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Introduction

Medication errors (ME) are a serious threat to patient safety and healthcare system efficiency, particularly in resource-limited settings like Ghana. Despite growing efforts to improve care quality, the financial and clinical impacts of these errors remain under documented, due to limited reporting and inadequate data on health economics research in Ghana

Objectives

This study seeks to quantify the cost trends from medication error interventions and to identify the demographic and clinical factors associated with error related costs in public hospitals in Ghana’s Eastern Region.

Methods

A retrospective, cross-sectional analysis was conducted using a standardized medication error intervention forms submitted by 24 public hospitals (across 19 districts) in Ghana’s Eastern Region from 2018 to 2024. The 2021 data was excluded from analysis due to incomplete records. 10,283 medication error intervention forms were reviewed for patient demographics, error type and stage, personnel involved, medication characteristics, and corrective actions. Cost estimations were performed from the health system payer perspective using the National Health Insurance Scheme (NHIS) pricing framework, comparing medication costs before and after interventions to quantify potential savings. Data were analyzed in STATA version 15, with continuous variables summarized as mean ± SD and categorical variables as frequencies and percentages. Multiple linear regression model assessed factors influencing cost variations, using pre-intervention medication cost as dependent variable and patient age, gender, error type, error stage, personnel category, and number of diagnosis as independent variables. Statistical significance was set at p < 0.05. Ethical approval and administrative clearance were obtained from the Eastern Regional Health Directorate (ERHD), and confidentiality of patient data was strictly maintained throughout the study.

Results

**Demographics:** The mean patient age was 40.7 years (±24.1 SD), with females accounting for 68% of all intervention forms accessed.

**ME identification:** Most errors were identified by Pharmacists (65.4%) and originated during the ordering/prescribing stage (90.5%).

**ME type:** The most prevalent error type was wrong dosage (57.3%), followed by wrong drug (18.4%) and wrong drug combinations (7.4%). Other types of errors include contraindication, omission error and wrong dosage form

**ME Cost analysis:** The total pre-intervention cost of error was GH¢1,091,954 (\$103,907), while post-intervention costs amounted to GH¢340,351 (\$34,200), resulting in GH¢751,578 (\$69,707) in savings - a 68.8% reduction. Cost savings varied annually, with the highest annual cost saving recorded in 2024 (GH¢503,906; 81.8 %). Age was a significant predictor of cost of error, with older age (particularly 65 years+) resulting in the highest cost of error compared with other age categories (β = GH¢115.4; *p* < 0.001, 95% CI: 62.29–168.59).

Year	Ordering / prescribing	Transcribing	Dispensing	Administration	Total
2018	534 (96.22%)	6 (1.08%)	13 (2.34%)	2 (0.36%)	555(5.42)
2019	799 (97.92%)	0 (0.00%)	16 (1.96%)	1 (0.12%)	816(7.96)
2020	641 (94.40%)	0 (0.00%)	36 (5.30%)	2 (0.29%)	679(6.63)
2022	1,067 (92.62%)	0 (0.00%)	81 (7.03%)	4 (0.35%)	1,152(11.24)
2023	3,067 (86.52%)	0 (0.00%)	465 (13.12%)	13 (0.37%)	3545(34.59)
2024	3,163 (90.32%)	0 (0.00%)	338 (9.65%)	1 (0.03%)	3502(34.17)
Total	9,271 (90.46%)	6 (0.06%)	949 (9.26%)	23 (0.22%)	10249(100)

Year	Cost Before Intervention GHS (USD)	Cost After Intervention GHS (USD)	Cost Saved GHS (USD)	% Cost Saved
2018	29,546 (6,117)	6,099 (1,263)	23,447 (4,854)	79.36
2019	55,315 (9,721)	28,940 (5,086)	26,375 (4,635)	47.68
2020	147,636 (25,237)	42,464 (7,259)	105,172 (17,978)	71.24
2022	33,826 (3,349)	22,013 (2,180)	11,812 (1,170)	34.92
2023	210,102 (17,582)	129,212 (10,813)	80,865 (6,767)	38.49
2024	615,529 (41,901)	111,623 (7,599)	503,906 (34,303)	81.87
Grand Total	1,091,954 (103,907)	340,351 (34,200)	751,578 (69,707)	68.83

Table 3 : Error Type / classification									
YR	Wrong dosage (N, %)	Wrong dosage form(N, %)	Wrong drug(N, %)	Omission error(N, %)	Contraindic ations(N, %)	Wrong drug combination s(N, %)	Wrong route administration (N, %)	Other error category(N, %)	Total(N, %)
2018	404(72.40)	84(15.05)	5(0.90)	17(3.05)	22(3.94)	21(3.76)	1(0.18)	4(0.72)	558(5.47)
2019	537(64.54)	5(0.60)	90(10.82)	32(3.85)	42(5.05)	76(9.13)	0(0.00)	50(6.01)	832(8.16)
2020	427(61.88)	14(2.03)	108(15.65)	24(3.48)	26(3.77)	77(11.16)	0(0.00)	14(2.03)	690(6.77)
2022	616(53.47)	30(2.60)	162(14.06)	119(10.33)	65(5.64)	152(13.19)	0(0.00)	8(0.69)	1152(11.30)
2023	1811(52.20)	32(0.92)	731(21.07)	150(4.32)	217(6.26)	177(5.10)	0(0.00)	351(10.12)	3469(34.03 )
2024	2042(58.48)	77(2.21)	774(22.16)	111(3.18)	168(4.81)	253(7.25)	13(0.37)	54(1.55)	3492(34.26 )
Total	5837(57.26)	242(2.37)	1870(18.35)	453(4.44)	540(5.30)	756(7.42)	14(0.14)	481(4.72)	10193(100.00)

Conclusion

ME interventions substantially reduced the economic burden of medication errors, achieving a 68.8% cost reduction and GH¢ 751,578 (\$69,707) in cost savings across public hospitals in Ghana’s Eastern Region. Older patients and specific error types were significantly associated with costs of error. Strengthening data-driven feedback systems and integrating pharmacist-led monitoring into routine practice are essential for sustaining cost savings and improving patient safety.

Policy Implications

Integrating evidence-based medication safety and cost monitoring mechanisms into national health policy can translate observed savings into sustainable system-wide efficiency

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