

Caregiver Knowledge, Attitudes and Home Medication Administration Practices for Children Attending a Nigerian Tertiary Hospital

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Abstract

Background: Once a child leaves the hospital or clinic with a prescription, the caregiver becomes the final safeguard against medication error, yet caregiver-level home practices are far less studied in Nigeria than hospital-based error.

Objective: To describe the knowledge, attitudes and home medication administration practices of caregivers of children attending a paediatric department in a Nigerian tertiary hospital, and to examine how these practices relate to caregiver education and child age.

Methods: A descriptive cross-sectional survey was conducted in 2020 among 215 caregivers of children attending the paediatric department of a Federal Medical Centre in South-South Nigeria, using a structured, interviewer-assisted questionnaire covering demographic characteristics and 23 items on medication-related knowledge, attitudes and practice. Descriptive statistics summarised the data, and the Pearson chi-square test assessed associations between caregiver education, child age and error type, with $p < 0.05$ considered significant.

Results: Most caregivers were mothers (47.4%) of a child aged 1–4 years (35.3%), residing in an urban area (66.5%), with tertiary education (37.2%) and a monthly income above N15,000 (74.9%). Dosing error (under-dose and over-dose combined) was the most frequently reported error type across all educational backgrounds and age groups, including among tertiary-educated caregivers (37.2% reporting dose error as the leading type). Regarding home practice, when a child vomited medicine, 41.9% of caregivers

re-administered the dose immediately and 38.1% waited before trying again; when a child refused medicine, 35.3% fed it forcefully. Most caregivers (78.6%) used the device supplied with the medicine, and 40.9% reconstituted liquids with boiled and cooled water, though 34.0% used bottled water and 8.4% used any available water.

Conclusion: Dosing error is common in the home setting even among educated, urban caregivers, and several widely practised responses to vomiting and refusal carry an appreciable risk of unintentional overdose. Caregiver education alone does not appear sufficient to prevent these practices; structured, practical counselling at the point of prescription is likely to be necessary.

Keywords: Caregiver, Medication Administration, Paediatric, Home Practice, Health Literacy, Dosing Error, Nigeria

1. INTRODUCTION

Hospital-based studies of paediatric medication error understandably focus on the prescribing, dispensing and administration steps performed by health professionals, yet for most children the majority of doses of an outpatient prescription are actually administered at home, by a parent or other caregiver, without professional supervision. This makes the caregiver's own knowledge, attitude and practice a determinant of medication safety in its own right, one that sits largely outside the hospital's direct line of sight once the child is discharged or leaves the outpatient clinic; a recent prospective observational study of caregiver dose-measurement accuracy found that meaningful deviation from the intended dose remains common even when caregivers use a purpose-supplied measuring device, underscoring that this risk does not disappear once the family leaves the pharmacy counter (Balıkçı & Güneş, 2024). This home-level dimension of medication safety is explicitly recognised within the World Health Organization's Third Global Patient Safety Challenge, Medication Without Harm, which frames transitions of care — including the point at which responsibility passes from health professional to caregiver — as one of its three priority action areas (World Health Organization, 2017).

Several practical steps in home medication administration carry meaningful risk if performed incorrectly: reconstituting a dry powder with the wrong volume or type of liquid, measuring a liquid dose with a household spoon rather than the device supplied with the medicine, or deciding what to do when a child vomits or refuses a dose. A recent Indian observational study found that 18.65% of caregivers committed a measurable dosing error despite the availability of standardised devices, with the measuring cup the most commonly chosen device and the oral syringe associated with the greatest accuracy (Joshi & Bavdekar, 2019), while an earlier Indian survey of caregivers of hospitalised children found generally favourable perceptions of standardised dosing devices alongside a residual minority still relying on informal measures (Buddhadev et al., 2016). Nigerian evidence points in a similar direction: a south-western Nigerian study of caregiver self-medication practices for under-five children found that informal, non-prescription-guided dosing decisions remained common even among caregivers with reasonable general health awareness (Okunola, 2020), while a Kaduna-based study of caregiver antibiotic-use practices found that early discontinuation of a prescribed course once the child's health improved was reported by a meaningful minority (17%) of respondents (Omole et al., 2022). Comparable data describing the specific home practices examined in the present study — device use, reconstitution liquid, and response to vomiting or refusal — among Nigerian caregivers remain limited, despite Nigeria's comparatively high burden of paediatric antibiotic and antimalarial prescribing in the outpatient setting.

This paper reports caregiver-level data collected alongside a parallel hospital-professional survey in the

same paediatric department, focusing specifically on the caregiver's own knowledge, attitudes and administration practice. The objectives were: (i) to describe caregiver demographic characteristics and their relationship with the type of medication error reported; (ii) to examine specific home practices around dose duration, response to vomiting or refusal, and liquid reconstitution; and (iii) to assess whether caregiver educational background and child age were associated with the type of error reported.

2. METHODS

2.1 Design and setting

This was a descriptive cross-sectional survey conducted in the paediatric department of a Federal Medical Centre (FMC) in South-South Nigeria, covering caregivers accompanying children attending the children's emergency ward, in-patient wards, special care baby unit, and children's out-patient clinic.

2.2 Study population and sampling

Caregivers of children attending the department were recruited using a convenience sampling technique over a three-month period (February to April 2020). A total of 215 caregivers were enrolled and completed the survey. The predominant relationship to the child was mother (47.4%), followed by father (18.1%), sister (12.1%), aunt (10.2%), brother (6.5%) and grandmother (5.6%).

2.3 Instrument and data collection

A structured questionnaire comprising a demographic section and a 23-item section addressing medication-related knowledge, attitude and practice was self-administered where possible; a face-to-face guided interview was used for caregivers who preferred this format, to ensure questions were correctly understood before response. This approach yielded a 100% response rate among enrolled participants.

2.4 Data analysis

Data were analysed in SPSS version 25. Descriptive statistics summarised demographic and practice-related variables as frequencies and percentages. The Pearson chi-square test examined the association between caregiver educational background, child age band, and reported type of medication error, with $p < 0.05$ taken as the threshold for statistical significance.

2.5 Ethical consideration

Ethical approval was obtained from the Research and Ethics Committee of the Federal Medical Centre, and informed consent was obtained from each caregiver before questionnaire administration.

3. RESULTS

3.1 Caregiver and child characteristics

Of the 215 caregivers surveyed, mothers formed the largest group (47.4%), and the modal child age band was 1–4 years (35.3%). Most caregivers worked as civil servants (43.7%) or in business (26.0%), resided in urban areas (66.5%), and had attained tertiary education (37.2%), followed by secondary (28.4%) and primary (9.3%) education; most (74.9%) reported a monthly income above N15,000.

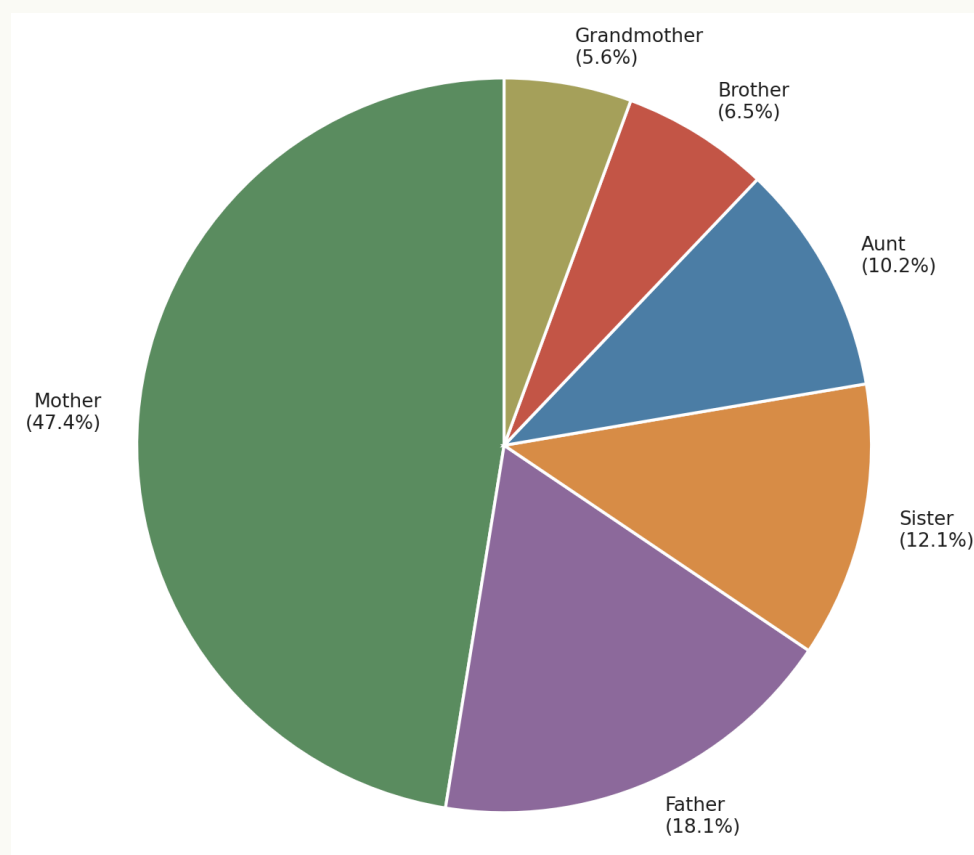


Figure 1. Caregiver relationship to the child (n=215).

3.2 Type of medication error by educational background

Dosing error was the most frequently reported type of error across every educational category. Among caregivers with tertiary education, under-dose (16.3%) and over-dose (14.4%) were the leading error types; among those with secondary education, the corresponding figures were 11.6% and 8.8%. Wrong time was reported by 3.7% of respondents at nearly every educational level except diploma holders (1.4%). Notably, the persistence of dosing error even among tertiary-educated caregivers (37.2% of whom identified dose error as their leading error type) suggests that formal education alone does not fully protect against this type of home error; the mechanics of weight-based liquid dosing may require explicit, practical instruction regardless of a caregiver's general educational attainment.

Table 1. Type of Medication error by Caregiver Educational Background (n=215).

Error type	Primary n(%)	Secondary n(%)	Tertiary n(%)	Postgrad. n(%)	Diploma n(%)	Sub-total n(%)
Under-dose	7 (3.3)	25 (11.6)	35 (16.3)	16 (7.4)	7 (3.3)	90 (41.9)
Over-dose	5 (2.3)	19 (8.8)	31 (14.4)	10 (4.7)	3 (1.4)	68 (31.6)
Wrong time	8 (3.7)	8 (3.7)	8 (3.7)	8 (3.7)	3 (1.4)	35 (16.2)
Wrong duration	–	4 (1.9)	5 (2.3)	2 (0.9)	–	11 (5.1)
Wrong medicine	–	1 (0.5)	–	2 (0.9)	2 (0.9)	5 (2.3)

Error type	Primary n(%)	Secondary n(%)	Tertiary n(%)	Postgrad. n(%)	Diploma n(%)	Sub-total n(%)
Wrong frequency	–	4 (1.9)	1 (0.5)	1 (0.5)	–	6 (2.9)

3.3 Type of medication error by child age

Under-dose and over-dose were equally the leading error types overall (34.5% each), followed by wrong time (12.5%), wrong frequency (10.9%), wrong duration (5.1%) and wrong medicine (2.3%), a distribution that differed significantly by age band ($p=0.03$). Children aged 1–4 years accounted for the largest share of both under-dose (13.5% of the total sample) and over-dose (17.7%), consistent with this age band's particular reliance on liquid formulations and calculated, rather than fixed, dosing.

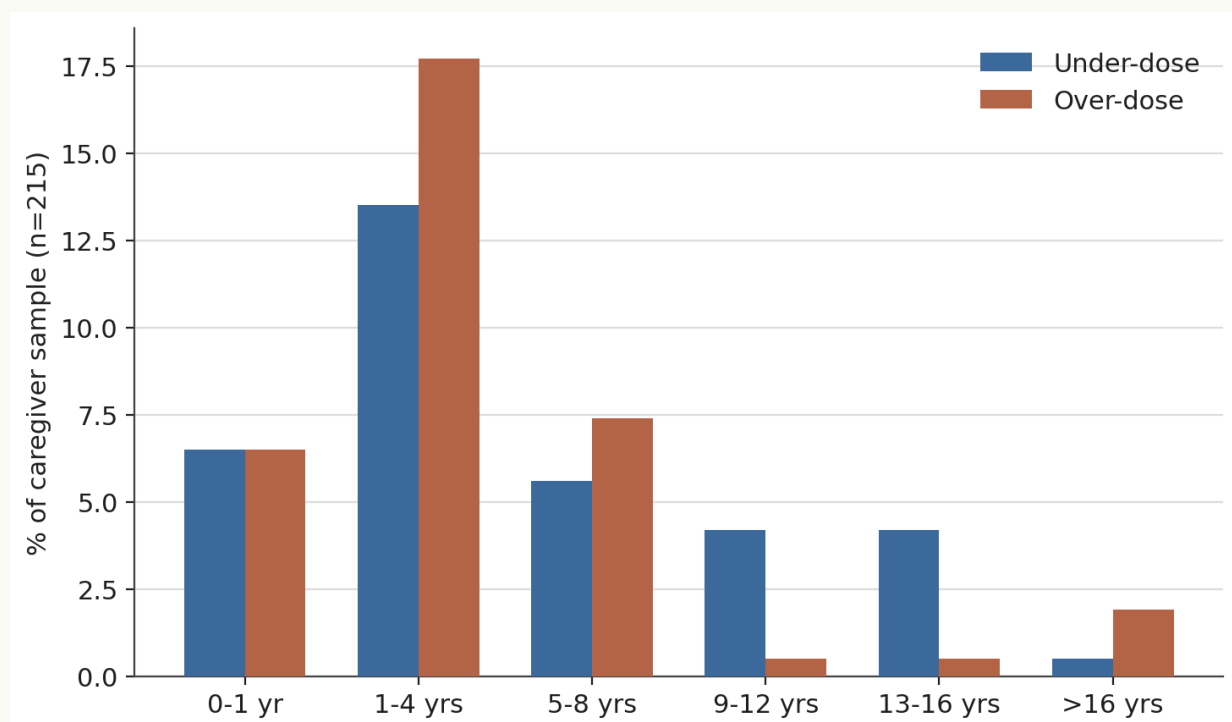


Figure 2. Under-dose and over-dose as a proportion of the caregiver sample ($n=215$), by child age band ($p=0.03$).

3.4 Home administration practices

Regarding duration of therapy, 60.5% of caregivers reported continuing medication for the duration stipulated by the prescribing physician, while 19.5% stopped after 3 days and 20.0% stopped once the child appeared to improve — a practice with particular implications for antibiotic courses, where early discontinuation can contribute to incomplete treatment and to resistance.

When asked what they did if the child vomited the medicine, 41.9% of caregivers reported giving the medicine again immediately, 38.1% waited some time before trying again, 10.7% skipped the present dose and gave the next scheduled dose, and 9.3% stopped the medicine altogether. The most common response — immediate re-dosing — carries a meaningful risk of double-dosing if some fraction of the original dose had already been absorbed before the child vomited.

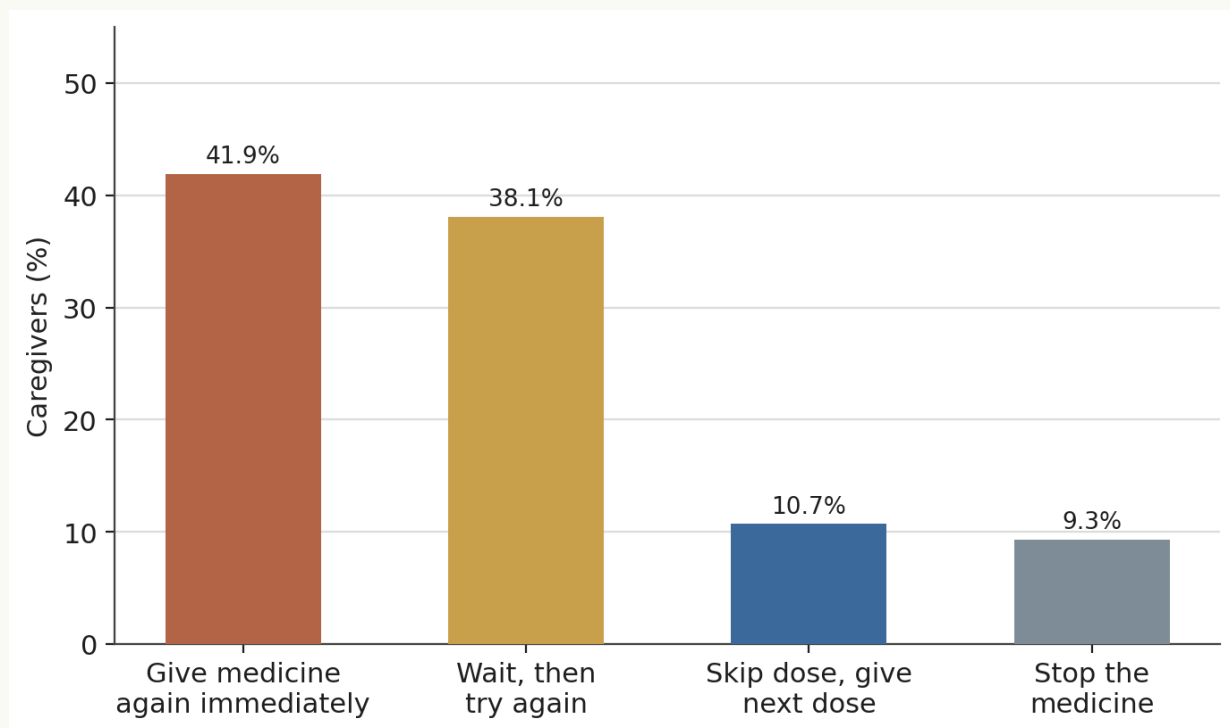


Figure 3. Caregiver response when a child vomits the medicine (n=215).

In the event of a child refusing medicine, 35.3% of caregivers reported feeding it forcefully, 25.6% fed it after some time, 16.3% gave it at another time, 10.7% diluted it with water, and 9.3% mixed it into milk before feeding. Dilution and mixing with food or milk can affect both the accuracy of the dose actually consumed and, for some drugs, absorption.

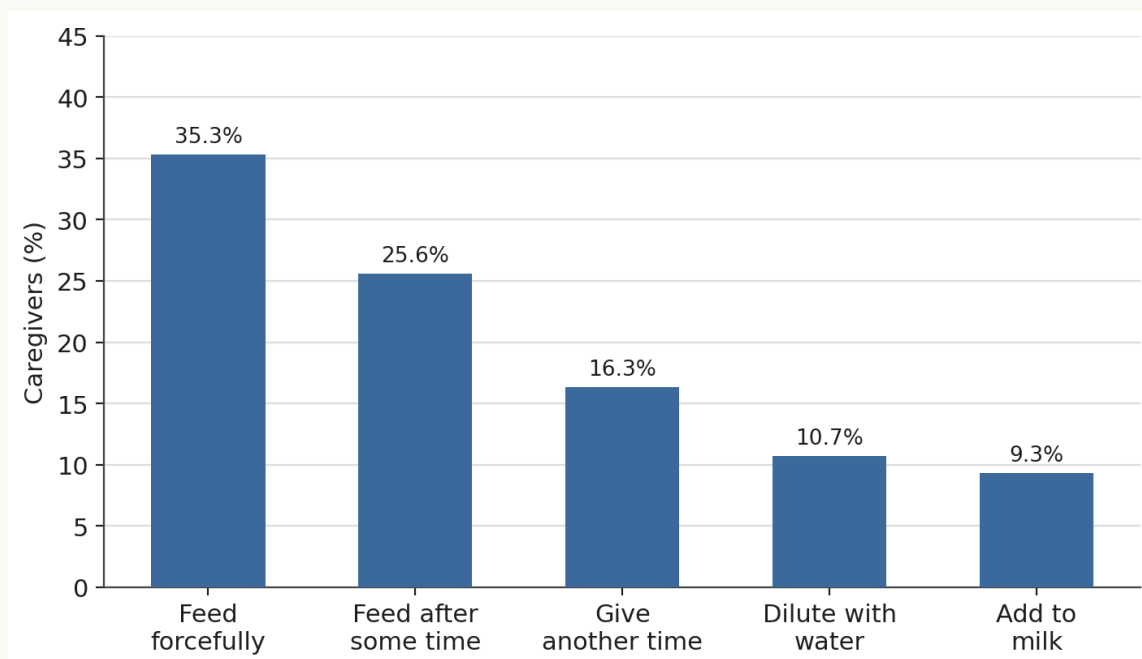


Figure 4. Caregiver response when a child refuses medicine (n=215).

Most caregivers (78.6%) used the measuring device supplied with the medicine, while 9.8% used a home spoon. Just under half (49.3%) reported checking the expiry date before administration. For liquid reconstitution, 40.9% used boiled and cooled water, 34.0% used bottled water, 8.4% used any available water, 6.0% used the reconstitution fluid supplied with the medicine, and 2.3% were uncertain what liquid they had used.

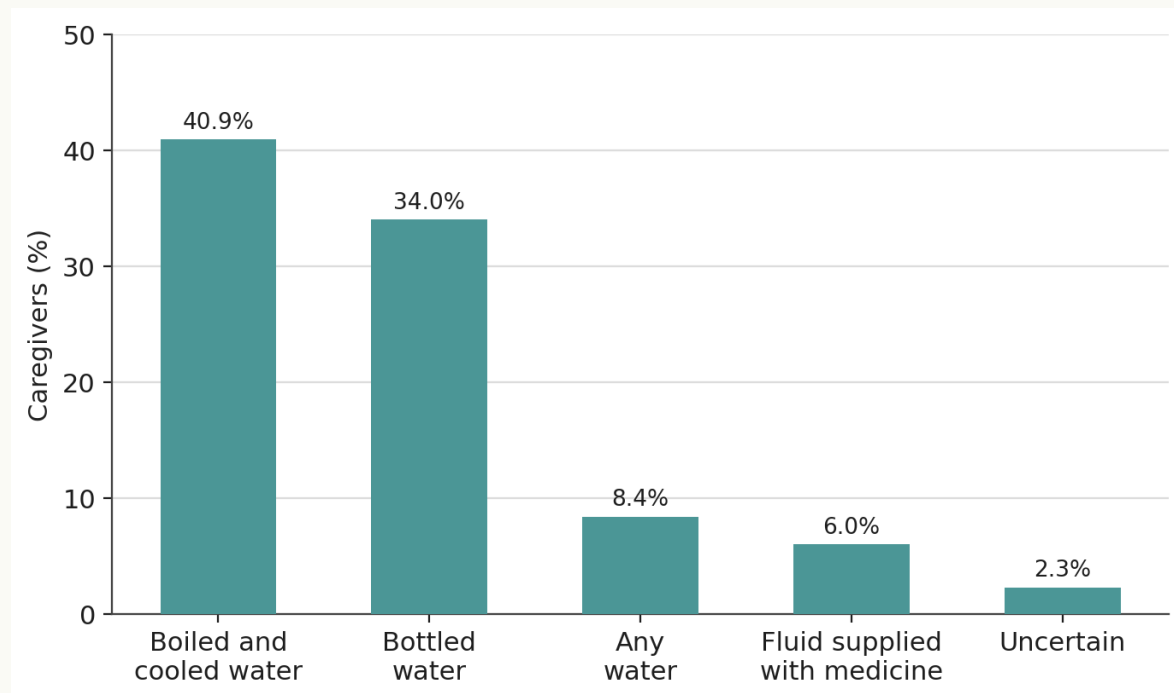


Figure 5. Liquid used by caregivers to reconstitute oral medication (n=215).

4. DISCUSSION

The demographic profile of caregivers in this sample — predominantly mothers, urban-resident, with at least secondary education — is broadly consistent with recent Indian caregiver samples: Sil et al. (2017) similarly found that mothers with at least some formal education made up the majority of primary caregivers surveyed in a comparable KAP study. This comparison is instructive: despite a caregiver profile that, on paper, looks reasonably educated and resourced, dosing error remained the leading reported error type in the present study across every educational category, including tertiary-educated caregivers. This is consistent with the possibility that liquid-dose measurement is a specific, teachable skill rather than a byproduct of general educational attainment — a caregiver can be highly literate and still never have been shown how to read a dosing syringe or calculate a weight-based liquid volume, a conclusion supported directly by a recent Indian observational study in which 18.65% of caregivers made a measurable dosing error despite most having access to a standardised device (Joshi & Bavdekar, 2019).

The majority use of the device supplied with the medicine (78.6%) is an encouraging finding, broadly consistent with earlier Indian survey data showing generally favourable caregiver perceptions of standardised dosing devices (Buddhadev et al., 2016). It also sits alongside a more recent prospective study which found that, even when caregivers used a standardised measuring device, a clinically meaningful proportion still produced a dose that deviated from the reference volume (Balıkcı & Güneş, 2024) — a reminder that supplying the right device is a necessary but not sufficient safeguard on its own. Even so, a residual minority using imprecise home measures in the present sample, combined with the substantial minority uncertain about or using unsuitable water for reconstitution (10.7% combined “any water” and “uncertain”), represents a specific, addressable target for counselling at the point of dispensing; a recent Indian intervention study found that supplementing verbal instruction with a simple pictogram significantly reduced liquid-dosing errors, including among less-educated mothers (Patidar, Mathur & Pathak, 2021), suggesting a low-cost, scalable option for this setting.

The caregiver response to vomiting observed here — immediate re-dosing by 41.9% — is a pattern with direct clinical implications. A recent Indian tertiary-hospital survey of paediatric medication re-dosing

practices after vomiting found that the time elapsed between ingestion and vomiting was a key factor influencing whether redosing was considered appropriate, and highlighted the absence of consistent, simple guidance for caregivers on this point as a specific gap (Thangaraju et al., 2022). Caregivers in the present sample were not asked to condition their redosing decision on elapsed time, and the practice pattern observed — immediate re-administration regardless of how long the medicine had been in the child's system — could plausibly result in some children receiving more than the intended cumulative dose. This is a more permissive practice than that reported by Sil et al. (2017), where caregivers were more likely to skip the present dose or delay rather than redose immediately, and represents one of the more concrete, actionable findings of this study: caregiver counselling that includes a simple time-based rule for redosing after vomiting could plausibly reduce inadvertent overdosing without requiring any change to prescribing practice.

Forceful feeding in response to refusal (35.3%) and the substantial minority who stopped therapy once the child appeared better (20.0%) both point toward gaps in caregiver counselling on treatment adherence rather than gaps in caregiver capability. Early discontinuation of a prescribed course, particularly for antibiotics, is a recognised contributor to incomplete treatment and antimicrobial resistance, and the pattern observed here — 60.5% completing the physician-directed duration against a combined 39.5% stopping early either at day 3 or upon clinical improvement — suggests this remains a meaningful minority practice in this setting, consistent with findings from Sil et al. (2017), where stopping medication once the child improved was similarly common, and with a Kaduna-based Nigerian study in which 17% of caregivers reported discontinuing antibiotics once the child's health improved (Omole et al., 2022).

4.1 Limitations

This study has two main limitations. First, the convenience sampling strategy and single-centre design restrict generalisability to caregivers attending other Nigerian hospitals with different patient populations or counselling practices. Second, practice data were self-reported rather than directly observed, which is subject to social-desirability bias, particularly for questions touching on forceful feeding or early discontinuation of therapy that caregivers may under-report.

5. CONTRIBUTION TO KNOWLEDGE

This study adds to the paediatric medication-safety literature in the following specific ways:

It provides one of the few Nigerian datasets disaggregating caregiver dosing error by both educational background and child age simultaneously, showing that dosing error persists even among tertiary-educated, urban caregivers — a finding that challenges the common assumption that caregiver education alone is protective.

It documents, with specific frequencies, three discrete home practices — response to vomiting, response to refusal, and choice of reconstitution liquid — that are rarely reported together in the same Nigerian sample, giving hospital pharmacists a concrete basis for structuring discharge counselling around the actual behaviours caregivers report, rather than generic medication-adherence advice.

It identifies immediate re-dosing after vomiting (41.9%) as the modal caregiver response in this population, a specific, actionable target that, informed by existing international guidance on redosing time-windows, can be addressed through a simple counselling rule rather than a broader health-literacy programme.

It offers a same-department, same-period caregiver dataset that can be read alongside a companion health-professional survey from the identical setting, a pairing that is uncommon in the Nigerian literature and that is developed further in a separate comparative paper.

6. CONCLUSION

Dosing error was the most common type of medication error reported by caregivers in this Nigerian paediatric outpatient population, and this pattern persisted even among caregivers with tertiary education, indicating that general educational attainment alone is not a sufficient safeguard against home dosing error. Several widely reported responses to common situations — particularly immediate re-dosing after vomiting and forceful feeding after refusal — carry a meaningful, and readily addressable, risk of unintentional overdose. Structured, practical counselling at the point of prescribing or dispensing, focused specifically on dose measurement, reconstitution and a simple rule for managing vomited doses, is likely to be a more effective safeguard than general health education alone.

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