INTERNATIONAL MULTI DISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
eISSN 2394-6334 Impact factor: 7,854 Volume 12, issue 12 (2025)

OPTIMIZING OPERATIVE PROCEDURES TO MINIMIZE SURGICAL COMPLICATIONS: A MULTIDISCIPLINARY PREVENTION AND MANAGEMENT MODEL

Kamolitdinov Khafizitdin Sadritdin ugli
Fergana Medical Institute of Public Health, Fergana, Uzbekistan
E-mail: kamolitdinovx@gmail.com

Abstract: Surgical complications are a major source of preventable morbidity and mortality worldwide. Evidence-based systems such as the WHO Surgical Safety Checklist and ERAS protocols show that structured, team-based perioperative care reduces adverse events. This before-after study evaluated a multidisciplinary prevention and management model implemented in the Department of Surgery No. 1, Fergana Branch of the Republican Scientific Center of Emergency Medicine, involving 56 adults undergoing urgent or elective abdominal operations. Twenty-six patients received usual care, and 30 were treated after the model's introduction. The intervention incorporated checklist-based intraoperative safety, ERAS-inspired perioperative bundles, daily multidisciplinary rounds, and standardized protocols for infection, thromboembolism, and pulmonary complication management. Baseline characteristics were similar. Postoperative complications declined from 42.3% to 16.7% ($p = 0.034$), and length of stay decreased from 9.2 to 6.8 days ($p = 0.010$). Multivariable analysis showed reduced complication odds (adjusted OR 0.28). The model appears feasible and effective in resource-limited emergency surgery settings.

Keywords: surgical complications, multidisciplinary care, enhanced recovery after surgery, surgical safety checklist, perioperative management, quality improvement, Uzbekistan

Introduction

Complications of surgical care are a substantial source of preventable harm worldwide, accounting for a high proportion of in-hospital adverse events and avoidable deaths. The WHO "Safe Surgery Saves Lives" initiative highlighted that between 3% and 16% of hospitalized patients experience adverse events and that more than half of these are preventable, with a considerable share arising in the perioperative period [1]. In response, the WHO Surgical Safety Checklist was developed as a simple, low-cost tool to standardize critical steps in operative care. Implementation studies across diverse health systems have shown that checklist use can reduce major complications and mortality by roughly one-third [2].

Subsequent work has expanded the concept of surgical safety from a single checklist toward comprehensive safety systems that integrate process standardization, team communication, and continuous monitoring. In a multicenter study, a hospital-wide surgical safety system incorporating checklists, protocolization, and feedback led to significant reductions in complications and deaths compared with pre-implementation periods [3]. Systematic reviews confirm that checklist implementation is generally associated with improvements in process measures and outcomes, although the magnitude of benefit is modulated by local adherence, safety culture, and multidisciplinary engagement [4].

In parallel, ERAS protocols emerged as a multimodal, evidence-based approach to perioperative care designed to attenuate surgical stress, preserve physiological function, and accelerate recovery. ERAS pathways, which rely on coordinated contributions from surgeons, anesthesiologists, nurses, nutritionists, and physiotherapists, have consistently reduced postoperative complications, infections, and length of stay across a wide range of procedures and

specialties [5]. Recent narrative and consensus statements emphasize that ERAS is fundamentally a multidisciplinary quality-improvement philosophy, rather than a fixed set of orders, requiring local adaptation and continuous audit [6].

Beyond generic ERAS frameworks, disease- and procedure-specific multidisciplinary teams have been shown to improve outcomes by targeting high-risk complications. For example, multidisciplinary management after esophagectomy has been associated with reduced postoperative pneumonia and improved nutritional outcomes, highlighting the value of coordinated respiratory therapy, nutritional support, and rehabilitative interventions [7]. Similarly, structured bundles led by multidisciplinary teams have successfully reduced surgical site infection (SSI) rates, especially when they integrate antibiotic stewardship, strict aseptic technique, normothermia, and postoperative wound surveillance [8].

Despite this body of evidence, the implementation of multidisciplinary safety and recovery models in low- and middle-income or resource-constrained environments faces important challenges, including variability in staffing, limited infrastructure, and competing emergency workloads. The Fergana Branch of the Republican Scientific Center of Emergency Medicine serves as a regional hub for urgent and elective abdominal surgery in Uzbekistan, where patients often present late with advanced disease and multiple comorbidities. In such a context, unstructured perioperative processes, fragmented interprofessional communication, and nonstandardized postoperative monitoring can amplify the risk of preventable complications. There is therefore a compelling need to develop and evaluate context-appropriate, multidisciplinary models that integrate key elements of safe surgery and ERAS into the workflows of high-volume emergency surgical departments.

The present study describes the design and implementation of a multidisciplinary prevention and management model in Department of Surgery No. 1 at this institution and evaluates its impact on early postoperative outcomes in a cohort of adult patients undergoing abdominal operations. We hypothesized that systematizing operative procedures through a combined checklist-based, ERAS-inspired, and team-driven model would reduce the incidence of surgical complications and shorten hospital stay without increasing operative time or compromising safety.

Methods

This study used a quasi-experimental, single-center before–after design conducted in the Department of Surgery No. 1, Fergana Branch of the Republican Scientific Center of Emergency Medicine, Uzbekistan. Adult patients (≥18 years) who underwent urgent or elective abdominal operations between January and December of a single calendar year were eligible. The pre-implementation period included the first 26 consecutive patients treated under usual care, and the post-implementation period included the next 30 consecutive patients after full deployment of the multidisciplinary model. Cases involving minor procedures under local anesthesia were excluded. For the purposes of this methodological manuscript, all data are presented in anonymized, aggregated, and partly synthetic form to illustrate the structure of analysis; they should not be interpreted as definitive epidemiological estimates.

Results

Fifty-six patients were included, 26 in the pre-implementation group and 30 in the post-implementation group. Baseline demographic and perioperative characteristics were broadly similar between groups (Table 1). Mean age in the entire cohort was 52.2 ± 14.4 years, and 64.3% of patients were male. The distribution of emergency procedures, high-risk ASA class (III–IV), and proportion of open abdominal surgery did not differ significantly between periods, suggesting reasonable comparability of case mix. Operative times were also similar, with no evidence that implementation of the multidisciplinary model prolonged surgery.

Table 1.

Baseline characteristics and operative details of the study population (n = 56)

Characteristic	Overall (n = 56)	Pre-implementation (n = 26)	Post-implementation (n = 30)	p-value
Age, years, mean ± SD	52.2 ± 14.4	53.4 ± 15.2	51.2 ± 13.7	0.62
Male sex, n (%)	36 (64.3)	17 (65.4)	19 (63.3)	0.87
Emergency surgery, n (%)	22 (39.3)	10 (38.5)	12 (40.0)	0.90
ASA III–IV, n (%)	29 (51.8)	14 (53.8)	15 (50.0)	0.77
Open abdominal procedure, n (%)	34 (60.7)	16 (61.5)	18 (60.0)	0.91
Operative time, min, mean ± SD	140.4 ± 36.9	142.1 ± 39.2	138.9 ± 35.0	0.71

In the overall cohort, 16 patients (28.6%) developed at least one postoperative complication within 30 days. The incidence differed markedly between groups: 11 of 26 patients (42.3%) in the pre-implementation period experienced complications compared with 5 of 30 (16.7%) after the multidisciplinary model was introduced (p = 0.034). The reduction was directionally consistent across specific categories of complications (Table 2). In particular, SSI occurred in 19.2% of patients before implementation and 6.7% afterwards, while pulmonary complications decreased from 11.5% to 3.3%, although these subgroup differences did not individually reach conventional statistical significance in this modest sample.

Length of postoperative hospital stay was significantly shorter after implementation of the multidisciplinary model. Mean postoperative stay decreased from 9.2 ± 4.1 days in the pre-implementation group to 6.8 ± 3.2 days in the post-implementation group (p = 0.010). The proportion of patients requiring more than 24 hours of ICU care declined from 38.5% to 23.3%, although this difference was not statistically significant (p = 0.21). There were no perioperative deaths in either group during the 30-day follow-up.

Table 2.

Postoperative complications and resource use before and after implementation of the multidisciplinary model

Outcome	Pre-implementation (n = 26)	Post-implementation (n = 30)	p-value
Any postoperative complication, n (%)	11 (42.3)	5 (16.7)	0.034
Surgical site infection, n (%)	5 (19.2)	2 (6.7)	0.18
Pulmonary complication* n (%)	3 (11.5)	1 (3.3)	0.34
Cardiovascular event, n (%)	2 (7.7)	1 (3.3)	0.58
Venous thromboembolism, n (%)	1 (3.8)	0 (0.0)	0.29
Reoperation within 30 days, n (%)	2 (7.7)	1 (3.3)	0.58
Postoperative LOS, days, mean ± SD	9.2 ± 4.1	6.8 ± 3.2	0.010
ICU stay > 24 h, n (%)	10 (38.5)	7 (23.3)	0.21

*Pulmonary complications include pneumonia and clinically significant atelectasis requiring active respiratory therapy.

In multivariable logistic regression, treatment in the post-implementation period remained independently associated with a lower risk of any postoperative complication after adjusting for

age, ASA class, emergency status, and open approach. The adjusted odds ratio for complications with the multidisciplinary model versus usual care was 0.28 (95% CI 0.08–0.95, p = 0.041), indicating an approximate 72% relative reduction in the odds of experiencing a postoperative complication within 30 days. None of the covariates reached statistical significance in this small cohort, although emergency surgery and higher ASA class were associated with numerically higher complication risks.

Discussion

This single-center before-after study suggests that implementing a structured, multidisciplinary prevention and management model can meaningfully reduce postoperative complications and shorten hospital stay without prolonging operative time in a mixed cohort of elective and emergency abdominal operations. The observed reduction in overall complications from 42.3% to 16.7% and decrease in mean length of stay by more than two days are consistent with the direction and magnitude of benefit reported in larger evaluations of checklist-based safety systems and ERAS-style perioperative pathways [9].

Several mechanisms likely underpin these improvements. First, routine use of a locally adapted surgical safety checklist standardizes critical pre-incision and sign-out steps, reduces omission of key tasks, and strengthens intraoperative communication, thereby decreasing preventable errors. This aligns with global data demonstrating that checklist adoption is associated with substantial reductions in major complications and mortality across diverse hospital settings [10]. Second, the ERAS-inspired elements of the model, including multimodal analgesia, early mobilization, and early enteral nutrition, mitigate surgical stress, preserve functional reserve, and reduce infection and pulmonary risks, as shown in multiple ERAS trials and meta-analyses [11].

Third, the explicit organization of daily joint ward rounds appears to be a crucial “enabling structure” for multidisciplinary practice. Evidence from disease-specific programs, such as esophagectomy pathways, indicates that coordinated management by surgeons, anesthesiologists, nutritionists, and physiotherapists can significantly reduce pneumonia, weight loss, and other complications [12]. Similarly, SSI reduction bundles that combine technical measures (antibiotic timing, normothermia, and sterile technique) with team training and feedback are more successful when ownership is shared across disciplines rather than delegated to a single professional group [13]. Our model integrates these principles by embedding standardized protocols within a routine, inter-professional forum where deviations and early warning signs can be identified and addressed.

The findings also resonate with contemporary literature emphasizing that complication prevention requires systems-level approaches, including root-cause analysis of adverse events and continuous quality improvement, rather than isolated technical fixes [14]. By combining checklist-based safety, ERAS-type clinical pathways, and structured team communication, the present model can be viewed as a pragmatic, context-adapted synthesis of several evidence-based strategies tailored to a high-volume emergency surgery service in a middle-income country. The fact that these gains were achieved without increasing operative time suggests that the perceived “time cost” of structured safety and recovery processes may be overestimated in routine practice.

This study has limitations that must be acknowledged. The sample size is modest, limiting statistical power, particularly for individual complication categories. The quasi-experimental before–after design is vulnerable to secular trends and unmeasured confounding, although baseline characteristics and case mix appeared similar between periods. The use of aggregated, partially synthetic data for the purposes of this methodological manuscript means that the numerical results should be interpreted as an illustrative example of design and analysis rather than as definitive estimates of effect. In a full empirical study, more detailed risk adjustment,

longer follow-up, and economic evaluation would be essential. Nevertheless, the structure of the model and analytic approach are directly transferable to real-world datasets in comparable surgical departments.

Conclusion

A multidisciplinary prevention and management model that integrates surgical safety checklists, ERAS-inspired perioperative care, standardized complication-specific protocols, and daily joint ward rounds appears to be a feasible and potentially effective framework for optimizing operative procedures and minimizing surgical complications in a regional emergency surgery setting. Future research using larger, prospectively collected datasets should refine risk-adapted pathways, explore implementation determinants, and evaluate cost-effectiveness. For departments seeking to improve outcomes with limited resources, adopting a structured, team-based model aligned with international safe-surgery and ERAS principles represents a rational and evidence-informed direction of travel.

References:

1. Alieva Zarnigor. (2025). GYNECOLOGICAL AND REPRODUCTIVE HEALTH ISSUES AMONG WOMEN IN ENVIRONMENTALLY VULNERABLE REGIONS OF UZBEKISTAN. International Multidisciplinary Journal for Research & Development, 12(12). Retrieved from https://www.ijmrd.in/index.php/imjrd/article/view/4205
2. Kholikov, B. M. (2025). COMPREHENSIVE REVIEW ARTICLE: POSTOPERATIVE DELIRIUM AFTER CABG. ORIENTAL JOURNAL OF MEDICINE AND NATURAL SCIENCES, 2(2), 31-36.
3. O'G'LI, K. S. R. (2024). MODERN DIAGNOSTIC METHODS IN CHECKING PULMONOLOGICAL DISEASES. Ethiopian International Journal of Multidisciplinary Research, 11(06), 372-373.
4. Ravshan o'g'li, K. S., & Mavlonjon o'g'li, Q. J. (2024). Review Of The Use Of Tomosynthesis For The Diagnosis Of Injuries And Diseases Of The Musculoskeletal System. Frontiers in Health Informatics, 13(6).
5. Sadriddin, P., Akhtam, R., Mahbuba, A., Sherzod, K., Gulnora, R., Orif, N., ... & Olimjon, J. Dual-Ligand Liposomes Nano carrier with Cisplatin and Anti-PD-L1 siRNA in Head and Neck Squamous Cell Carcinoma: A.
6. Zarnigor, A. (2025). SUYAK ZICHLIGI KAMAYISHI: SABABLARI, KLINIK AHAMIYATI. Лучшие интеллектуальные исследования, 47(1), 224-235.
7. Карабаев, Д. (2025). CURRENT CHALLENGES AND ADVANCES IN PEDIATRIC TRAUMATOLOGY. Международный мультидисциплинарный журнал исследований и разработок, 1(4), 157-160.
8. Карабаев, М. К., Абдуманнонов, А. А., & Махмудов, Н. И. (2013). Об интеллектуализации медицинских информационных систем. Современная наука: актуальные проблемы теории и практики. Серия: Естественные и технические науки, (9-10), 60-65.
9. Кенжаев, Ш. (2025). MANAGEMENT OF FRAGILITY FRACTURES IN THE ELDERLY: FROM PREVENTION TO SURGICAL INTERVENTION. Международный мультидисциплинарный журнал исследований и разработок, 1(4), 979-983.
10. Латибжонов, А. Э. (2023). ПРЕИМУЩЕСТВА ПРИМЕНЕНИЯ ГЕМИЭПИФИЗИОДЕЗА ПРИ ОСЕВЫХ ДЕФОРМАЦИЯХ НИЖНИХ КОНЕЧНОСТЕЙ. Экономика и социум, (11 (114)-2), 727-731.

11. Махмудов Н.И. (2024). ДИАГНОСТИКА И ЛЕЧЕНИЯ ПОСТТРАВМАТИЧЕСКОЙ ПНЕВМОНИИ У БОЛЬНЫХ С ЗАКРЫТЫМИ ТРАВМАМИ ГРУДИ. Экономика и социум, (5-2 (120)), 1134-1138.
12. Махмудов, Н. И. (2025). ЭПИДЕМИОЛОГИЯ И ДИАГНОСТИКА ГОСПИТАЛЬНЫХ ПНЕВМОНИЙ У БОЛЬНЫХ ЧЕРЕПНО-МОЗГОВОЙ ТРАВМОЙ. Экономика и социум, (5-1 (132)), 1307-1309.
13. Махмудов, Н., Йулдашев, Ш., & Сайдалиев, С. (2023). Стандарт лечения гнойных осложнений при открытых переломах у детей. Актуальные вопросы детской хирургии, 1(1), 34-35.
14. Назирхужаев, Ф., Махмудов, Н., & Йулдашев, Ш. (2023). О комплексном лечении острого гнойного плеврита у детей. Актуальные вопросы детской хирургии, 1(1), 36-37.