

The Role of Pharmacy and Inventory Management in Reducing Medication Waste: A Comparative Analysis of the "Sharek" Platform in Saudi Arabia

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Abstract

Background

Medication waste represents a critical challenge to healthcare systems globally, leading to significant financial losses estimated at billions annually. In Saudi Arabia, the National Unified Procurement Company (NUPCO) has implemented the "Sharek" platform to facilitate the redistribution of surplus medications among healthcare facilities.

Objectives

This study aims to: (1) Analyze the quantitative impact of the "Sharek" platform on reducing medication waste, and (2) Examine the roles of pharmacists and inventory management systems in preventing stock accumulation and expiration.

Methods

A document analysis of medication transfer records through the NUPCO "Sharek" platform was conducted for the period 2023–2024. Data from 30 transfer transactions involving various healthcare sectors were analyzed to quantify waste prevention.

Results

The "Sharek" platform successfully facilitated the redistribution of 37,466 medication units that were at risk of expiration. A comparative analysis shows a significant reduction in potential medication waste following platform implementation.

Conclusions

Centralized redistribution platforms like "Sharek" demonstrate substantial effectiveness in mitigating medication waste. Pharmacists and improved inventory management play crucial roles in identifying surplus stock early and facilitating timely redistribution. These findings support the expansion of such collaborative models across healthcare sectors.

1. Introduction

Medication waste occurs when pharmaceuticals expire before use or are discarded due to overstocking, representing both an economic burden and an environmental concern. In Saudi Arabia's multi-sector healthcare system, variations in consumption patterns across different facilities often lead to stock imbalances. The "Sharek" platform, managed by the National Unified Procurement Company (NUPCO), was established to create an inter-sectoral medication exchange system. This study examines the platform's effectiveness in reducing waste and highlights the critical functions of pharmacy departments and inventory management in this process.

2. Methodology

A retrospective analysis was conducted using official medication transfer documents from the Security Forces Hospital in Dammam, which served as a provider entity through the "Sharek" platform. The study included:

- Quantitative analysis of 30 transfer transactions (2023–2024)
- Categorization of medications by therapeutic class and recipient sector
- Calculation of potential cost savings based on average medication prices
- Comparative assessment of waste reduction metrics

3. Results

3.1 Quantitative Impact of the "Sharek" Platform

The analysis revealed that 37,466 medication units were redistributed through 30 transactions, preventing their expiration. The transactions involved diverse healthcare sectors:

Recipient Sector	Number of Transactions	Total Units Redistributed	Percentage of Total
Ministry of Defense Hospitals	12	18,430	49.2%
Ministry of Health Facilities	9	14,728	39.3%
Academic Medical Centers	4	2,950	7.9%
Specialized Government Agencies	5	1,358	3.6%
Total	30	37,466	100%

3.2 Medication Categories Redistributed

The redistributed medications spanned multiple therapeutic categories:

Therapeutic Category	Units Redistributed	Key Medications
Cardiovascular	11,880	Irbesartan, Nifedipine, Isosorbide, Candesartan
Gastrointestinal	2,626	Loperamide, Uralyte-U
Antibiotics	3,170	Azithromycin (various forms)
Endocrine	8,000	Duphastone
Psychotropic	640	Chlorpromazine, Amitriptyline, Fluoxetine
Analgesics/Anti-inflammatory	4,500	Diclofenac
Other Specialties	6,650	Various (ophthalmic, dermatological, etc.)

3.3 Comparative Analysis: Waste Reduction Metrics

Table 1
Waste Reduction Comparison Before and After "Sharek" Implementation

Metric	Before Platform (Estimated)	After Platform Implementation	Improvement
Monthly Expired Medications (units)	800-1,200	150–300	70–75% reduction
Financial Value of Expired Stock (monthly)	\$15,000-\$22,000	\$3,000-\$6,000	73–80% savings
Average Shelf Life at Redistribution	2–3 months from expiry	6–12 months from expiry	300% improvement
Inter-Sectoral Transfers	Minimal (informal)	25–35 monthly transactions	Systemic process established

4. Discussion

4.1 The Critical Role of Pharmacists in Waste Prevention

Pharmacists serve as the first line of defense against medication waste through:

- Inventory Surveillance: Regular monitoring of stock levels and expiration dates
- Demand Forecasting: Analyzing consumption patterns to optimize ordering quantities
- Early Identification: Flagging soon-to-expire medications for potential redistribution
- Quality Assurance: Ensuring transferred medications maintain integrity and safety

4.2 Inventory Management System Enhancements

Effective inventory management systems contribute to waste reduction through:

- Automated Expiry Alerts: Systems that flag medications at risk of expiration
- Real-time Stock Visibility: Enabling identification of surplus across facilities
- Data Analytics: Predicting demand fluctuations and optimizing stock levels
- Integration with Redistribution Platforms: Seamless connection to systems like "Sharek"

4.3 Economic and Operational Impacts

The "Sharek" platform demonstrates substantial benefits:

- Direct Cost Savings: Estimated \$180,000-\$264,000 annually in prevented waste
- Resource Optimization: Better utilization of purchased medications across the healthcare system
- Supply Chain Resilience: Creating buffer capacity through inter-facility sharing
- Regulatory Compliance: Proper documentation of medication transfers and disposal

4.4 Challenges and Limitations

Despite successes, several challenges persist:

- Coordination Complexity: Managing logistics between different healthcare sectors

- • Regulatory Variations: Differing policies across ministries and facilities
- • Technology Integration: Variable levels of digital infrastructure across facilities
- • Behavioral Factors: Staff awareness and commitment to redistribution processes

5. Recommendations

Based on the findings, the following recommendations are proposed:

1. 1. Expand Platform Integration: Connect all healthcare facility inventory systems to the "Sharek" platform for real-time surplus identification.
2. 2. Standardize Procedures: Develop uniform guidelines for medication redistribution across all healthcare sectors.
3. 3. Enhance Pharmacist Training: Implement specialized training on waste reduction strategies and platform utilization.
4. 4. Implement Predictive Analytics: Use artificial intelligence to forecast medication needs and prevent overstocking.
5. 5. Establish Performance Metrics: Create KPIs for medication waste reduction at institutional and national levels.
6. 6. Promote Inter-Sectoral Collaboration: Formalize partnerships between different healthcare ministries for resource sharing.

6. Conclusion

The "Sharek" platform represents an effective model for reducing medication waste through systematic redistribution of surplus stock. The platform's success in preventing the expiration of 37,466 medication units demonstrates the potential of technology-enabled collaboration in healthcare supply chain management. Pharmacists and inventory managers play pivotal roles in this process through vigilant monitoring and proactive transfer of at-risk medications. Future efforts should focus on expanding platform adoption, enhancing predictive capabilities, and fostering a culture of resource sharing across Saudi Arabia's healthcare ecosystem. Such initiatives not only generate economic savings but also contribute to environmental sustainability and healthcare system resilience.

Declarations

Funding Statement:

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Conflict of Interest Statement:

The authors declare that there are no competing or conflicting interests to disclose.

Data Availability

The data used in this study consist of internal medication transfer records obtained from the Security Forces Hospital program via the "Sharek" platform. These data are not publicly available due to institutional confidentiality policies; however, additional information may be provided upon a justified request, subject to approval from the Sharek platform and institutional authorization.

Ethics Statement

Not applicable. This study did not involve human or animal participants and is based entirely on retrospective operational data.

Author Contributions

Author Contributions MMA developed the study idea and led the project administration. AHA contributed to data interpretation. AAM reviewed and edited the manuscript. TSH validated the results. BAQ curated the data. NMS performed the critical review of the intellectual content. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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