LOOMING ANTIMICROBIAL RESISTANCE CRISIS: THE PARADOX OF NON-ADHERENCE TO CESAREAN ANTIBIOTIC PROPHYLAXIS GUIDELINES IN ETHIOPIA – A COMMENTARY

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ABSTRACT

The administration of prophylactic antibiotics is a cornerstone of infection prevention for Cesarean section (CS), with global and Ethiopian national guidelines recommending a single, pre-operative dose of narrower spectrum 'Access' antibiotics like cefazolin. However, an "implementation gap" exists in Ethiopia, characterized by a shift to multiple postoperative doses and/or use of ceftriaxone ('Watch' group antibiotics).

This shift is driven by multifaceted factors including surgical teams' fear of contamination, supply chain fragility causing inconsistent cefazolin availability, and hierarchical 'prescribing etiquette' (seniority-driven prescribing culture) where junior clinicians follow legacy practices than evidence-based medicine. Paradoxically, despite this antibiotic overuse, surgical site infection rates in Ethiopia remain high (9–16%). Moreover, overreliance on multiple-dose and/or broad-spectrum agents is potentially contributing to accelerating regional antimicrobial resistance, where multidrug-resistant Gram-negative bacilli reported at rates as high as 82.7% in some Ethiopian hospitals. Global projections warn that by 2050 AMR could cause 10 million deaths annually, surpassing cancer mortality and exceeding the combined toll of malaria and tuberculosis.

To address this crisis, physicians must move beyond individual prescribing habits toward systemic antimicrobial stewardship and align with WHO's call for evidence-based surgical bundles. WHO surgical bundles, particularly underused practices such as preoperative vaginal cleansing in cesarean sections, are proven to reduce postoperative infections. Simultaneously, the Ministry of Health must prioritize the reliable procurement of 'Access' category antibiotics, such as cefazolin, strengthen adherence monitoring for national clinical guidelines, and support context-specific implementation research to build provider trust in standardized protocols.

KEYWORDS: Antimicrobial stewardship, Cesarean section, Guideline Adherence, Surgical antibiotic prophylaxis, Ethiopia, Ceftriaxone, Surgical site infection

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INTRODUCTION

The administration of prophylactic antibiotics remains a cornerstone of infection prevention for women undergoing Cesarean section (CS), significantly reducing the risk of wound infection, endometritis, and maternal sepsis[1]. Leading global health organizations and professional organizations, consistently recommend a single, pre-operative doses of a narrower spectrum antibiotics[1]. Specifically for CS, a single dose of suitable antibiotic, typically a first-generation cephalosporin, should be administered within 60 minutes of skin incision to ensure peak tissue concentrations before potential contamination[1]. Similarly, Ethiopian national protocol recommend a single prophylactic doses, cefazolin or ampicillin[2].

Supporting such stewardship efforts, the World Health Organization (WHO) developed the AWaRe (Access, Watch, Reserve) classification as a tool for monitoring and reducing antimicrobial resistance (AMR)[3]. The 'Access' group covers 'narrow' spectrum, first choice antibiotics for common infections, while the 'Watch' group includes broader agents with higher resistance risk, reserved for specific indications, and the "Reserve" group comprises last-resort antibiotics intended for treatment of confirmed or suspected infections caused by multidrug-resistant organisms[3]. Global targets call for ≥60% of national antibiotic use to come from the 'Access' group, safeguarding the effectiveness of 'Watch' and 'Reserve' agents[3].

Ethiopia has formally aligned its regulatory framework with these global standards. The Ethiopian Essential Medicines List reinforces this directive by classifying cefazolin as a vital 'Access' drug, ensuring its priority for surgical prophylaxis and protecting broader spectrum agents for other indications[4]. Despite alignment with international standards, studies from Ethiopia reveal an implementation gap: hospitals commonly administer multiple postoperative doses and/or substitute ceftriaxone, a practice that replace the recommended single dose "Access" agents for cesarean prophylaxis[5, 6]. Furthermore, cross-sectional studies from Ethiopian hospitals show that the single-dose standard is breached, with extended postoperative antibiotic regimens administered for 24–48 hours or longer, reflecting non-compliance with recommended prophylaxis duration[7].

This guideline non-adherence is contributory to a worsening regional antimicrobial resistance profile, as the routine use of "Watch" group antibiotics for surgical prophylaxis, flagged by WHO's 2022 AWaRe classification as high-risk, drives multidrug resistance, including extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae[3]. Such reliance on multiple doses and/or use of third generation cephalosporins potentially contribute to the existing AMR crisis, a national meta analysis showed 82.7% MDR prevalence among Gram negative bacilli, with up to 78% already resistant to agents like ceftriaxone, which has been misused for surgical prophylaxis[8]. Multicenter data from the country's referral hospitals also highlighted that sepsis pathogens like Klebsiella pneumoniae show up to 84% resistance, underscoring how prophylactic use of third generation cephalosporins is increasingly misused and mismatched to local resistance patterns[9].

In obstetric care, AMR risk may extend to neonates, resistant maternal flora can be transmitted vertically, while hospitals also act as reservoirs for MDR strains. Longitudinal data from Ethiopian neonatal units have shown preterm infants with high sepsis rates were caused by broadly resistant pathogens[10, 11]. More recent multicenter evidence also confirms that neonatal sepsis in some facilities is increasingly dominated by MDR bacteria that exhibit high-level resistance to 'Watch' group agents[11, 12]. So, non-adherence to surgical prophylaxis guidelines undermines maternal care and can contribute to creating hospital wide selective pressure leaving neonates exposed to pathogens largely resistant to standard empirical therapy. The widespread normalization of multiple postoperative doses and miss use of antibiotics represents one of the critical

public health threats, projections warn that by 2050 AMR could cause 10 million deaths annually, surpassing cancer mortality and exceeding the combined toll of malaria and tuberculosis[13].

The drivers of this non-adherence to guidelines are multifaceted and deeply rooted in the clinical environment. Among surgical teams, a pervasive 'fear of contamination' drives reliance on multiple postoperative doses as a perceived safety net against operation room sterility breaches[14]. Structural barriers are compounded by supply chain fragility: inconsistent cefazolin availability in Ethiopian Pharmaceutical Supply Service (EPSS) forces default use of other antibiotics[15]. Ethnographic studies have also highlighted the 'prescribing etiquette' (seniority-driven prescribing culture) and hierarchy as critical barriers, as junior clinicians follow legacy multi doses practices to avoid conflict with senior staff who remain skeptical of single efficacy in spite of guidelines recommendations[16].

Paradoxically, despite widespread use of broad spectrum antibiotics and extended postoperative dosing, the country is facing a high rate of surgical site infection, often reported at 9 to 16%[17]. Overreliance on use of antibiotics either by multiple postoperative doses and/or broad spectrum 'Watch' antibiotics to offset environmental gaps is a profound failure and cannot substitute for core infection prevention practices. WHO instead advocates evidence based surgical bundles, including preoperative vaginal cleansing with povidone-iodine, strict hand antisepsis, and proper skin preparation[1]. Implementing surgical bundles, especially underused practices like vaginal cleansing in cesarean sections has proven effectiveness in preventing postoperative SSI and endometritis[18].

Closing such guideline–practice gap requires shifting from individual prescribing habits to systemic antimicrobial stewardship. This deep-rooted reliance on extended use of antibiotics for surgical prophylaxis reflect a low value practice that accelerates antimicrobial resistance without reducing surgical site infections. Preserving the therapeutic utility of 'Watch' and 'Reserve' antibiotics demands that the FMOH and the EPSS ensure consistent procurement of 'Access' agents such as cefazolin. Clinical education and practice must pivot towards holistic surgical bundles rather than antibiotics overuse. Importantly, doing implementation research or clinical trials tailored to Ethiopia's local context could generate actionable evidence, strengthen clinician confidence, and support alignment of guideline recommendations with actual clinical practice. Implementation research or clinical trials would not only validate global recommendations but also embed them within Ethiopia's health system realities, thereby supporting sustainable improvements in maternal and neonatal outcomes while contributing to mitigation of the antimicrobial resistance crisis.

It is high time for strict infection control and antibiotic stewardship programs be integrated into Ethiopian obstetric care. Urgent action is needed to align procurement chains with national guidelines and to implement surveillance systems that monitor the effectiveness of single dose prophylaxis. At the same time, the Ministry of Health should prioritize the reliable procurement of "Access" category antibiotics such as cefazolin, strengthen adherence monitoring to national clinical guidelines, and support context specific implementation research to build provider confidence in standardized protocols.

List of Abbreviations

AMR: Antimicrobial Resistance
AMS: Antimicrobial stewardship
CS: Cesarean section
WHO: World Health Organization
AWaRe: Access, Watch, Reserve (WHO classification)
MDR: Multidrug-resistant / Multidrug resistance
ESBL: Extended-spectrum beta-lactamase
SSI: Surgical site infection
EPSS: Ethiopian Pharmaceutical Supply Service
FMOH: Federal Ministry of Health

Authors' contributions

GBA and SFG conceptualized the commentary. GBA performed the literature review and drafted the initial manuscript. SFG provided critical revisions. Both authors read and approved the final manuscript.

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