

OPTIMIZATION OF COLOPROCTOLOGY PATIENT PATHWAYS IN THE CONTEXT OF UZBEKISTAN'S DIGITAL HEALTH TRANSFORMATION

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Abstract

The rising incidence of colorectal cancer and other coloproctological conditions necessitates a revision of care delivery models. In Uzbekistan, fragmentation between outpatient and inpatient services continues to undermine the efficiency of diagnosis, treatment, and follow-up care. This article presents a conceptual framework for an integrated model of coloproctology care, developed with consideration of both international best practices and the national healthcare context. A central element of the model is digital patient routing, supported by a unified electronic medical record, remote monitoring tools, and multidisciplinary coordination. The proposed system is expected to streamline the patient journey, reduce delays in diagnosis and treatment, lower the share of emergency interventions and readmissions, and provide a robust data infrastructure for quality management in coloproctology.

Keywords: Coloproctology, integrated healthcare, electronic medical record, patient routing, digital health, follow-up care, Uzbekistan.

Introduction

Coloproctological diseases - ranging from benign conditions such as hemorrhoids and anal fissures to malignant neoplasms of the colon and rectum - represent a significant medical and social challenge. According to projections by the International Agency for Research on Cancer, the global incidence of colorectal cancer is expected to rise by 60% by 2030, reaching over 2.2 million new cases annually [1]. In Uzbekistan, as in many other countries, there is a noticeable increase in patient visits for coloproctological conditions, many of which require both outpatient follow-up and specialized, high-tech surgical care.

However, the current healthcare delivery model in Uzbekistan remains fragmented, with weak coordination between outpatient and inpatient sectors. After hospital discharge, patients often fall



out of medical oversight, and polyclinics responsible for follow-up care frequently lack access to detailed information about prior treatments, interventions, and clinical progress. This discontinuity results in duplicated diagnostics, delayed diagnoses, and diminished quality and efficiency of care. In the context of ongoing digital transformation in healthcare, developing solutions to bridge these gaps in patient routing and continuity of care has become increasingly important. One such solution involves designing a digital system for managing the patient journey - from primary contact through specialized inpatient treatment to long-term follow-up. This article presents a conceptual model specifically tailored for coloproctological care in Uzbekistan.

Integration of outpatient and inpatient services is a key prerequisite for the effectiveness of modern patient-centered healthcare systems. In countries such as Kazakhstan, models covering the full continuum of care - from prevention to social support - have already been implemented on the basis of unified digital platforms [4]. In Uzbekistan, the foundation for similar developments is being established through the national healthcare digitalization strategy, along with the expansion of electronic services and patient flow management tools.

Against this backdrop, there is an urgent need to rethink the organization of specialized care for coloproctological diseases, where continuity across care levels is critical to achieving favorable clinical outcomes. The present study aims to formulate a conceptual framework for such a model - adapted to national conditions, informed by international benchmarks, and aligned with the practical needs of the healthcare system - as an operational tool for improving coloproctological care delivery.

Methodology

To substantiate the structure of the integrated ambulatory-inpatient model for coloproctological care, we employed methods of comparative analytical review, systems analysis, and design modeling.

Key components of existing healthcare integration models were analyzed in countries with comparable socio-economic and organizational conditions. Particular attention was given to the experience of Kazakhstan, where an integrated system of care delivery is being implemented using the DamuMed digital platform, encompassing all levels of care - from prevention to follow-up. Additionally, we examined the experience of the Russian Federation, specifically the regional oncology system “Oncor,” which provides end-to-end patient tracking and inter-level routing throughout the continuum of treatment.

The analysis of the current state of coloproctological care in Uzbekistan was based on statistical indicators from a specialized hospital over the period 2020–2024. Metrics such as hospitalization volumes, number and structure of surgical interventions, length of stay, and readmission rates were evaluated. Furthermore, we reviewed strategic national policy documents that define the direction of Uzbekistan’s healthcare digital transformation, including the Healthcare Development Concept for 2019–2025 and the “E-Health – 2025” Program.

The model was designed from the perspective of systemic integration and continuity of care. Key organizational and digital components were identified, including:

- a unified electronic medical database for patient information;
- an automated system for electronic referrals and routing;
- tools for remote clinical monitoring;



– mechanisms for inter-level collaboration, including multidisciplinary case conferences and digital coordination protocols.

Results

The analysis of the current system of coloproctological care delivery in Uzbekistan revealed several critical limitations, summarized in Figure 1. Most notably, a lack of integration between outpatient and inpatient levels persists. Structured patient routing mechanisms are underdeveloped, continuity of care is not ensured, and screening and follow-up services remain insufficient. As a result, patients are often responsible for transferring their own medical information between institutions, which increases the risk of data loss and duplicated diagnostics.

Additionally, regulatory and structural deficiencies were identified, such as the absence of a clearly defined three-tiered care model and limited access to specialized coloproctology services in certain regions. Information and organizational gaps also remain substantial, including reliance on paper-based documentation, data fragmentation, the lack of electronic medical records, and the absence of a unified digital platform and outcome monitoring tools.

These factors collectively contribute to the overburdening of inpatient facilities, delays in detecting complications, and reduced patient satisfaction with the quality and continuity of medical care.

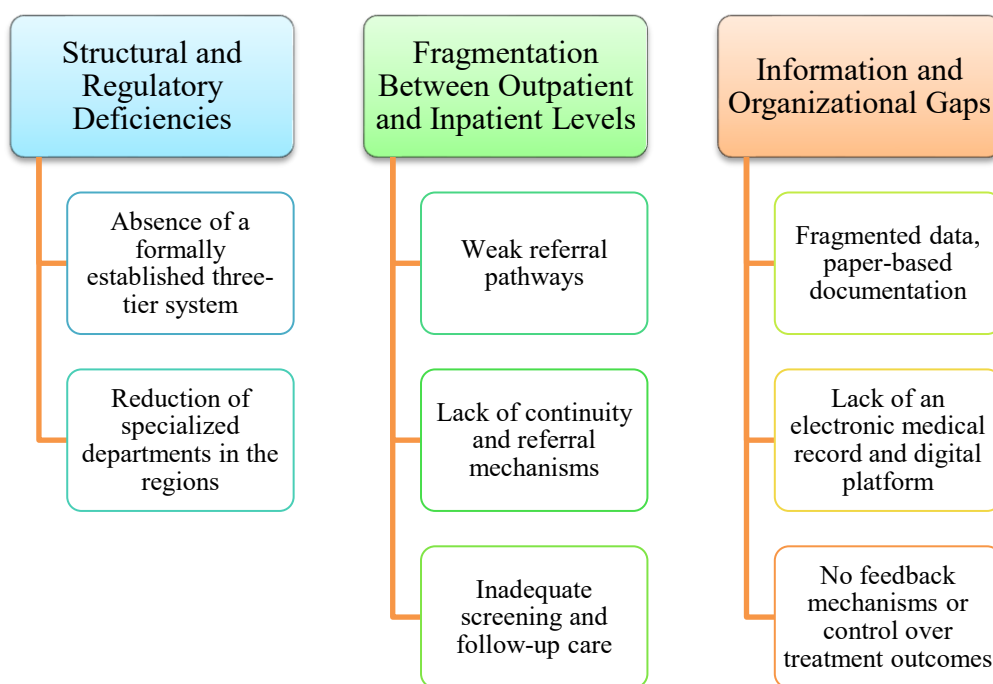


Figure 1. Structure of key limitations and their consequences in the organization of coloproctological care.

As an example, we analyzed surgical activity indicators from Multidisciplinary Clinic of the Center for professional development of medical personnel in Tashkent for the period 2020–2025. The data revealed fluctuations in the volume of interventions, a predominance of emergency procedures, and a decline in planned surgeries. These trends may indicate systemic issues in patient routing, coordination, and continuity of follow-up care.



Table 1. Dynamics of surgical activity structure at the Multidisciplinary Clinic, Tashkent (2020–2025)

| | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|----------------------------|------|------|------|------|------|------|
| Total number of surgeries | 1142 | 1100 | 1121 | 1038 | 1012 | 468 |
| Paid surgical procedures | 587 | 849 | 815 | 771 | 751 | 396 |
| Abdominal surgeries | 88 | 168 | 250 | 175 | 135 | 29 |
| Vascular surgeries | 397 | 452 | 461 | 404 | 395 | 206 |
| Dermatosurgical procedures | 363 | 480 | 410 | 459 | 482 | 233 |

Based on the analysis of organizational and informational barriers to effective coloproctological care, an integrated model was developed. This model is designed to ensure continuity and coordination between outpatient and inpatient levels of care, addressing the current fragmentation and improving clinical outcomes.

Special emphasis in the proposed model is placed on the post-hospital follow-up stage. All data related to rehabilitation, scheduled follow-up visits, and laboratory results are automatically uploaded to the Electronic Medical Record (EMR) and made accessible to primary care physicians. The model includes remote patient monitoring through telemedicine consultations and digital applications. Patients can independently report symptoms and self-measurements, enabling early detection of complications and timely therapeutic adjustments without the need for rehospitalization. This approach is particularly relevant in settings with geographic remoteness and uneven distribution of healthcare personnel.

The model also incorporates a multidisciplinary component: for complex clinical cases, virtual case conferences are conducted involving proctologists, oncologists, endoscopists, and other relevant specialists. This ensures the development of a unified treatment strategy and continuity of care.

In addition, the model's digital platform serves an analytical function, allowing real-time tracking of key performance indicators such as patient pathway duration, complication rates, and protocol completion rates. These data provide an evidence base for informed managerial decisions and continuous improvement of clinical and organizational processes.

The current state of coloproctological care in Uzbekistan reveals a marked fragmentation between outpatient and inpatient services. This disconnect leads to diagnostic delays, duplication of tests, lack of continuity in care, and reduced treatment efficiency. Local data indicate that a significant proportion of patients are admitted to inpatient facilities on an emergency basis, bypassing timely outpatient monitoring—a reflection of insufficient coordination between healthcare levels.

In this context, the transition to integrated care models appears to be a logical step in the development of the national healthcare system. International experience demonstrates that organizational integration of services and unified health information infrastructures can significantly enhance patient management. For instance, the implementation of the *DamuMed* platform in Kazakhstan has facilitated standardized patient routing and improved case monitoring [4], while the *Onkor* system in Russia has successfully consolidated diagnostics, treatment, and



follow-up into a single digital trajectory, ensuring continuity and coordinated management of oncological cases [5].

The proposed integrated ambulatory-inpatient model is designed to establish a unified digital framework that encompasses all stages of care-from initial consultation to postoperative follow-up. Its implementation can be aligned with ongoing national digital health initiatives in Uzbekistan, including the deployment of electronic medical records, smart routing systems, remote monitoring tools, and multidisciplinary coordination mechanisms.

Expected outcomes include a reduction in time to initiation of specialized treatment, fewer repeat hospitalizations, improved clinical efficiency, and higher patient satisfaction. Moreover, the use of a centralized digital platform enables real-time analytics and performance monitoring based on objective quality indicators.

Conclusion

Fragmentation in coloproctological care in Uzbekistan-from poor coordination between outpatient and inpatient services to the absence of digital continuity-poses significant barriers to timely diagnosis, treatment, and follow-up. The proposed integrated ambulatory-inpatient care model offers a structural solution to these challenges, grounded in principles of digitalization, cross-level collaboration, and data-driven clinical management.

Implementing a model that spans the entire patient care pathway-from primary contact to post-hospital monitoring-has the potential to improve coordination among healthcare professionals, reduce time to diagnosis and initiation of treatment, and lower the rates of emergency interventions and rehospitalizations. The use of a unified information platform, aligned with national digital health initiatives (e.g., *e-Health 2025* [2]), creates a foundation for scalability and systematic quality management in medical care.

Further research and pilot implementation in real-world settings will help refine organizational mechanisms, adapt digital tools to the local healthcare infrastructure, and assess effectiveness through key clinical and economic indicators.

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