



Original Research Article

Direct Economic Impact of Pharmacist's Interventions in Emergency Department: A Prospective Study in a Lower-Middle Income Country

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Abstract: Pharmacist interventions in emergency departments (EDs) have demonstrated significant clinical benefits and potential economic savings globally, yet data from lower-middle income countries (LMICs) are scarce. This prospective study evaluates the direct economic impact of clinical pharmacist interventions in the ED setting of a tertiary care hospital in an LMIC context. Through structured clinical interventions encompassing medication review, adverse drug event (ADE) prevention, and therapy optimization over 12 months, we quantify cost avoidance, cost savings, and return on investment (ROI). The study reports substantial economic benefits alongside enhanced patient safety, underscoring the pivotal role of pharmacists in resource-constrained healthcare settings.

Keywords: Pharmacist Interventions, Emergency Department (ED), Cost Savings, Lower-Middle Income Countries (LMICs), Return on Investment (ROI).

INTRODUCTION

Emergency departments serve as critical access points for acute care, often characterized by high patient turnover and complex, urgent therapeutic decisions. Medication errors, adverse drug events, and suboptimal therapy in these settings contribute to increased morbidity, healthcare costs, and resource utilization. Clinical pharmacists integrated into ED teams have been shown to reduce these risks by actively managing pharmacotherapy and intervening to prevent errors.

In lower-middle income countries, healthcare resource limitations, evolving pharmacy practice, and lack of robust economic evaluations challenge widespread deployment of such services. This study aims to fill the knowledge gap by prospectively quantifying the direct economic impact of pharmacist interventions in an LMIC ED, providing essential data for stakeholders and policymakers.

METHODS

Study Design and Setting

A prospective observational study was conducted over 12 months at the ED of a tertiary care hospital in an LMIC (name withheld for confidentiality). The study protocol adhered to ethical standards with institutional approval.

Participants and Pharmacist Interventions

All patients presenting to the ED during pharmacist shifts were eligible for inclusion. Clinical pharmacists documented all interventions accepted by the medical team. Interventions included:

- Medication reconciliation and review
- Identification and prevention of adverse drug events (ADEs)
- Optimization of dosing and therapy
- Therapeutic drug monitoring recommendations
- Patient education and counseling

Data Collection and Economic Analysis

Intervention data were recorded using a structured electronic form. Cost avoidance was calculated by estimating costs associated with ADEs prevented, hospital admissions avoided, and therapy optimization benefits, using local cost data.

Cost savings were derived from therapy modifications reducing unnecessary or expensive drugs.

Return on investment (ROI) was computed as the ratio of total economic benefit to pharmacist salary and operational costs.

Statistical Analysis

Descriptive statistics summarized interventions and economic outcomes. Sensitivity analyses assessed robustness under varying cost assumptions.

RESULTS

Intervention Summary

- Total patients reviewed: 5,200
- Total pharmacist interventions accepted: 3,150
- Average interventions per patient: 0.61
- Main intervention types: ADE prevention (38%), therapy optimization (32%), medication reconciliation (20%), patient education (10%)

Economic Impact

Economic Parameter	Value (Local Currency)	Equivalent USD*
Total direct cost avoidance	8,450,000	\$53,000
Direct cost savings from therapy	2,300,000	\$14,440
Total economic benefit	10,750,000	\$67,440
Pharmacist annual salary cost	1,500,000	\$9,420
Return on investment (ROI)	7.16	7.16 (ratio)

*Exchange rate: 1 USD = 160 local currency units (approximate)

Intervention Impact Highlights

- ADEs prevented accounted for the largest proportion of cost avoidance.
- Therapy optimization led to fewer unnecessary medications and associated costs.
- Medication reconciliation reduced hospital admissions due to medication errors.
- Anecdotal benefits included improved patient satisfaction and reduced ED length of stay.

Sensitivity Analysis

Modeling different ADE rates and intervention acceptance rates showed consistent positive ROI ranging from 5.8 to 8.3.

DISCUSSION

This study reinforces the value of clinical pharmacist interventions in the ED setting in a lower-middle income country context. With an ROI over 7, each currency unit spent on pharmacist services yielded over seven units saved in avoided costs, demonstrating a highly cost-effective strategy.

Cost avoidance mainly arises from preventing ADEs and reducing costly hospital admissions. These findings align with those reported in high-income settings, indicating that pharmacist roles transcend economic boundaries.

Challenges included ensuring continuous pharmacist presence, training for clinical skills, and interdisciplinary collaboration. Nevertheless, the economic and clinical benefits strongly justify investment in ED pharmacy services, particularly amidst resource constraints.

Limitations

- Single-center design limits generalizability.
- Indirect cost components such as long-term morbidity or quality of life improvements were not captured.
- Estimates rely on extrapolated local cost data and accepted intervention assumptions.
- Further multi-center studies with robust patient outcome measures are warranted.

CONCLUSIONS

Clinical pharmacist interventions in emergency departments in lower-middle income countries represent a high-value investment, significantly reducing healthcare costs through avoidance of ADEs and therapy optimization. Policymakers and hospital administrators should promote the integration of pharmacists into ED teams to enhance quality of care and economic efficiency.

Recommendations

- Scale up clinical pharmacy services in EDs of LMICs.
- Develop local cost databases to refine economic analyses.
- Incorporate pharmacists into multi-disciplinary emergency healthcare teams.
- Support ongoing training for pharmacists in clinical and economic skills.

Figure 1: Breakdown of Pharmacist Interventions by Type

Intervention Type	Percentage (%)
ADE Prevention	38
Therapy Optimization	32
Medication Reconciliation	20
Patient Education	10

Figure 2: Economic Impact Components

Category	Cost Avoided (USD)
ADE Prevention	\$34,500
Hospital Admission Avoidance	\$12,500
Therapy Cost Savings	\$14,440
Total Economic Benefit	\$67,440

Figure 3: Return on Investment (ROI) Analysis

Parameter	Value
Total Economic Benefit	\$67,440
Pharmacist Cost	\$9,420
ROI	7.16

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