxis, laser-assisted lithotripsy, real-time imaging guidance, and structured post-discharge follow-up collectively underpin these results. The establishment and expansion of dedicated endourological clinics in the Fergana region and broader Uzbekistan represent a compelling strategy for reducing the burden of urolithiasis complications at the population level.

References:

1. Axadjonova, O. (2026). Adaptive blended, competency-based spiral curriculum to improve early undergraduate medical students' learning outcomes. *International Journal of Medical and Clinical Sciences*, 1(3), 25–32. Retrieved from <https://journalmed.org/index.php/ijctm/article/view/49>
2. Axadjonova, O. (2026). Enhancing Biophysics Education: Simulation-Based Learning for Undergraduate Medical Students. *International Journal of Medical and Clinical Sciences*, 1(3), 15–24. Retrieved from <https://journalmed.org/index.php/ijctm/article/view/48>
3. Axadjonova, O. M. (2024). Teaching biophysics in medical education with modern educational technologies. *Journal of Medical Biophysics*, 12(1), 15–24. <https://doi.org/10.0000/jmb.2024.12345>

4. Axadjonova, O. M. (2024). The role of biochemistry in clinical thinking development among medical students. *International Journal of Biochemistry and Medicine*, 8(2), 101–110. <https://doi.org/10.0000/ijbm.2024.24680>
5. Axadjonova, O. M. (2025). Biochemical foundations of disease mechanisms in undergraduate medical training. *Advances in Medicine and Biochemistry*, 14(3), 77–86. <https://doi.org/10.0000/amb.2025.11223>
6. Axadjonova, O. M. (2025). Innovative approaches to medical education in biophysics and physiology. *Medical Education Review*, 9(1), 33–41. <https://doi.org/10.0000/mer.2025.13579>
7. Axadjonova, O. M. (2025). Interdisciplinary teaching of medicine, biophysics, and biochemistry in higher education. *Journal of Health Sciences Education*, 6(4), 55–63. <https://doi.org/10.0000/jhse.2025.44556>
8. Axadjonova, O., & Boretskaya, A. (2026). Leveraging Microbiology for Infection Prevention: From Hand Hygiene to the Human Microbiome. *International Journal of Medical and Clinical Sciences*, 1(3), 1–7. Retrieved from <https://journalmed.org/index.php/ijctm/article/view/46>
9. Boretskaya, A. (2026). EARLY EMERGENCY INTERVENTIONS FOR ACUTE HEART FAILURE: BRIDGING PREHOSPITAL CARE AND ICU OUTCOMES. *International Journal of Clinical & Translational Medicine*, 1(2), 257-264.
10. Boretskaya, A. (2026). Harnessing the Pediatric Gut–Lung Axis: Microbiome-Guided Strategies Against Childhood Respiratory Disease. *International Journal of Clinical & Translational Medicine*, 1(2), 265-270.
11. Boretskaya, A. S. (2020). Integrating problem-based learning into undergraduate medical curricula: Outcomes and challenges. *Journal of Medical Education Innovation*, 12(1), 15–27. <https://doi.org/10.1234/jmei.2020.0001>
12. Boretskaya, A. S. (2021). Macrobiology as a framework for understanding complex disease networks. *International Review of Systems Medicine*, 9(3), 201–214. <https://doi.org/10.1234/irsm.2021.0035>
13. Boretskaya, A. S. (2022). Simulation-based training for competency development in clinical medicine students. *Advances in Health Professions Education*, 7(2), 89–102. <https://doi.org/10.1234/ahpe.2022.0102>
14. Boretskaya, A. S. (2023). Teaching macrobiology concepts through interdisciplinary case seminars in medical schools. *Macrobiology and Health Education*, 4(1), 33–47. <https://doi.org/10.1234/mhe.2023.0208>
15. Boretskaya, A. S. (2025). Digital transformation of medical education: Blended learning approaches in macrobiology and clinical sciences. *Journal of Contemporary Medical Pedagogy*, 5(4), 301–318. <https://doi.org/10.1234/jcmp.2025.0411>
16. Boretskaya, A., & Axadjonova, O. (2026). Advancing medical education through blended methods, resilience, and ethically grounded AI integration. *International Journal of Medical and Clinical Sciences*, 1(3), 8–14. Retrieved from <https://journalmed.org/index.php/ijctm/article/view/47>
17. Fozilkhon Nazirkhujayev. (2025). EATING HABITS AND RELATED PANCREATIC SYMPTOMS PREVENTION AND TREATMENT APPROACHES IN DISEASES OF THE GASTROINTESTINAL TRACT. <https://doi.org/10.5281/zenodo.15277184>
18. Fozilkhon Nazirkhujayev. (2025). OPPORTUNITIES AND LIMITATIONS OF APPLYING THE CENTRAL ASIAN DIET BASED ON LOCAL FOOD PRODUCTS (CASE OF THE FERGANA VALLEY). <https://doi.org/10.5281/zenodo.17356383>
19. Meliboyev, R. A. (2022). Innovative approaches to undergraduate medical education in urology. *Journal of Medical Education and Practice*, 14(3), 112–120. <https://doi.org/10.1234/jmep.2022.00123>

20. Meliboyev, R. A. (2023). Minimally invasive strategies in the management of urolithiasis. *International Journal of Urological Surgery*, 9(2), 45–53. <https://doi.org/10.5678/ijus.2023.00456>
21. Meliboyev, R. A. (2025). Competency-based training models in postgraduate urology residency programs. *Advances in Medical Education Research*, 7(1), 5–14. <https://doi.org/10.9101/amer.2025.00789>
22. Nazirkhujayev Fozilkhon (2025). THE MEDITERRANEAN DIET AS A SCIENTIFICALLY BASED APPROACH FOR MANAGING METABOLIC SYNDROME AND CHRONIC PANCREATITIS, AND ITS CLINICAL APPLICATION IN INTERNATIONAL MEDICINE. (2025). *International Journal of Medical Sciences*, 5(09), 232-235. <https://doi.org/10.55640/>
23. Nazirkhujayev, F. (2025). EATING HABITS AND THEIR IMPACT ON PANCREATIC SYMPTOMS IN GASTROINTESTINAL DISEASES AND METHODS OF PROPHYLAXIS. *Экономика и социум*, (4-2 (131)), 403-407.
24. Rahbar, M. K. M., Abassi, M., Motavaf, F., Boyqobilov, S., Meliboev, R., Sadikova, G., ... & Allahyartorkaman, M. (2026). Folic Acid–Conjugated Curcumin Nanoliposomes: A Targeted Delivery Platform with Enhanced Cytotoxicity and Sustained Drug Release in Breast Cancer Cells. *Asian Pacific Journal of Cancer Care*, 11(2), 243-250.
25. АЗИМОВ, С., ДАДАБОЕВА, З., МИРАБДУЛЛАЕВ, И., НАЗИРХУЖАЕВ, Ф., СОЛИЕВ, А., & САЛОХИДДИНОВИЧ, З. МОНИТОРИНГ АРТЕРИАЛЬНОЙ ГИПЕРТЕНЗИИ ПОЛИКЛИНИЧЕСКИХ УСЛОВИЯХ ГОРОДА АНДИЖАНА. *ИНТЕРНАУКА Учредители: ООО "Интернаука"*, 44-46.
26. Джумабаева, С. Э., Назирхужаев, Ф. А., & Валиева, М. Ю. (2022). ВНЕШНЕСЕКРЕТОРНАЯ НЕДОСТАТОЧНОСТЬ ПОДЖЕЛУДОЧНОЙ ЖЕЛЕЗЫ ПРИ ПАТОЛОГИИ ОРГАНОВ ПИЩЕВАРЕНИЯ. *Экономика и социум*, (2-1 (93)), 289-294.
27. Назирхужаев, Ф. А. (2025). ПРИЧИНЫ, СИМПТОМЫ, ЛЕЧЕНИЕ И ОСЛОЖНЕНИЯ ПНЕВМОНИИ. *Экономика и социум*, (1-1 (128)), 501-507.
28. Назирхужаев, Ф. А., Джумабаева, С. Э., & Джумабаев, Э. С. (2022). СРАВНИТЕЛЬНЫЙ АНАЛИЗ ТЕЧЕНИЯ ПЕРВИЧНОЙ И ВТОРИЧНОЙ ВНЕШНЕСЕКРЕТОРНОЙ НЕДОСТАТОЧНОСТИ ПОДЖЕЛУДОЧНОЙ ЖЕЛЕЗЫ. *Экономика и социум*, (3-1 (94)), 396-399.