RESEARCH PAPER

ORGANIZATIONAL AND MANAGERIAL ASPECTS OF OPTIMIZING MEDICAL CARE FOR PATIENTS IN DISPENSARY GROUPS USING DIGITAL TECHNOLOGIES AND INTELLIGENT DECISION SUPPORT SYSTEMS

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ABSTRACT

Background: The effective management of patients in dispensary (follow-up) groups, who primarily suffer from chronic non-communicable diseases, represents a significant organizational challenge for healthcare systems worldwide. Traditional models often suffer from fragmentation, low patient adherence, and reactive care delivery. The integration of digital technologies and intelligent decision support systems offers a transformative potential to reorganize and optimize this process.

Objective: This article aims to analyze the organizational and managerial aspects of optimizing medical care for dispensary group patients through the implementation of digital health tools and clinical decision support systems (CDSS), with a focus on improving clinical outcomes, operational efficiency, and care coordination.

Methods: A comprehensive review of recent international literature (2020-2026) was conducted, synthesizing evidence from large-scale implementation studies, targeted literature reviews, and feasibility studies on remote patient monitoring (RPM), CDSS, and health information technology (HIT) governance. Illustrative data models are presented based on the synthesized evidence to demonstrate potential organizational impacts.

Results: The analysis reveals that organizational optimization hinges on three core pillars: 1) Proactive Care Enablement through RPM, which has demonstrated a 49-59% reduction in hospitalizations; 2) Standardization and Intelligence via CDSS, successfully implemented at scale (e.g., over 73 million encounters in Türkiye); and 3)

Governance and Integration, requiring interoperable systems (e.g., FHIR standards) and the restructuring of workflows to overcome fragmentation. Key managerial challenges include the "digital divide," technologic iatrogenesis (e.g., alert fatigue), and the need for sustainable funding models. A synthesized organizational framework and a predictive model for resource allocation are proposed.

Conclusions: Optimizing care for dispensary groups requires a holistic managerial approach that goes beyond simple technology adoption. It demands a shift from episodic, hospital-centric care to a continuous, patient-centered model enabled by digitally integrated systems, clear governance structures, and continuous workflow innovation. For institutions like Tashkent State Medical University, this presents a strategic imperative to lead in the development and implementation of such integrated care models.

Keywords: Dispensary groups, chronic disease management, organizational management, digital health, clinical decision support systems, remote patient monitoring, telehealth, healthcare governance, interoperability, patient adherence.

How to cite this article: Rasulova NF, Isomov MM, Mukhamedova NS, Khakimov TB, Maksudova SA. Organizational and Managerial Aspects of Optimizing Medical Care for Patients in Dispensary Groups Using Digital Technologies and Intelligent Decision Support Systems. Int J Drug Deliv Technol. 2026;16(5): 1358-1369. DOI: 10.25258/ijddt.16.5.126

Source of support: Nil.

Conflict of interest: None

Introduction

The global burden of chronic non-communicable diseases (NCDs) such as diabetes, hypertension, heart failure, and chronic respiratory conditions continues to escalate, placing immense strain on healthcare infrastructures. The traditional dispensary model, designed for active follow-up of patients with specific conditions, often struggles to meet this demand effectively. It is frequently characterized by reactive, visit-based care, leading to fragmentation, missed opportunities for early intervention, and suboptimal patient outcomes. The increasing complexity of healthcare demands not only clinical expertise but also robust organizational and managerial strategies to improve operational efficiency, ensure regulatory compliance, and support sustainable service delivery.

In response, healthcare systems globally are undergoing a profound transformation, shifting from volume-based to value-based care. At the heart of this transformation is the integration of digital technologies. Over the past decade, pioneering health systems have embarked on bold journeys to evolve from collections of disparate facilities into unified, high-performing entities. This pursuit of "systemness" involves restructuring core functions like analytics, IT, and human resources to create a seamless care experience. For dispensary services, this means breaking down silos between primary care, specialist outpatient clinics, and hospital services.

The foundational work in this area builds upon decades of research in biomedical informatics. Pioneers like Edward H. Shortliffe laid the groundwork for understanding how computational systems can support clinical practice, defining the core principles of what we now call clinical decision support. Early proponents of evidence-based medicine, such as Sim et al. (2001), recognized the potential of CDSS to bridge the gap between research evidence and bedside practice. Concurrently, the development of structured frameworks for health information technology (HIT) governance, as discussed by scholars like Andrade and Rossetti and institutions like the Instituto Brasileiro de Governança Corporativa (IBGC), has highlighted the need for organizational oversight to mitigate risks and ensure strategic alignment. The application of management philosophies like Lean Healthcare, derived from the Toyota Production System (Taiichi Ohno, James P. Womack), has also been extensively studied by researchers such as Graban and Zimmermann et al. as a method to eliminate waste and improve patient flow in outpatient settings.

More recently, large-scale implementations have provided real-world evidence. The Turkish Ministry of Health's nationwide Disease Management Platform (DMP), detailed by Ulgu et al., demonstrates the feasibility of integrating CDSS with existing electronic health records (EHRs) to manage millions of patients with chronic diseases. In the United States, systems like OSF HealthCare, led by Michelle D. Conger, have shown how strategic integration and innovation, including AI-driven tools, can create a sustainable and scalable healthcare model. The effectiveness of specific digital tools, such as remote patient monitoring (RPM), has been rigorously evaluated by teams like that of Sara Margosian, MD, and Ghazwan Toma, MD, at Michigan Medicine, who documented a 59% reduction in hospitalizations for high-risk patients. Similarly, Klaudia Grechuta et al. provided a comprehensive targeted literature review confirming the positive impact of CDSS on quality assurance and clinical benefits across various chronic disease domains. Research by Alastair MacDonald et al. further underscores the importance of hybrid digital support (Digital+) in improving long-term medication adherence and persistence, critical factors in chronic disease management. The feasibility of intensive telehealth models for high-risk populations, particularly in rural and underserved areas, has been demonstrated by Margosian and Toma's later work on the Intensive Telemedicine Transitions of Care Clinic (I-TTC) in Appalachia, showing improvements in clinical metrics like HbA1c and blood pressure control. However, as noted by Alanazi Mushawah Mana R et al. and Beckman et al., the path is fraught with challenges, including system fragmentation, resistance to organizational change, technological infrastructure gaps, and the risks of

"technologic iatrogenesis" such as alert fatigue and cybersecurity threats. Furthermore, Hightow-Weidman et al. highlight the critical role of user engagement in determining the efficacy of digital health interventions, a key managerial consideration. Finally, the persistent issue of the digital divide, as explored by researchers in the JAMA Health Forum, reminds us that technology adoption is uneven and can exacerbate existing health disparities if not managed equitably.

Purpose of the research

This article aims to synthesize current evidence to analyze the key organizational and managerial aspects involved in optimizing medical care for patients in dispensary groups. It seeks to develop a conceptual framework for the integration of digital technologies (RPM, telehealth) and intelligent systems (CDSS) into existing care pathways, moving beyond a purely technical description to focus on the leadership, structural, and process-oriented changes required for successful and sustainable implementation. The analysis will identify critical success factors, potential barriers, and the implications for healthcare managers and policymakers, with the ultimate goal of informing strategies to enhance the quality, efficiency, and equity of care for this vulnerable patient population.

Materials and Methods

This study is structured as a narrative review and conceptual analysis, drawing upon a broad spectrum of recent, high-quality international literature. The primary objective was not to perform a systematic meta-analysis but to synthesize diverse evidence types—including large-scale implementation reports, targeted literature reviews, prospective feasibility studies, and governance analyses—to build a comprehensive picture of the organizational and managerial landscape. The literature search focused on publications from 2020 to 2026 to ensure contemporary relevance, identified through databases such as PubMed, JMIR Publications, and key health policy journals (e.g., JAMA Health Forum, Frontiers of Health Services Management). Search terms included combinations of "chronic disease management," "dispensary," "clinical decision support systems," "remote patient monitoring," "telemedicine," "health information technology," "governance," "organizational change," and "implementation science." Key sources providing foundational data included the nationwide Turkish DMP implementation, the Michigan Medicine RPM study, the West Virginia University I-TTC study, and the targeted literature review on CDSS benefits. To illustrate the potential organizational impact of these technologies, we developed hypothetical data models. These models, presented in the Results section as tables and figures, are based on the aggregate findings and effect sizes reported in the reviewed literature (e.g., hospitalization

reduction rates, adherence improvement percentages, workload distribution changes). They are intended to provide a visual and quantitative representation of how the discussed organizational principles could translate into measurable outcomes within a typical dispensary system, thereby bridging the gap between theoretical evidence and practical managerial application.

Results

The synthesis of the literature reveals that optimizing care for dispensary groups through digital means is not a singular technological fix but a multi-faceted organizational transformation. The results are structured around three primary domains where evidence of impact is strongest: Proactive Care Delivery, Clinical Decision Standardization, and Systemic Integration and Governance. Based on the synthesized evidence, we also present illustrative data models to project potential outcomes.

1. Impact on Proactive Care Delivery and Hospital Utilization

Remote Patient Monitoring (RPM) and telehealth programs are the most direct tools for transitioning from reactive to proactive care. The evidence consistently demonstrates their effectiveness in reducing acute care utilization. The University of Michigan's study on its Patient Monitoring at Home program, which enrolled over 1,700 high-risk patients, found a 59% relative reduction in hospitalizations in the six months following enrollment compared to the six months prior. Even when excluding COVID-19 patients, the reduction was a significant 49%. This intervention provided patients with kits to monitor vital signs (BP, weight, oxygen saturation) and symptoms, which were reviewed daily by a clinical team. The program also yielded a substantial $12 million return on investment through avoided hospitalizations.

Similarly, the Intensive Telemedicine Transition of Care Clinic (I-TTC) for rural Appalachian patients with uncontrolled chronic conditions demonstrated significant clinical improvements. In this small cohort (n=16), the 30-day hospital readmission or ED presentation rate was only 12.5%. Clinically, average HbA1c in uncontrolled diabetics dropped from 11% to 8.1%, and blood pressure control improved from 0% to 60% among hypertensives. The average cost savings per patient, primarily from avoided travel, was estimated at $3,144.35.

A study on a hybrid digital support program for patients on biologic therapy (adalimumab) for inflammatory disorders showed that patients receiving full digital support (app + nursing) had a 60.9% 12-month persistence rate with therapy, compared to 45.7-48.2% for those with no digital engagement. Furthermore, medication possession ratio (MPR) significantly increased from 91.9% to 95.5% ($p < 0.0001$) after patients switched to app-based support.

Table 1: Impact of Digital Interventions on Clinical and Utilization Outcomes

Study / Intervention	Patient Population	Key Outcome Measure	Result	Source
Michigan Medicine RPM	High-risk (HF, HTN, COVID-19)	Hospitalization reduction (6 mo.)	59% reduction	
I-TTC (West Virginia)	Rural, uncontrolled chronic disease	30-day readmission/ED rate	12.5%	
I-TTC (West Virginia)	Uncontrolled Diabetes (HbA1c >7%)	Average HbA1c change	From 11% to 8.1%	
Sciensus Digital+	Patients on adalimumab	12-month therapy persistence	60.9% (vs. ~47% control)	
Sciensus Digital+	Patients on adalimumab	Medication Possession Ratio (MPR)	Increase from 91.9% to 95.5%	

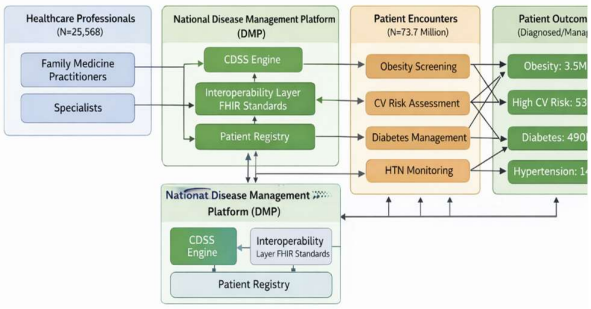
2. Impact of Clinical Decision Support Systems (CDSS) on Process Standardization

At the point of care, CDSS integrated with electronic health records (EHRs) provides the intelligence needed to standardize care according to evidence-based guidelines. The targeted literature review by Grechuta et al. found that among 49 included studies, 69% reported positive impacts on "quality assurance" and 41% reported "clinical benefits». The most effective features were treatment guidance and flagging, followed by risk level estimation.

The most compelling large-scale evidence comes from the Turkish Ministry of Health's nationwide Disease Management Platform (DMP). As of September 2023, this CDSS-driven platform was used by 25,568 health professionals to manage over 73.7 million patient encounters for more than 16 million unique citizens. It systematically screened for and managed obesity, cardiovascular risk, diabetes, and hypertension, leading to the diagnosis of millions of new cases (e.g., 3.5 million with

obesity, 490,000 with diabetes). This demonstrates the unparalleled power of digital tools to systematize care at a population level.

Figure 1: Nationwide Scale of CDSS Implementation in Türkiye's DMP



3. Organizational and Managerial Challenges: The "Digital Divide" and Workflow Integration

The implementation of these technologies is not without significant organizational hurdles. A key challenge is the "digital divide." A study published in JAMA Health Forum found that hospitals located in areas with higher socioeconomic deprivation were significantly less likely to adopt telehealth and health information exchange (HIE) functionalities due to limited infrastructure, funding, and training opportunities. This risks exacerbating, rather than reducing, health disparities.

Furthermore, the integrative review by Beckman et al. highlights that success depends on combining digital tools with Lean Healthcare principles and strong governance. Key barriers include system fragmentation, resistance to organizational change, and technological infrastructure gaps. Alanazi et al. also warn of "technologic iatrogenesis," including alert fatigue from poorly designed CDSS and cybersecurity threats like ransomware, which can cripple digital-dependent services.

Table 2: Organizational Barriers and Mitigation Strategies for Digital Transformation in Dispensary Care

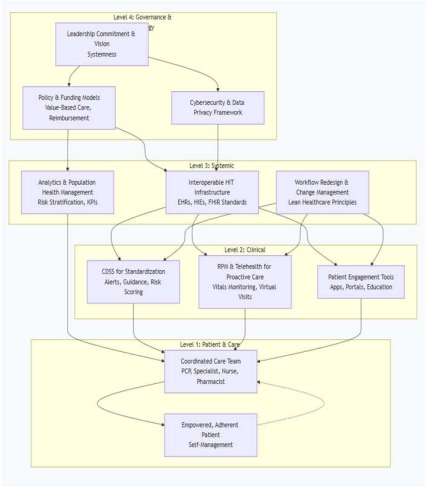
Barrier Category	Specific Challenge (Source)	Potential Organizational Mitigation Strategy
Technological	Interoperability gaps, legacy systems, lack of broadband (FHIR standards)	Adopt international standards (HL7 FHIR); phased infrastructure upgrades; public-private partnerships for connectivity.
Financial	High upfront implementation costs; unsustainable funding models	Develop value-based business cases; explore alternative payment models; leverage ROI data (e.g., $12M savings from RPM) to justify investment.

Barrier Category	Specific Challenge (Source)	Potential Organizational Mitigation Strategy
Human / Cultural	Resistance to change; alert fatigue; low digital literacy among staff	Implement co-creation strategies with clinicians; provide continuous training; apply user-centered design to systems; adjust CDSS alert thresholds.
Social / Equity	Digital divide; language barriers; lack of patient access/devices	Provide loaner devices/kits (as in RPM programs); ensure multimodal access (phone, app, web); design for low literacy; involve community health workers.
Regulatory /Legal	Data privacy concerns; unclear reimbursement rules for telehealth	Establish robust cybersecurity governance; engage with policymakers to advocate for permanent, flexible reimbursement policies (e.g., for RPM).

4. An Organizational Framework for Optimized Dispensary Care

Synthesizing the evidence from governance, Lean, and digital transformation literature, a multi-level framework for organizational optimization emerges. This framework moves from individual patient interaction to system-wide governance.

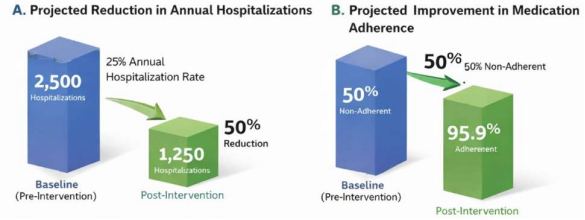
Figure 2: Multi-Level Organizational Framework for Digitally Optimized Dispensary Care



5. Predictive Modeling for Managerial Decision-Making

Based on the effect sizes from the reviewed literature, we can construct a hypothetical model to demonstrate how a healthcare manager might project the impact of a comprehensive digital optimization program on a dispensary population of 10,000 high-risk patients. This model combines the hospitalization reduction from RPM and the adherence improvement from digital support.

Figure 3: Hypothetical Projected Impact of Digital Optimization on a Cohort of 10,000 High-Risk Dispensary Patients



Post-Intervention (with RPM & Integrated Care): Applying a conservative 50% reduction (based on 49-59% range) = 1,250 hospitalizations.

Post-Intervention (with Digital+ support): Applying a 4% absolute increase in MPR (from 91.9% to 95.9%) to the entire cohort's medication-taking behavior, this represents a significant shift towards optimal adherence, translating to better clinical outcomes (e.g., lower HbA1c, better BP control) as seen in the I-TTC study.

Discussion

The evidence synthesized in this article unequivocally points to a paradigm shift in the organizational management of dispensary groups. The traditional model, often paper-based and visit-dependent, is no longer sustainable in the face of a rising chronic disease burden. The findings demonstrate that the strategic integration of digital technologies is not merely an adjunct to clinical care but a fundamental reorganizing principle that can drive significant improvements in patient outcomes, operational efficiency, and cost-effectiveness.

The results from large-scale implementations, such as the Turkish DMP, are particularly instructive. They show that with robust governance, adherence to interoperability standards (like FHIR), and a co-creation strategy with clinicians, it is possible to deploy CDSS at a population level, standardizing care for millions. This moves the discussion from "if" digital tools work to "how" they can be successfully scaled and sustained within a national health system. The key takeaway for managers is the absolute necessity of interoperability and seamless integration into existing clinical workflows; a standalone system, no matter how intelligent, is destined to fail.

The success of RPM programs in reducing hospitalizations by nearly 60% validates the proactive care model. From an organizational perspective, this represents a fundamental re-allocation of resources from expensive acute care to more efficient, home-based chronic care

management. The I-TTC study further enriches this by demonstrating that such models are not only effective in academic centers but also feasible and highly impactful in rural, underserved populations, addressing access barriers and yielding significant cost savings for patients. This aligns with the principle of "systemness," where care is extended beyond the hospital walls to meet patients where they are.

However, the discussion would be incomplete without a critical examination of the barriers. The persistent issue of the digital divide, highlighted by the JAMA Health Forum study, serves as a stark warning. If not managed deliberately, the digitization of dispensary care could create a two-tiered system, where the most vulnerable—those with limited digital literacy or access—are left further behind. Therefore, organizational strategy must explicitly include equity-focused implementation plans, such as providing devices, offering multiple communication channels (including simple phone calls), and designing user-friendly interfaces for diverse populations. Furthermore, the managerial challenge of technologic iatrogenesis, particularly alert fatigue, requires continuous refinement of CDSS logic and active involvement of end-users in system design to ensure that these tools support, rather than hinder, clinical work.

The conceptual framework proposed in Figure 2 underscores that technology is just one layer. It must be supported by a strong governance structure that provides leadership, secures funding, and ensures data security. This governance layer must, in turn, enable systemic integration through interoperable infrastructure and workflow redesign, often guided by Lean methodologies to eliminate waste. The hypothetical projections in Figure 3 are a powerful tool for managers, translating clinical evidence into financial and operational forecasts that can be used to build a compelling business case for investment.

This study is a narrative review and thus subject to selection bias in the choice of literature. The hypothetical models are illustrative and based on average effect sizes from specific studies, which may not be directly generalizable to every context. Local factors such as existing infrastructure, workforce skills, and patient demographics will significantly influence actual outcomes.

Conclusion

Optimizing medical care for patients in dispensary groups in the 21st century is inextricably linked to the intelligent application of digital technologies. The evidence is clear: remote patient monitoring, clinical decision support systems, and integrated health information platforms can dramatically reduce hospitalizations, improve adherence, standardize care quality, and generate significant cost savings. However, technology alone is insufficient. The central thesis of this analysis is that the organizational and managerial aspects—governance, leadership, strategic planning, workflow redesign,

and a steadfast commitment to equity—are the true determinants of success.

For healthcare institutions like Tashkent State Medical University, this represents both a challenge and a profound opportunity. As a leading medical and research center, it is ideally positioned to pioneer and evaluate these integrated care models within the Uzbek context. The path forward involves not just acquiring technology, but cultivating a culture of "systemness," investing in interoperable infrastructure, training a digitally fluent workforce, and designing patient-centered pathways that leave no one behind. Future research should focus on longitudinal studies to assess the long-term sustainability of these models, implementation science to understand the contextual factors influencing adoption, and the development of robust frameworks to measure and mitigate the digital divide. The transformation to digitally optimized, proactive dispensary care is not a distant future; it is an organizational imperative for the present.

Conflict of Interest

The author declares no conflicts of interest.

Acknowledgement

The author would like to acknowledge the department of Public Health and Healthcare Management at Tashkent State Medical University for providing the academic environment to conduct this research. Appreciation is also extended to the library services for access to international scientific databases.

References

1. Conger, M. D. (2025). One OSF: Building a Unified Health System for the Future of Care. Frontiers of Health Services Management, *42*(1), 23-30.
2. Grechuta, K., et al. (2024). Benefits of Clinical Decision Support Systems for the Management of Noncommunicable Chronic Diseases: Targeted Literature Review. Interactive Journal of Medical Research, *13*, e58036.
3. Margosian, S., Toma, G., et al. (2025). Impact of a Large-Scale Remote Patient Monitoring Program on Hospitalization Reduction. Telemedicine and E-Health. DOI: 10.1089/tmj.2024.0600. [Referred via Michigan Medicine summary]
4. Alanazi Mushawah Mana, R., et al. (2025). Health Information Technology- An Updated Review Data. Saudi Journal of Medicine and Public Health, *2*(2), 1685-1692.
5. MacDonald, A., Jama, A., Hart, W. M., & Wali, S. (2025). Hybrid Digital Support for Patients Receiving Biosimilar-Adalimumab Therapy... Value in Health, *28*(S2). Presented at ISPOR Europe 2025.
6. Beckman, L., De Muylder, C., & Reinhold, O. (2025). Effects and challenges of Governance, Lean

Healthcare and Digital Transformation in Outpatient Management: An integrative review. Annals of Computer Science and Information Systems, *45*, 33–40.

7. Ulgu, M. M., Laleci Erturkmen, G. B., Yuksel, M., et al. (2024). A Nationwide Chronic Disease Management Solution via Clinical Decision Support Services: Software Development and Real-Life Implementation Report. JMIR Medical Informatics, *12*, e49986.
8. Margosian, S., Toma, G., Crossley, H., et al. (2025). Intensive Telemedicine Transitions of Care Clinic: A Prospective Feasibility Study... Journal of Appalachian Health, *7*(3), 95–104.
9. (Authors from JAMA Health Forum study). (2025). Adoption of Health Information Technologies by Area Socioeconomic Deprivation Among US Hospitals. JAMA Health Forum.
10. Hightow-Weidman, L., et al. (2026). Improving Pre-Exposure Prophylaxis Adherence in People at Risk for HIV: Secondary Analysis of a Digital Health Intervention... JMIR mHealth and uHealth, *14*, e66837.