O Mundo da Saúde

Pharmacoepidemiological profile of patients treated at a teaching clinic in the brazilian Amazon

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Highlights

• No patient demonstrated high adherence to pharmacotherapy.
• Chronic diseases increase the risk of self-medication and adverse drug reactions.
• The use of integrative practices is common and occurs without professional guidance.
• Low utilization of pharmaceutical consultations limits therapeutic care.
• Polypharmacy (38.75%) associated with chronic diseases (p = 0.005).

Graphical Abstract
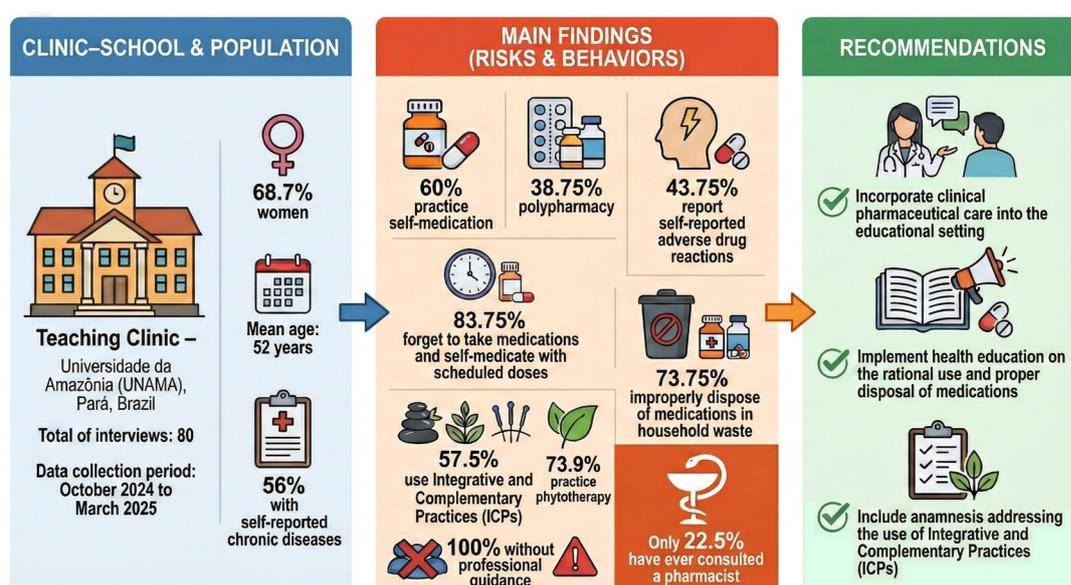
Abstract

Characterizing medication use constitutes a fundamental health indicator, particularly in the context of challenges such as polypharmacy and self-medication. However, populations assisted in teaching clinics remain underinvestigated, despite encompassing diverse profiles and serving as strategic settings for professional training. This study aimed to characterize the therapeutic profile and health-related behaviors of patients treated at a teaching clinic in the Brazilian Amazon. An observational, cross-sectional study was conducted from october 2024 to march 2025 at the Teaching Clinic of the *Universidade da Amazônia*, Belém, PA, Brazil. A convenience sample included 80 consecutive adults who met the eligibility criteria. Data were collected using a semi-structured questionnaire administered through individual interviews and analyzed using descriptive statistics and chi-square/Fisher's exact tests. The sample was predominantly female (68.7%), with a mean age of 52.13 ± 17.91 years, and 56.2% reported chronic diseases. A high prevalence of self-medication (60%) and polypharmacy (38.75%) was observed. Self-medication was significantly associated with the presence of chronic diseases (RR = 1.64; p = 0.04) and self-reported adverse drug reactions (RR = 1.93; p = 0.038). No participant demonstrated high therapeutic adherence, with neglect of dosing schedules being the main reason for non-adherence (83.75%). Access to pharmaceutical consultations was low (22.5%), and improper disposal of medications was prevalent (73.75% disposed of medicines in household waste). Integrative and Complementary Practices were used by 57.5% of participants, predominantly phytotherapy (73.9%), without professional guidance. These findings indicate a high-risk pharmacotherapeutic profile characterized by self-medication, polypharmacy, adverse drug reactions, and absence of high therapeutic adherence, associated with limited access to pharmaceutical services. The implementation of pharmaceutical care strategies integrated into the teaching-clinic environment is necessary to optimize pharmacotherapy and enhance evidence-based professional training grounded in local realities.

Keywords: Self-medication. Polypharmacy. Therapeutic Adherence. Pharmaceutical Care.

INTRODUCTION

Characterizing patterns of medication use within a community is recognized by the World Health Organization as a fundamental health indicator, enabling a comprehensive understanding of how populations utilize available therapeutic resources[1]. In a global context of increasing medication consumption, driven by epidemiological transition and population aging, significant public health challenges have emerged. Polypharmacy, self-medication, and poor therapeutic adherence represent risk factors for adverse drug reactions, drug–drug interactions, and other Drug-Related Problems (DRPs), which burden health services and increase morbidity and mortality[2,3].

In the Brazilian context, the complexity of this scenario is intensified by social determinants of health. Factors such as income, educational level, and access to services directly influence pharmacotherapeutic behaviors, generating inequalities in the management of prevalent chronic diseases, such as hypertension and diabetes[4]. National studies show that, despite the high prevalence of medication use, access and adherence are uneven, varying according to sociodemographic and regional characteristics[5,6]. Self-medication, in particular, constitutes a widespread practice and a persistent challenge, frequently associated with negative clinical outcomes and poisoning events[7,8].

There is a knowledge gap regarding the specific characteristics of populations assisted in teaching clinics strategic settings that concentrate patients with diverse profiles and function as environments for professional training. Pharmacoepidemiological investigation in this context offers a dual opportunity: to generate data that optimize pharmaceutical care and to support academic training with real-world evidence from the assisted community[9].

Beyond conventional pharmacotherapy, the analysis of the therapeutic profile should encompass a holistic view of health care that transcends medication use alone. Resources such as phytotherapy, physical therapy practices, acupuncture, and other Integrative and Complementary Practices (ICPs) are increasingly employed by the population, either alone or in combination with conventional pharmacotherapy[10]. Investigating these resources is crucial for a comprehensive understanding of patients' therapeutic approaches and for preventing potential interactions and DRPs[11]. In this context, the present study aims to characterize the therapeutic profile and health-related behaviors of the population assisted in a teaching-clinic environment, in order to generate information to support the planning of pharmaceutical care strategies.

MATERIALS AND METHODS

Study Design, Setting, and Period

This was an observational, cross-sectional study with a descriptive–exploratory approach, conducted in the outpatient clinics of the Teaching Clinic of the Universidade da Amazônia (UNAMA), Alcindo Cacela campus, in Belém, Pará, Brazil. The services provided by the Teaching Clinic are open to the general public. Multidisciplinary care includes Psychology, Speech Therapy, Dentistry, Nutrition, Physical Therapy, Aesthetics, and Occupational Therapy. The complex assists an average of 30 patients per day, in two shifts (9:00 a.m. to 12:00 p.m. and 2:00 p.m. to 5:00 p.m.), five days per week.

The cross-sectional design was employed to characterize the profile of the population assisted by these services and to investigate the prevalence of and factors associated with polypharmacy and self-medication at a single point in time. Data collection was carried out from October 2024 to March 2025. Data were collected weekly on predefined days and times through direct approach to patients in the teaching clinic's waiting room. The same research team conducted all approaches and interviews throughout the study period, ensuring that participants were not included more than once.

Population, Sample, and Eligibility Criteria

The study population comprised patients assisted at the teaching clinic during the data collection period. A non-probabilistic convenience sample included 80 consecutive participants who met the inclusion criteria: age ≥18 years, current attendance or attendance within the previous six months at the teaching clinic, and consent to participate through signing the Free and Informed Consent Form (FICF).

The sample size of 80 participants was determined considering the descriptive and exploratory nature of the study, allowing prevalence estimates with a 95% confidence interval and an estimated prevalence of 50% (conservative scenario), with a maximum error of 11%, which is considered acceptable for studies characterizing population profiles[12]. In addition, for association analyses, the estimated statistical power was approximately 75–80% to detect associations of moderate to high effect size (RR ≥ 2.0), considering α = 0.05 and an exposed/non-exposed ratio of 1:1, which

is appropriate for exploratory studies aimed at identifying relevant associations for future investigations[12].

Patients with cognitive impairment that could compromise the reliable completion of the questionnaire were excluded. Identification of such impairment was performed through brief screening conducted by the researchers, with support from health professionals directly involved in clinical care (psychologists, physical therapists, occupational therapists, among others) who were familiar with the patients' clinical profiles. This assessment took place at the initial approach, prior to questionnaire administration.

Data Collection and Definition of Variables

Data were collected using a semi-structured questionnaire developed based on previously validated instruments. Sociodemographic variables followed standards established by the Brazilian Institute of Geography and Statistics (IBGE) and Vigitel 2023[4]; the adherence assessment was adapted from instruments validated for the Brazilian population; and the operational definitions of self-medication and polypharmacy followed World Health Organization (WHO) criteria[13] applied in national studies. Prior to the main data collection, a pilot test was conducted with four patients (not included in the final sample) to assess clarity, comprehensibility, and administration time (15–20 minutes). All researchers (n = 5) were trained to ensure standardized application of the instrument. The questionnaire was divided into sections to address the study objectives:

Socioepidemiological and Clinical Profile: variables such as sex, age (years), income (in minimum wages), educational level, and presence and type of chronic diseases.

Therapeutic Profile: assessment of all medications used in the previous 120 days, including medications prescribed by physicians and other health professionals, non-prescribed medications (self-medication), phytotherapy, and dietary supplements (vitamin and multimineral complexes). Medication use was self-reported by participants, who were asked to list all pharmaceutical products used during the defined period. During data collection, duplicate records were identified and excluded. The instrument also included investigation of the use of Integrative and Complementary Practices (ICPs).

Health Behaviors and Access to Pharmaceutical Care: assessment of access to pharmaceutical services (through the question: "Have you had any consultation with a pharmacist in the last 12 months?"), treatment adherence, and methods of medication disposal.

The main outcome variables were operationalized as follows:

Polypharmacy: categorized dichotomously, with patients classified as "Yes" if they reported the concomitant use of four or more prescribed and/or non-prescribed medications[14], and as "No" if they used fewer than four. Although the definition of five or more medications is common, a threshold of four or more was adopted to increase sensitivity for risk detection, considering the lack of universal consensus on the term[14].

Self-medication: categorized based on self-reported frequency over the previous 120 days. Patients who reported self-medicating with "Some frequency" or "High frequency" were classified as practitioners ("Yes"). Those who reported "Rarely" or "No" self-medication during the recall period were classified as non-practitioners ("No").

Self-reported Adverse Drug Reaction: a dichotomous variable (Yes/No) based on the participant's perception of the occurrence of any undesirable effect following medication use in the previous 120 days. To validate the plausibility of the association between the reported medication and the adverse effect, researchers consulted package inserts approved by the Brazilian Health Regulatory Agency (ANVISA) and, when necessary, reference pharmacological databases (Micromedex, UpToDate). An adverse reaction was considered present when the reported symptom/sign was listed as a known adverse effect of the medication used.

Treatment Adherence: assessed using four Yes/No questions adapted and validated by Almeida[15], Soares16, and Valente17: Do you forget to take your medications? Do you take your medications at the correct time? Do you stop taking your medications when you start to feel worse? Do you stop taking your medications when you start to feel better? The sum of points (each "Yes" response = 1 point) generates a score ranging from 0 to 4, used to classify adherence as follows: score 0 = High adherence; score 1–2 = Moderate adherence; score 3–4 = Low adherence, based on responses regarding forgetfulness, compliance with dosing schedules, and interruption of treatment when feeling better or worse.

For the outcomes of interest self-medication, adverse drug reactions, and medication use a recall period of 120 days prior to the interview was established to ensure greater accuracy of information and data comparability.

Statistical Analysis

Collected data were entered into Microsoft Excel® spreadsheets and subsequently analyzed using the Bio-Estat bio-statistical package, version 5[18]. Categorical variables were presented as absolute (n) and relative (%) frequencies. Associations between variables were investigated using Pearson's chi-square test or Fisher's exact test, as appropriate. The following associations were tested: polypharmacy versus self-medication;

polypharmacy versus socioepidemiological variables and presence of chronic diseases; self-medication versus socioepidemiological variables and presence of chronic diseases; occurrence of self-reported adverse drug reactions versus self-medication and polypharmacy.

To quantify the magnitude of statistically significant associations with the occurrence of adverse reactions, Relative Risk (RR) was calculated as: risk in the exposed group / risk in the non-exposed group, with the corresponding 95% Confidence Interval (95% CI). The level of statistical significance adopted for all analyses was 5% ($p < 0.05$). Additionally, effect sizes were calculated to determine the magnitude of associations. The Phi coefficient (Φ) was used for 2×2 contingency tables. Effect size interpretation followed the criteria established by Cohen (1988)[19]: small effect (0.10–0.29), medium effect (0.30–0.49), and large effect (>0.50).

Ethical Aspects

The study was conducted in full compliance with the ethical principles established by National Health Council Resolutions No. 466/2012 and No. 510/2016. The study protocol was submitted to and approved by the Research Ethics Committee (REC) of UNAMA under CAAE No. 82520124.7.0000.5173 (Opinion No. 7,187,666). All participants were duly informed about the study objectives and procedures and formalized their participation by signing the Free and Informed Consent Form.

RESULTS

Sociodemographic, Clinical, and Therapeutic Profile

It was estimated that approximately 1,800 patients were assisted by the services during the data collection period (6 months × 4 weeks × 3 collection days × 30 patients/day, considering service overlap), corresponding to an estimated participation rate of approximately 4.4% of eligible individuals. The sociodemographic and clinical characterization of the sample (n = 80) is detailed in Table 1.

The sample comprised 80 patients, with a predominance of females (68.7%). The mean age was 52.13 ± 17.91 years, with a higher concentration in the 41–60 years (37.5%) and over 60 years (35.0%) age groups. Completed secondary education was the most prevalent educational level (38.8%), followed by completed higher education (27.5%). Half of the participants (50.0%) reported a household income between 1 and 2 minimum wages. The Unified Health System (SUS) was identified as the main health care system by 43.7% of the sample, whereas 38.8% used private health insurance and 17.5% reported using both systems (Table 1).

The presence of noncommunicable chronic diseases (NCDs) was reported by 56.2% of participants. Among individuals with NCDs, arterial hypertension was the most prevalent condition (42.5% of the total sample), followed by diabetes mellitus (16.5%) and dyslipidemia (12.5%). When stratified by sex, a higher prevalence of NCDs was observed among men (68.0%; 95% CI: 48%–82%) compared with women (50.9%; 95% CI: 38%–63%).

Data related to medication use reflected a therapeutic profile consistent with the observed chronic morbidity pattern, with 38.75% of patients reporting the concomitant use of four or more medications. The most prevalent pharmacological classes were antihypertensive agents (42.5%), followed by analgesics (18.7%), antidiabetic agents (16.2%), and lipid-lowering drugs (12.5%).

Use of Integrative and Complementary Practices (ICPs)

The use of ICPs was reported by 57.5% of participants. Phytotherapy was the most prevalent modality (73.9%), followed by acupuncture (15.2%) and homeopathy (8.7%). ICP use was higher among females in older age groups (>60 years: 64.7%), whereas among males, 100% use was observed in the 18–40 years age group. The most commonly used medicinal plants were chamomile, boldo, and lemon balm. Recommendations originated predominantly from family members (12.5%) and other non-professional sources (15%), with no records of guidance provided by health professionals.

Pharmacotherapeutic Risks (Polypharmacy, Self-medication, and ADRs)

The prevalence of self-medication in the sample was 60% (95% CI: 49%–70%), being significantly higher among males (76%; 19/25) compared with females (52.7%; 29/55). The main reasons reported for self-medication were the management of inflammation (14/48) and headache (14/48), influenced by household medication stocks (19/48), advertising (16/48), and recommendations from family members/friends (14/48).

The prevalence of polypharmacy (defined as the use of four or more medications) was 38.75% (95% CI: 28%–49%). Similar to self-medication, polypharmacy was more prevalent among men (48%) than among women (34.54%). The occurrence of self-reported adverse drug reactions (ADRs) was 43.75% (95% CI: 33%–54%).

Table 2 presents the bivariate statistical associations. Self-medication was significantly associated with

the presence of chronic diseases (RR = 1.64; 95% CI: 1.03–2.61) and with the occurrence of self-reported ADRs (RR = 1.93; 95% CI: 1.04–3.55), with association strengths considered moderate (Φ = 0.26), but with important practical implications (substantial risk differences). Polypharmacy showed a strong association with the presence of NCDs (p = 0.005), with moderate strength (Φ = 0.34). No statistically significant associations were found between polypharmacy and self-medication (p = 0.17) or between polypharmacy and ADRs (p = 0.069).

Care Behaviors and Access to Pharmaceutical Care

The demand for pharmaceutical consultations was low, with only 22.5% of patients reporting having consulted a pharmacist. The therapeutic adherence profile represented the most critical finding of the study: no participant (0%) was classified as having high adherence. The entire sample was classified as having either moderate adherence (76.25%) or low adherence (23.75%). The most frequent non-adherence behaviors were "carelessness with dosing schedules" (83.75%) and "forgetting to take medications" (66.25%).

Regarding waste management, a dissociation between knowledge and practice was observed. Although 62.5% (n = 50) reported having received guidance on medication disposal, the predominant practice was disposal in household waste (73.75%), with only 26.25% using specific collection points.

Table 1 - Sociodemographic and clinical characteristics of patients treated at a teaching clinic. Belém, Pará, Brazil, 2024–2025 (n = 80).

Characteristic	n (%)	Mean ± SD
Sex		
Female	55 (68.7)	
Male	25 (31.3)	
Age (years)		
18-40	22 (27.5)	
41-60	30 (37.5)	52.13 ± 17.91
> 60	28 (35.0)	
Educational level		
Illiterate	1 (1.3)	
Completed elementary education	7 (8.7)	
Completed secondary education	31 (38.8)	
Incomplete secondary education	3 (3.7)	
Completed higher education	22 (27.5)	
Incomplete higher education	7 (8.7)	
Postgraduate education	9 (11.3)	
Household income (minimum wages*)		
No income	1 (1.3)	
<1	2 (2.5)	
1 a 2	40 (50.0)	
3 a 4	18 (22.5)	
>4	19 (23.7)	
Main health care system		
Private health insurance	31 (38.8)	
Unified Health System (SUS)	35 (43.7)	
Both	14 (17.5)	
Presence of chronic disease	45 (56.2)	
Main chronic diseases**		
Arterial hypertension	34 (42.5)	
Diabetes mellitus	13 (16.5)	
Dyslipidemia	10 (12.5)	

SD: Standard deviation.
SUS: Unified Health System.
*: Brazilian minimum wage in force during 2024–2025.
**: Self-reported noncommunicable chronic diseases; percentages calculated based on n = 80; participants may present multiple conditions.
Source: Data extracted from and tabulated based on semi-structured questionnaires administered to 80 different patients.

Table 2 - Association between self-medication, polypharmacy, and clinical characteristics of patients according to the presence of chronic diseases and self-reported adverse reactions.

Subgroups	Category	Self-medicate	Do not self-medicate	Total	RR**	95% CI	p-value	Φ
Patients with Chronic Diseases	Yes	32	13	45	1.64	*1.03-2.61*	*0.04**	*0.26*
	No	16	19	35				
Self-reported Adverse Drug Reactions	Yes	26	9	35	1.93	*1.04-3.55*	*0.038**	*0.26*
	No	22	23	45				
Patients with Polypharmacy	Yes	22	9	31	1.63	*0.86-3.07*	*0.174*	
	No	26	23	49				

p < 0.05
* RR: Relative Risk (risk in the exposed group)/(risk in the non-exposed group)

DISCUSSION

This pharmacoepidemiological study revealed a profile of high pharmacotherapeutic vulnerability among patients treated at a teaching clinic in the Brazilian Amazon, characterized by a complete absence of high therapeutic adherence, an association between self-medication and chronic diseases, and low utilization of pharmaceutical services. The findings reflect not only individual patient characteristics but also structural limitations of the investigated setting, which lacks integrated pharmaceutical services. Recent studies conducted in Brazilian teaching clinics corroborate the relevance of these settings as spaces where social vulnerabilities and clinical complexity converge, and where atypical patterns of medication use are frequently observed[20,21].

The most alarming finding was the low level of therapeutic adherence. This rate of 100% suboptimal adherence (moderate or low) is substantially worse than the national average non-adherence rate of 44.4% (for hypertension) reported by Coelho[22], indicating therapeutic failures in the studied population. This result may be explained by the high prevalence of polypharmacy, consistent with data from a global meta-analysis demonstrating similar average prevalence in adults[23], which increases regimen complexity and consequently reduces adherence[14]. A recent study among older Brazilian adults identified patterns of inappropriate prescribing and high pharmacotherapeutic risk associated with polypharmacy, reinforcing that this phenomenon transcends institutional settings and reflects systemic weaknesses in pharmaceutical care nationwide[24].

Meta-analyses of clinical trials demonstrate that structured pharmaceutical interventions are effective in improving medication adherence[25,26]; however, the limited access to pharmaceutical consultations observed in this sample deprives patients of this proven beneficial resource. Socioeconomic barriers, evidenced by the concentration of participants with low household income, represent an additional determinant recognized as a predictor of non-adherence[27,28].

The absence of structured pharmaceutical services at the investigated teaching clinic represents an important gap that perpetuates this scenario. A Brazilian experience implementing pharmacotherapeutic follow-up in a teaching pharmacy demonstrated clinical benefits for patients, but also highlighted institutional challenges, including organizational resistance, infrastructure limitations, and the need for continuous preceptor training[29]. These findings suggest that, although the implementation of clinical pharmaceutical services in academic environments is feasible and beneficial, it requires strategic planning, institutional support, and effective integration into multiprofessional teams[30,31].

The observed prevalence of polypharmacy reflects the chronic morbidity profile of the sample and aligns with a global systematic review that identified similar average prevalence in adults, with variations according to context and definition used[23]. National studies consistently demonstrate an association between multiple chronic diseases and the use of multiple medications[32,33]. Recent investigations have shown that polypharmacy is often associated with potentially inappropriate prescribing patterns, including the use of high-risk medications, therapeutic duplication, and clinically relevant drug–drug interactions[24].

Although the association between polypharmacy and adverse drug reactions did not reach statistical significance in the present study, the borderline p-value and the magnitude of observed adverse events suggest clinical relevance. A meta-analysis on adverse drug reactions in primary care demonstrates that polypharmacy is one of the main risk factors for preventable adverse events[34], a finding corroborated by reviews addressing adverse effects in Brazilian populations[33,35]. The limited sample size may have reduced statistical power to detect this association with formal significance; however, consistency with the literature reinforces its clinical importance.

The higher prevalence of chronic diseases, polypharmacy, and adverse reactions among men contrasts with the national epidemiological pattern, in which women consistently present higher prevalence of these outcomes[32,34]. This finding likely reflects selection bias characteristic of teaching clinics, which concentrate populations with greater clinical complexity and social vulnerability compared with conventional services[20,21]. Men who seek this type of service may represent a specific subgroup with delayed access to care or accumulation of undiagnosed or poorly controlled conditions. The absence of an on-site pharmacy or medication dispensing service at the investigated clinic may intensify this bias, attracting patients who seek consultations and health services offered in the teaching environment while maintaining uncoordinated pharmacological treatment elsewhere.

The high prevalence of Integrative and Complementary Practices (ICPs), predominantly phytotherapy, reflects the Amazonian cultural tradition of medicinal plant use and exceeds national prevalences documented by the National Health Survey[36]. The critical aspect was the complete absence of professional guidance, with all recommendations originating from family members or other unqualified sources. Although the Brazilian National Policy on Integrative and Complementary Practices in the Unified Health System advocates integration of these practices into care[10], the World Health Organization report on traditional and complementary medicine[37] emphasizes the need for health professionals to actively investigate phytotherapy use during anamnesis, as recommended to prevent herb–drug interactions an especially relevant risk among chronically ill and polymedicated patients.

The observed dissociation between knowledge of appropriate medication disposal and actual practice indicates that information alone does not produce sustained behavioral change. A recent study on pharmaceutical counseling for medication disposal[38] demonstrates that effectiveness depends on accessible infrastructure and continuous educational campaigns, rather than isolated informational actions.

The results of this study demonstrate that teaching clinics are not merely service delivery sites, but strategic settings for professional training anchored in real-world population challenges. Epidemiological and pharmacotherapeutic characterization enables students and professionals to develop competencies tailored to prevalent problems: strategies to improve adherence in resource-limited contexts, active screening of self-medication and integrative practice use, safe management of polypharmacy, and prevention of drug-related problems.

The teaching–service–community integration, when structured based on local situational diagnoses, enhances the training of professionals better prepared to meet Unified Health System needs[20,39]. In the specific field of clinical pharmacy, Brazilian experiences with pharmacotherapeutic follow-up in teaching environments have demonstrated simultaneous benefits for patients (improved clinical outcomes and quality of life) and students (development of clinical reasoning and communication skills)[40].

The absence of pharmaceutical services at the studied institution therefore represents a dual loss: clinical—by depriving patients of proven effective care—and educational—by limiting training opportunities for future pharmacists with clinical competencies. Implementing such services in teaching clinics, despite challenges documented in the national literature[30,31,39], constitutes a strategic investment to simultaneously strengthen care and education.

Finally, the cross-sectional design precludes causal inferences. Non-probabilistic sampling and limited sample size restrict generalizability. Self-reported data are subject to recall and social desirability bias. Reduced statistical power may have limited detection of associations between polypharmacy and self-medication. Validation of adverse reactions was based on consultation of package inserts and pharmacological databases, without the application of formal causality algorithms, precluding definitive causal attribution between medication and adverse event. Prospective studies with larger samples are required to confirm the identified associations and investigate causal relationships.

CONCLUSION

This study identified important pharmacotherapeutic vulnerabilities among patients attending a teaching clinic in the Brazilian Amazon, characterized by lack of therapeutic adherence, high prevalence of self-medication significantly associated with chronic diseases and adverse reactions, substantial use of integrative practices without professional guidance, and limited access to clinical pharmaceutical services. A relevant finding was the association between chronic diseases and self-medication, contrasting with the national pattern in which chronic patients typically present lower prevalence of this practice.

These results indicate that structural barriers to health service access—exacerbated by the absence of integrated pharmaceutical services at the teaching clinic—drive patients with greater clinical complexity

toward unsupervised self-care strategies, increasing the risk of drug-related problems. The magnitude of non-adherence, combined with underutilization of pharmacists, reveals a critical gap between medication availability and assurance of safe use, perpetuating cycles of poor chronic disease control and preventable exacerbations.

It is necessary to integrate pharmacists into the multiprofessional team of the teaching clinic by implementing pharmaceutical consultations for systematic medication review and individualized adherence-improvement strategies, prioritizing polymedicated patients. Protocols for active investigation of self-medication and integrative practice use should be incorporated to enable appropriate guidance on interactions and safe use. Permanent educational actions on rational medication use and appropriate disposal should be expanded, with the teaching clinic established as a collection point for expired medications, fulfilling both educational and environmental roles.

The teaching-clinic environment represents an opportunity to implement evidence-based pharmaceutical care interventions grounded in local realities, integrating qualified care for vulnerable populations with training of professionals prepared for regional challenges. This study advances pharmacoepidemiological knowledge in the Brazilian Amazon and provides support for strengthening rational medication use policies within the Unified Health System, demonstrating that teaching clinics function as sentinels of pharmacotherapeutic problems requiring systemic responses. Confirmation of these findings in multicenter studies and evaluation of the effectiveness of pharmaceutical interventions implemented in these settings are necessary to consolidate replicable care models in other teaching–service contexts nationwide.

CRediT author statement

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All authors have read and agreed to the published version of the manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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