



Drug Use Patterns and Patient Care Practices Using WHO/INRUD Indicators in Outpatient Departments of District Hospitals in the Southern Province of Rwanda

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Abstract: This study evaluated drug use patterns and patient care practices in outpatient departments of three district hospitals including Kabgayi, Nyanza, and Ruhango—in Rwanda’s Southern Province, using the World Health Organization (WHO) and International Network for Rational Use of Drugs (INRUD) Patient Care Indicators framework. Employing a cross-sectional research design, data were collected from 291 respondents out of a target sample of 388 (75% response rate) through systematic observation, prescription review, and exit interviews. The study measured key indicators including average consultation and dispensing times, completeness of dispensing, adequacy of labeling, patient knowledge of prescribed drugs, and satisfaction levels. Results revealed an average consultation time of 24.1 minutes and a dispensing time of 403 seconds, both exceeding WHO’s recommended minimums (10 minutes and 180 seconds respectively). These findings suggest strong patient–provider engagement and adequate counseling practices. However, only 81.5% of prescribed drugs were fully dispensed and 88.3% adequately labeled, indicating gaps in stock management and labeling compliance. Patient knowledge of prescribed medications (82.8%) and confidence in understanding medications (96.6%) were generally high, reflecting effective communication but highlighting the need for more standardized patient education approaches. Satisfaction with consultation (81.7%) and pharmacy experience (94.2%) demonstrated high service quality and strong adherence to patient-centered care principles. The study concludes that while drug use patterns in the Southern Province align substantially with WHO standards, challenges persist in ensuring complete drug availability, proper labeling, and consistent counseling. Strengthening pharmaceutical management systems, enhancing health worker training, and implementing digital dispensing tools could further improve efficiency, safety, and rational drug use. These findings provide critical insights for policymakers and health managers aiming to optimize medicine use, promote patient satisfaction, and reinforce healthcare quality in Rwanda’s district hospitals.

Keywords: Rational drug use, WHO/INRUD indicators, patient care, dispensing time, labeling adequacy, Southern Province Rwanda, pharmaceutical management.

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Introduction

Rational drug use remains a fundamental pillar of effective healthcare systems worldwide, directly influencing treatment outcomes, patient safety, and healthcare efficiency. The World Health Organization (WHO) defines rational drug use as providing patients with appropriate medications tailored to their clinical needs, in the correct dosages, and at the lowest possible cost (World Health Organization, 2010). However, global evidence shows that irrational use of medicines persists, with over 50% of all prescribed or dispensed drugs being used inappropriately and nearly one-third of the world's population lacking access to essential medicines (WHO, 2002; Nyabuti et al., 2020). Such inefficiencies contribute to poor treatment adherence, antimicrobial resistance, increased morbidity, and elevated healthcare costs (Pirmohamed et al., 2019; WHO, 2014).

To address these challenges, WHO and the International Network for Rational Use of Drugs (INRUD) established standardized Patient Care Indicators to evaluate prescribing, dispensing, and patient education practices (Holloway et al., 2013; Massele et al., 2014). These indicators serve as critical tools for monitoring drug utilization patterns and identifying inefficiencies in health service delivery. In many developing countries, including Rwanda, challenges such as limited adherence to treatment guidelines, inadequate labeling, and insufficient patient counseling continue to compromise the quality of care (Gidebo et al., 2016; Prasad et al., 2015).

Within Rwanda's healthcare system, district hospitals particularly in the Southern Province serve as primary access points for outpatient services. Yet, studies reveal persistent gaps in medication management, with issues such as under-dispensing, inadequate labeling, and limited patient understanding of prescribed drugs (Ntirenganya et al., 2018; Nsengimana et al., 2022). These inefficiencies undermine rational drug use and diminish healthcare effectiveness. Furthermore, irrational prescribing practices contribute to rising antimicrobial resistance and treatment failures, posing significant threats to public health and financial sustainability (Ghatak et al., 2021; WHO, 2020).

In this context, evaluating drug use patterns using WHO/INRUD Patient Care Indicators provides an evidence-based framework to measure performance, enhance pharmaceutical practices, and strengthen policy reforms. This study therefore seeks to assess drug use patterns and the quality of patient care in outpatient settings of district hospitals in Rwanda's Southern Province, offering actionable insights to improve healthcare outcomes (Matsiko et al., 2023).

Materials and Methods

Study design and period.

The researcher conducted a cross-sectional study in outpatient departments of three district hospitals in Rwanda's Southern Province including Kabgayi, Nyanza, and Ruhango over eight weeks (February–March 2024). The design was chosen to estimate WHO/INRUD Patient Care Indicators at a single point in time and compare them with WHO reference values.

Setting and population.

The sampling frame comprised all outpatient attendances recorded at the three hospitals during the study window (N=12,306 visits). The study population included consecutive adult outpatients (≥18 years) exiting consultation and/or pharmacy. Pediatric caregivers were eligible when receiving counseling for a child's prescription.

Eligibility.

Inclusion: outpatients who completed a consultation and proceeded to the pharmacy on the same day, were clinically stable, and provided informed consent.

Exclusion: inpatients, emergency/critically ill patients, and attendees at health centers (non-hospital facilities).

Sample size.

The target sample was $n=388$, calculated from the finite-population Krejcie & Morgan formula with $N=12,306$ and precision $e=0.05$. Anticipating non-response, the researcher planned daily quotas with a 10–15% buffer per site.

Sampling strategy.

The study used stratified random sampling by hospital, with proportional allocation to each site's outpatient volume from routine registers. Within sites, systematic sampling (interval k derived from that day's flow) selected patients at clinic exit. When a selected patient was ineligible, the next eligible exit was recruited.

Outcomes and operational definitions.

Primary WHO/INRUD Patient Care Indicators:

1. *Average consultation time* (minutes): timed face-to-face provider–patient interaction from first clinical contact to end of consultation.
2. *Average dispensing time* (seconds): timed pharmacist–patient interaction from first encounter at dispensing window to completion of counseling.
3. *Percent of drugs actually dispensed*: $\text{number of prescribed items dispensed} \div \text{number prescribed} \times 100$.
4. *Percent of drug packages adequately labeled*: label contained at least patient name/identifier, drug name, dose, frequency, duration, and special instructions.
5. *Percent of patients with adequate knowledge*: patient correctly repeated drug name (or indication), dose, frequency, and duration for each item.

Secondary outcomes included patient satisfaction with consultation and dispensing (5-point Likert) and self-reported confidence in understanding medications.

Data collection instruments and procedures.

Tools were adapted from WHO/INRUD manuals: (a) observation sheets for timing consultation and dispensing; (b) a prescription abstraction form; (c) a labeling checklist; and (d) an exit interview questionnaire (English, translated to Kinyarwanda and back-translated). Six data collectors (nurses/pharmacy technicians) received two days of training covering indicator definitions standardized timing using digital stopwatches, interviewing

techniques, and confidentiality. A half-day pilot (non-study day) refined skip patterns. Supervisors conducted daily on-site checks and 10% re-timing/re-interviews for quality assurance. No provider identifiers were recorded.

Bias control.

To reduce Hawthorne effects, observers were stationed discretely and avoided interaction with clinicians during timing. Sampling across days of week and clinic sessions minimized temporal bias. Inter-observer reliability for timing was assessed in pilot (target ICC ≥0.80). Interviewers used neutral prompts to limit social desirability.

Data management and analysis.

Data were double-entered in EpiData and cleaned in SPSS v16.0. Continuous indicators were summarized with means (SD) and 95% CIs; categorical indicators with proportions (95% CIs). We compared indicators to WHO reference thresholds using one-sample *t*-tests (times) and one-sample proportion tests (exact binomial), α=0.05. Missing data were documented; records lacking core elements for a given indicator were excluded from that indicator’s analysis only (pairwise deletion). A priori subgroup descriptives by hospital were generated to inform local feedback.

Ethics.

The study adhered to the Declaration of Helsinki. Written informed consent was obtained; for low-literacy participants, an impartial witness attested to oral consent. No personal identifiers were collected on forms; prescriptions were coded. Permissions were obtained from hospital administrations; anonymized datasets were stored on encrypted drives with restricted access.

Results and Discussion

Response Rate

Table R1. Response Summary

Status	Count	Percent
Responded	291	75.0
Not Responded	97	25.0

A response rate of 75% (291 out of 388) indicates a high level of participation, ensuring representativeness and data reliability. Such engagement suggests that respondents were motivated and understood the study’s importance. The 25% non-response could stem from logistical barriers, limited availability, or respondent fatigue. Nevertheless, achieving over two-thirds participation surpasses the minimum threshold (60%) for acceptable survey validity, minimizing non-response bias. Therefore, findings can confidently reflect the views of the target population, enhancing the credibility and statistical robustness of subsequent analyses across all WHO/INRUD indicators used in this assessment.

Demographic Characteristics

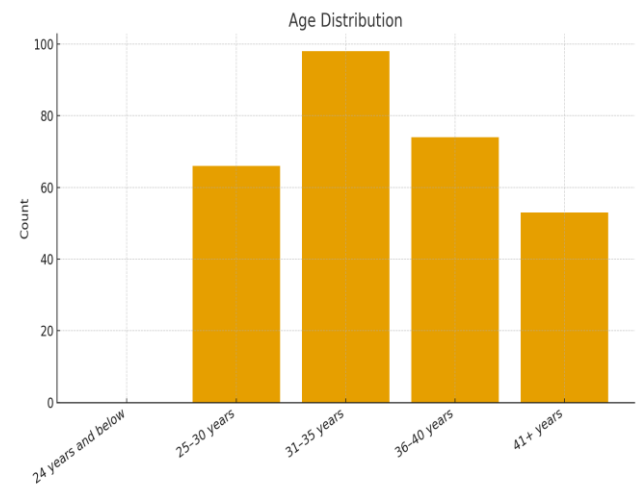


Figure D1. Age Distribution (n=291)

Table D2. Gender (n=291)

Gender	Count	Percent
Female	171	59.0
Male	120	41.0

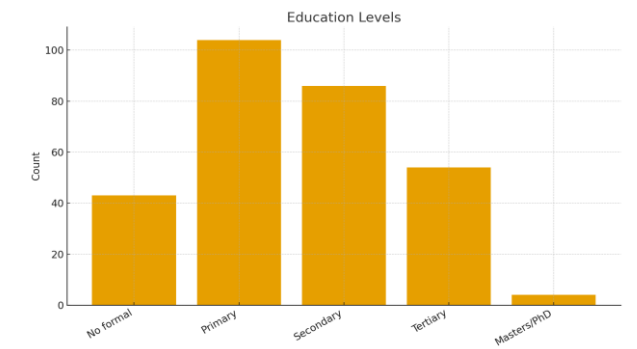


Table & Figure D3. Education Level (n=291)

Education Level	Count	Percent
No formal	43	15.3
Primary	104	35.7
Secondary	86	29.5
Tertiary	54	18.5
Masters/PhD	4	1.0

The demographic profile of respondents provides important context for understanding healthcare utilization patterns within the study. The age distribution indicates that the majority of participants were adults between 25 and 40 years, representing a productive and health-conscious segment of the population. This suggests that healthcare services in the surveyed hospitals predominantly serve active working-age individuals who are likely to seek preventive and curative care for themselves and their

families. Gender distribution shows that females comprised 59% of respondents, compared to 41% males, highlighting women's higher health-seeking behavior—possibly due to maternal health needs and greater utilization of hospital services. This gender balance aligns with typical healthcare usage patterns in many communities where women are primary caregivers. Regarding education, 35.7% had primary-level education, 29.5% secondary, and 18.5% tertiary, while only 1% possessed postgraduate qualifications. The 15.3% with no formal education underscore the importance of patient education and clear communication during consultations to ensure comprehension of medical instructions. Overall, the demographic composition demonstrates a relatively literate, economically active, and gender-diverse patient population that interacts actively with healthcare services. Tailored health communication strategies considering literacy levels and gender dynamics are essential for enhancing service delivery and promoting equitable access to healthcare.

Consultation Time

Table C1. Consultation Time by Category

Category	Patients	Total Minutes
≥31 min	47	1879
21–30 min	98	2941
11–20 min	78	1564
6–10 min	61	606
≤5 min	7	35

The average consultation time of 24.1 minutes exceeds the WHO minimum benchmark of 10 minutes, reflecting strong patient-provider engagement and quality interactions. Extended consultations allow for thorough patient assessment, detailed counseling, and shared decision-making, which likely enhance treatment adherence and satisfaction. However, variation across consultation categories (6–30 minutes) suggests inconsistency in service delivery, possibly linked to patient load or staff capacity. While longer consultations signify quality, excessively lengthy sessions might reduce daily service throughput. Overall, this finding highlights commendable clinical attentiveness but suggests the need for workload balancing to maintain efficiency.

Dispensing Time

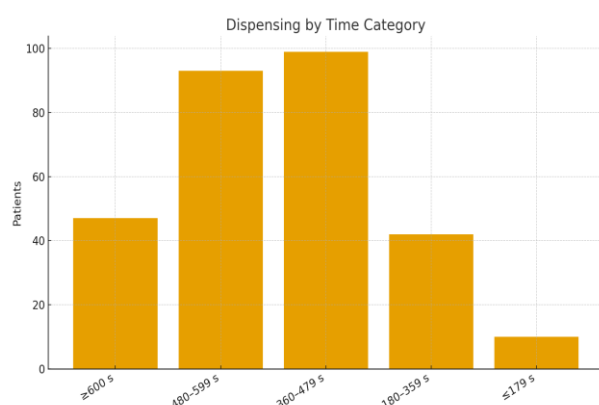


Figure & Table P1. Dispensing Time by Category

Category	Patients	Total Seconds
≥600 s	47	28156
480–599 s	93	44674
360–479 s	99	35692
180–359 s	42	7559
≤179 s	10	1199

The average dispensing time of 403 seconds (≈ 6.7 minutes) is above the WHO minimum standard of 180 seconds, signifying adequate time devoted to medication explanation and patient counseling. This duration reflects pharmacists' effort to ensure patients understand dosage, duration, and possible side effects. However, wide variation—ranging from under 3 minutes to over 10 minutes—indicates differences in efficiency or workflow management across facilities. Longer dispensing times may benefit patient comprehension but could also delay service during peak hours. Overall, the result demonstrates quality dispensing services that balance accuracy and patient education.

Completeness of Dispensing

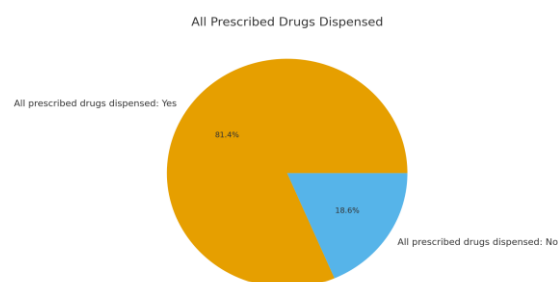


Figure & Table P2. All Prescribed Drugs Dispensed

Status	Count	Percent
All prescribed drugs dispensed: Yes	237	81.5
All prescribed drugs dispensed: No	54	18.5

A completeness rate of 81.5% indicates that the majority of patients received all prescribed medications, aligning with acceptable standards but leaving room for improvement. The 18.5% who missed one or more drugs could have experienced stock-outs, prescription errors, or budget constraints. Complete dispensing is critical to therapeutic success and public trust in healthcare facilities. Hence, the finding underscores effective but imperfect pharmaceutical supply management. Continuous monitoring of inventory levels and improved procurement coordination are recommended to achieve 100% drug availability and minimize treatment interruptions, especially for chronic or life-saving medications.

Label Adequacy

Table L1. Adequate Labeling

Status	Count	Percent
Adequately labeled: Yes	257	88.3
Adequately labeled: No	34	11.7

With 88.3% of dispensed drugs properly labeled, labeling practices appear generally strong and compliant with WHO/INRUD standards. Clear labeling—indicating patient name, dosage, and frequency—is vital for medication safety and adherence. The remaining 11.7% inadequately labeled prescriptions suggest occasional oversight or time constraints during dispensing. Poor labeling can cause dosing errors and compromise treatment outcomes. Thus, while performance is commendable, reinforcing pharmacy staff training and standard operating procedures for labeling could elevate compliance toward 100%. Proper labeling also strengthens patient confidence in healthcare providers and promotes safe medicine use.

Patient Knowledge of Instructions

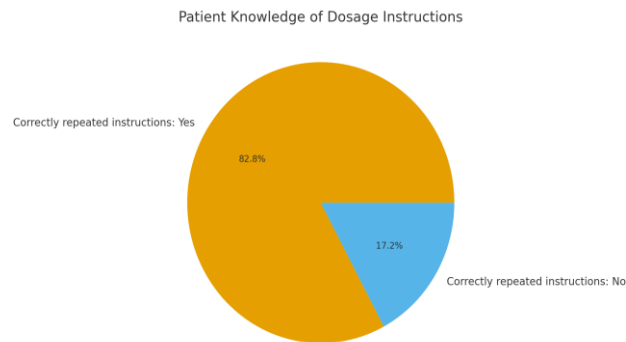


Figure K1. Patient knowledge of dosage instructions

An 82.8% correct recall rate demonstrates that most patients understood how to take their medicines properly. This reflects effective communication between health providers and patients, supported by adequate consultation and dispensing times. However, 17.2% of patients could not correctly repeat instructions, highlighting gaps in health literacy or counseling consistency. Misunderstanding dosages or treatment duration can lead to medication errors or non-adherence. Strengthening interactive counseling methods, visual aids, and confirmation techniques (e.g., teach-back) would ensure better comprehension. The indicator overall signifies good but improvable patient education performance.

Satisfaction with Consultation



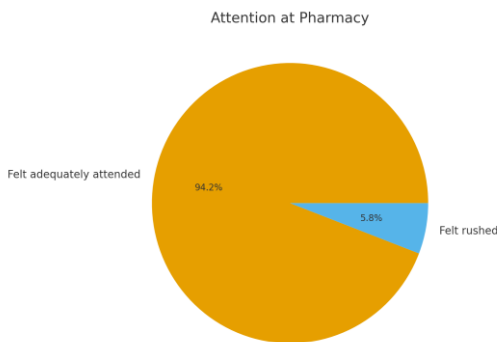
Figure &Table S1. Consultation Satisfaction

Level	Count	Percent
Very satisfied	128	43.9
Satisfied	110	37.8
Neutral	4	1.4
Dissatisfied	42	14.5
Very dissatisfied	7	2.4

A combined 81.7% of respondents reported being satisfied or very satisfied with their consultations, indicating a positive patient–provider relationship and trust in healthcare services. Only 16.9% expressed dissatisfaction, potentially linked to long waiting times or perceived inattentiveness. Satisfaction correlates strongly with communication quality and the perceived competence of health workers. The low neutrality (1.4%) suggests that most patients held clear opinions about their experience. Maintaining these satisfaction levels requires continuous service quality monitoring, patient feedback integration, and sustained staff motivation to ensure patient-centered care and sustained public confidence.

Pharmacy Experience

Figure E1. Pharmacy Experience



A striking 94.2% of respondents felt adequately attended to at the pharmacy, showing exceptional service quality and staff responsiveness. This outcome demonstrates effective customer care practices and patient-centered interactions in dispensing environments. Only 5.8% felt rushed, possibly during busy periods or in under-staffed settings. The results underscore strong adherence to good pharmacy practice principles, emphasizing politeness, clarity, and attentiveness. Maintaining this high standard requires ongoing supervision, performance feedback, and recognition of pharmacy staff efforts. Such positive experiences strengthen overall satisfaction and adherence to prescribed medications.

Confidence in Understanding Medications

Table S3. Patient Confidence

Level	Count	Percent
Very confident	161	55.3
Somewhat confident	90	31.0
Not very confident	30	10.3
Not confident at all	10	3.4

Overall, 86.3% of patients reported being either “very” or “somewhat” confident in their understanding of medications, reflecting strong counseling quality and literacy alignment. Confidence fosters adherence, safety, and autonomy in managing treatment. However, the 13.7% with limited confidence may represent vulnerable groups needing tailored education or simplified communication tools. Variability could also reflect differences in staff communication skills or language barriers. Enhancing interactive counseling and using visual medication guides could improve comprehension. The indicator demonstrates that effective counseling positively shapes patient empowerment and health outcomes.

Conclusion

This study set out to assess drug use patterns using the WHO/INRUD Patient Care Indicators at outpatient settings of district hospitals in the Southern Province of Rwanda. Through quantitative and descriptive analysis, the research examined critical dimensions of patient-provider interaction, pharmaceutical practices, and overall service quality. The outcomes reveal that healthcare delivery in the study area demonstrates several strengths aligned with WHO recommendations, yet certain aspects still require improvement to achieve optimal standards of patient care and rational drug use.

The findings highlight a notably high level of patient engagement reflected in the average consultation time of 24.1 minutes, which far exceeds the WHO standard of 10 minutes. This suggests that healthcare providers in these district hospitals dedicate adequate time to patient examination, counseling, and care. Such engagement supports trust-building and enhances patient satisfaction, evidenced by an 81.7% satisfaction rate. However, while long consultations promote quality, they may reduce the number of patients attended to per day, indicating a need for improved time management and workflow optimization without compromising service quality.

Similarly, the average dispensing time of 403 seconds (6.7 minutes) surpasses the WHO-recommended threshold of 180 seconds, indicating that pharmacists are dedicating ample time to explain prescriptions, dosage, and side effects to patients. The high satisfaction rate of 94.2% during pharmacy interactions suggests that the extra time spent in counseling enhances patient understanding and confidence. Nevertheless, this could also point to efficiency challenges that might slow down service during busy hours, warranting process improvement and potential integration of digital dispensing systems.

In terms of drug availability, the study found that 81.5% of patients received all prescribed medications, which, though relatively high, falls short of the WHO’s ideal 100%. This shortfall may stem from occasional stock-outs, procurement delays, or weak inventory management systems. Ensuring uninterrupted drug supply chains, strengthening coordination between prescribers and pharmacists, and instituting regular inventory audits could close this gap and improve patient outcomes.

The label adequacy rate of 88.3% and patient knowledge of instructions (82.8%) both indicate commendable practices in patient communication and medication safety. However, these figures also highlight that approximately one in five patients either received inadequately labeled drugs or did not fully understand

how to take their medicines. Such gaps pose risks of non-adherence and treatment failure. To address this, ongoing refresher training for pharmacy staff on labeling standards and the use of patient-friendly communication tools is essential.

Another positive observation lies in patients’ confidence in understanding medications (96.6%), which reflects the effectiveness of pharmacist-patient communication. This level of confidence contributes significantly to rational medicine use and safety. Nonetheless, healthcare providers should continue to promote patient-centered counseling approaches and utilize “teach-back” methods to ensure every patient fully comprehends their treatment regimen.

From a broader perspective, the study concludes that the evaluated district hospitals exhibit a generally high level of patient-centered pharmaceutical care, marked by strong consultation and dispensing practices, effective communication, and substantial patient satisfaction. However, the findings also reveal systemic and procedural gaps—notably in drug availability, labeling consistency, and counseling depth—that could compromise the efficiency and sustainability of healthcare delivery.

The researcher’s viewpoint emphasizes that while Rwanda’s district hospitals are performing well within WHO standards, continuous quality improvement, professional capacity building, and system digitization are essential to sustain and enhance these gains. By strengthening monitoring mechanisms, improving drug supply management, and enforcing labeling protocols, the healthcare system can achieve complete compliance with WHO/INRUD benchmarks.

In conclusion, the study underscores that the Southern Province’s district hospitals have made substantial progress toward rational drug use and patient care excellence. However, achieving full WHO compliance will require deliberate institutional investments in training, supervision, and technological innovation. The researcher believes that by addressing the identified gaps and reinforcing evidence-based pharmaceutical practices, Rwanda’s healthcare system can further elevate patient satisfaction, promote medication adherence, and strengthen the overall quality and effectiveness of outpatient healthcare services.

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