Administrative, Pharmaceutical, and Clinical Analysis of Doctor's Prescriptions at Puskesmas X, West Bandung Regency

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Abstract. Prescription screening is an assessment of the suitability of prescriptions to minimize the occurrence of medication errors. The aim of this study was to compare the discrepancies of electronic prescriptions and manual prescriptions in administrative, pharmaceutical and clinical aspects. The sampling method is retrospective, namely research based on data from pharmacy prescription archives. Data analysis in Microsoft Excel 2013 during July - December 2024 with 10.127 electronic prescriptions and 1.447 manual prescriptions. The results analysis of electronic prescriptions in administrative and pharmaceutical aspects did not find discrepancies, but there were still some discrepancies in clinical aspect is drug interactions (11%). And the results analysis of manual prescription in administrative aspect found discrepancies is age (6%), gender (16%), weight (32%), patient address (24%), doctor's name (41%), date of prescription (35%), prescription origin unit (38%), in pharmaceutical analysis found discrepancies is the strength of the preparation (19%) and availability (12%), in clinical aspect found discrepancies is drug interactions (10%). The conclusion in this study that electronic prescriptions can reduce medication errors in administrative and pharmaceutical aspects

Keywords: *Prescription, Administrative, Pharmaceutical, Clinical*

Introduction

A prescription is a written request from a doctor or dentist to a pharmacist—whether in paper or electronic form—to prepare and dispense medication to a patient in accordance with applicable regulations (Ministry of Health Regulation No. 73, 2016). A prescription must contain sufficient information to enable pharmacists and

pharmaceutical personnel to accurately interpret and dispense the medication (Katzung, 2004).

Medication errors can occur at various stages, one of which is the prescribing phase. Common prescribing errors include incomplete prescription information, unclear dosage instructions, and the use of uncommon abbreviations. One effective strategy to minimize prescribing errors is through prescription screening (Nu'man Maiz et al., 2014).

Electronic prescribing has been shown to reduce prescribing errors, enhance efficiency, and lower healthcare costs (Amber Porterfield et al., 2014).

Given the importance of screening prescriptions for administrative, pharmaceutical, and clinical completeness, this study aims to analyze and compare the appropriateness of electronic versus manual prescriptions. The goal is to identify which method is more effective in preventing medication errors across the administrative, pharmaceutical, and clinical aspects of prescribing.

Methodology

Research Design

This study uses a retrospective design, which involves analyzing data obtained from archived prescriptions. The analysis focuses on the administrative, pharmaceutical, and clinical aspects of both electronic and manual prescriptions submitted to the facility.

Population and Sample

The population in this study includes all prescriptions received at Puskesmas X, West Bandung Regency, during the period of July to December 2024, totaling 11,574 prescriptions. This consists of 10,127 electronic prescriptions and 1,447 manual prescriptions.

The sample size was determined using the Slovin formula, as follows:

Prescription Type	Formula	Calculation	Sample Size (n)
Electronic Prescriptions	$n = N / (1 + N \times d^2)$	n = 10,127 / (1 + 10,127 × 0.1²) = 10,127 / (1 + 101.27) = 10,127 / 102.27	**≈ 99** samples
Manual Prescriptions	$n = N / (1 + N \times d^2)$	n = 1,447 / (1 + 1,447 × 0.1²) = 1,447 / (1 + 14.47) = 1,447 / 15.47	**≈ 94** samples

Note:

- N = Population size
- d = Margin of error (10% or 0.1)
- n = Required sample size

Research Instrument

The instruments used in this study include both manual and electronic prescriptions obtained from patients who collected their medications at Puskesmas X, West Bandung Regency, during the period of July to December 2024. Additionally, a standardized data collection form was used to record the information.

Data Analysis

The data analysis in this study was conducted through direct observation, in which each prescription—both manual and electronic—was examined individually. All relevant aspects of prescription completeness were recorded using a pre-designed data collection form. The collected data were then processed using Microsoft Excel 2013. Each data point was manually entered into the software, and calculations were performed to determine the percentage (%) of completeness in three key areas: administrative, pharmaceutical, and clinical. The analysis covers prescriptions issued from July to December 2024 at Puskesmas X in West Bandung Regency.

Results and Discussion

The analysis of electronic prescriptions revealed no discrepancies in the administrative and pharmaceutical aspects. However, discrepancies were still found in the clinical aspect. In contrast, the analysis of manual prescriptions showed inconsistencies in all three aspects: administrative, pharmaceutical, and clinical.

To provide a clearer overview, the findings are presented in the following sections:

Administrative Analysis

The completeness of administrative information in both manual and electronic prescriptions was assessed based on the inclusion of the following elements: patient's name, age, gender, body weight, prescribing doctor's name, doctor's initials/signature, prescription date, and the originating unit/department.

Table 1. Data on the Completeness of Administrative Analysis Results

Administrative Element	Electronic Prescriptions	% Complete	% Incomplete	Manual Prescriptions	% Complete	% Incomplete

Patient Name	99 Complete / 0 Incomplete	100%	0%	94 Complete / 0 Incomplete	100%	0%
Date of Birth (Age)	99 / 0	100%	0%	88 / 6	94%	6%
Gender	99 / 0	100%	0%	79 / 15	84%	16%
Body Weight	99 / 0	100%	0%	64 / 30	68%	32%
Patient Address	99 / 0	100%	0%	71 / 23	76%	24%
Doctor's Name	99 / 0	100%	0%	55 / 39	59%	41%
Doctor's Initials/Signature	99 / 0	100%	0%	94 / 0	100%	0%
Prescription Date	99 / 0	100%	0%	61 / 33	65%	35%
Prescribing Unit/Department	99 / 0	100%	0%	58 / 36	62%	38%

Based on Table 1, the results of the administrative analysis show the completeness of prescription data. For electronic prescriptions, no administrative incompleteness was found—each item was recorded at 100% completeness. In contrast, manual prescriptions exhibited several administrative deficiencies, including missing or incomplete patient date of birth/age (6%), gender (16%), body weight (32%), patient address (24%), doctor's name (41%), prescription date (35%), and prescribing unit/department (38%).

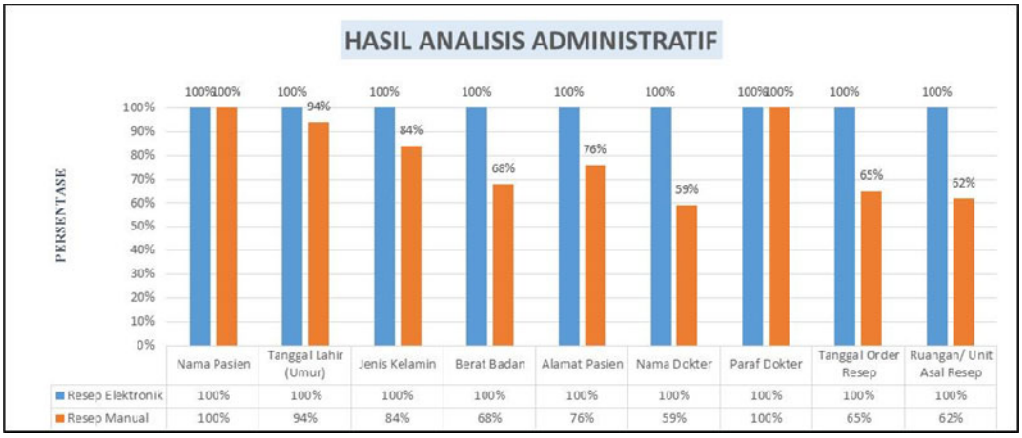


Figure 1. Data on the Completeness of Administrative Analysis Results

Based on Figure 1, a comparison of the administrative analysis results between electronic and manual prescriptions reveals that electronic prescribing is more effective in reducing medication errors than manual prescribing. In manual prescriptions, several administrative elements were found to be incomplete, including date of birth (age), gender, body weight, patient address, doctor's name, prescription date, and the prescribing unit or department.

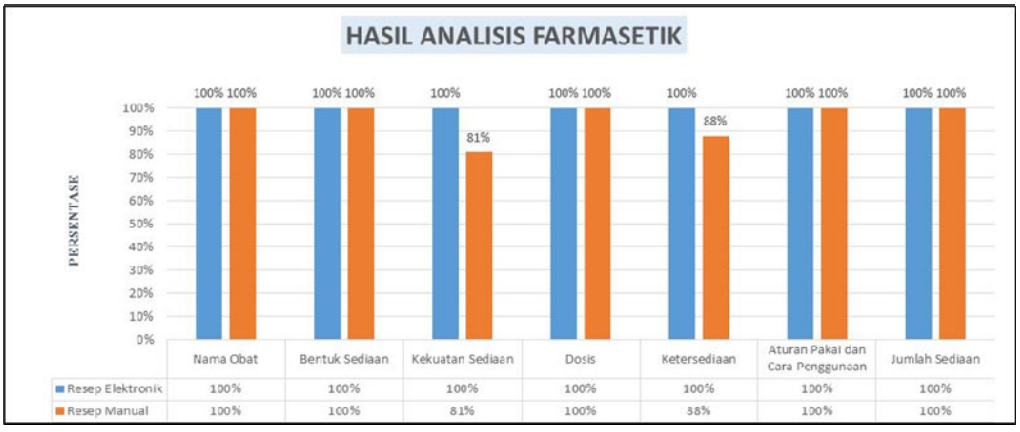
Pharmaceutical Analysis

Pharmaceutical requirements include the drug name, dosage form and strength, dosage and quantity, availability, as well as directions and method of use. The data resulting from the pharmaceutical analysis can be found in Table 2 and Figure 2 below:

Pharmaceutical Element	Electronic Prescriptions	% Complete	% Incomplete	Manual Prescriptions	% Complete	% Incomplete
Drug Name	99 Present / 0 Missing	100%	0%	94 Present / 0 Missing	100%	0%
Dosage Form	99 / 0	100%	0%	94 / 0	100%	0%
Strength of Preparation	99 / 0	100%	0%	76 / 18	81%	19%
Dosage	99 / 0	100%	0%	94 / 0	100%	0%
Availability	99 / 0	100%	0%	83 / 11	88%	12%
Instructions for Use	99 / 0	100%	0%	94 / 0	100%	0%
Quantity Prescribed	99 / 0	100%	0%	94 / 0	100%	0%

The results of the pharmaceutical analysis are presented in Table 2. The analysis of electronic prescriptions showed no discrepancies in any of the pharmaceutical components—all prescriptions met the required standards. In contrast, the analysis of manual prescriptions revealed inconsistencies in two aspects: strength of preparation, with 18 prescriptions (19%) lacking this information, and availability, which was incomplete in 11 prescriptions (12%). However, all manual prescriptions met the requirements for the following elements: drug name, dosage form, dosage, directions and method of use, and quantity prescribed, with 94 prescriptions (100%) recorded as complete.

Figure 2. Data on the Completeness of Pharmaceutical Analysis Results



Based on Figure 2, a comparison of the pharmaceutical analysis results between electronic and manual prescriptions shows that electronic prescribing is more

effective in reducing medication errors than manual prescribing. In manual prescriptions, incompleteness was found in two key aspects: strength of preparation and availability.

Clinical Pharmacy Analysis

In this study, an analysis was also conducted to evaluate the clinical pharmacy appropriateness of both electronic and manual prescriptions. Clinical pharmacy requirements include: accuracy of indication, dosage, drug interactions and side effects, contraindications, allergies and Adverse Drug Reactions (ADR), drug duplication, and timing of drug administration. The results of the clinical analysis are presented in Table 3 and Figure 3 below:

Table 3. Results of Clinical Pharmacy Appropriateness Analysis

Clinical Element	Electronic Prescriptions	% Appropriate	% Not Appropriate	Manual Prescriptions	% Appropriate	% Not Appropriate
Indication Accuracy	99 / 0	100%	0%	94 / 0	100%	0%
Dosage Accuracy	99 / 0	100%	0%	94 / 0	100%	0%
Drug Interactions & Side Effects	88 / 11	89%	11%	85 / 9	90%	10%
Contraindications	99 / 0	100%	0%	94 / 0	100%	0%
Allergies & Adverse Drug Reactions	99 / 0	100%	0%	94 / 0	100%	0%
Drug Duplication	99 / 0	100%	0%	94 / 0	100%	0%
Timing of Administration	99 / 0	100%	0%	94 / 0	100%	0%

The results of the clinical pharmacy analysis are presented in Table 3. Both electronic and manual prescriptions showed discrepancies in the category of drug interactions and side effects, with 11 prescriptions (11%) in the electronic group and 9 prescriptions (10%) in the manual group identified as inappropriate. Meanwhile, other clinical aspects—including indication, dosage, contraindications, allergies and Adverse Drug Reactions (ADRs), drug duplication, and timing of drug administration—were found to be fully appropriate (100%) in both prescription types.

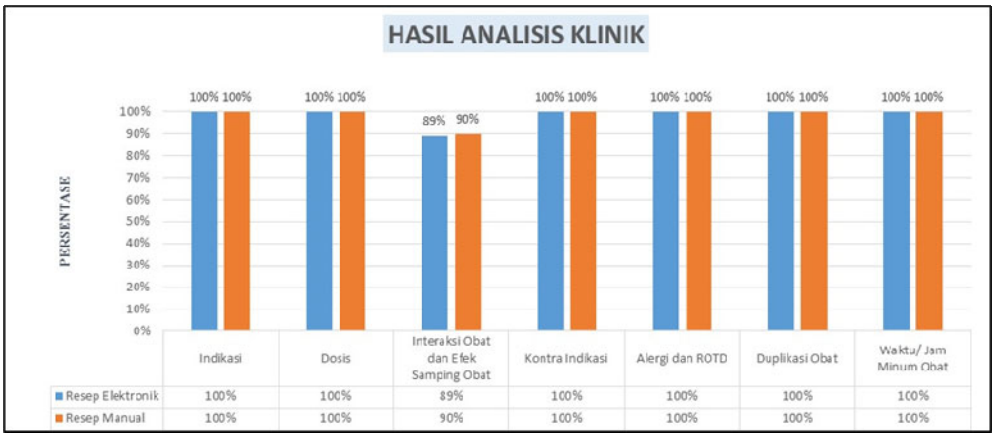


Figure 3. Data on the Clinical Appropriateness Analysis Results

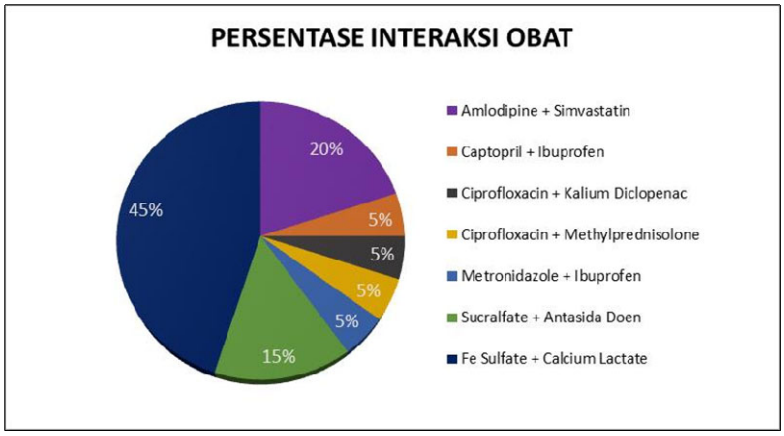
Based on Figure 3, the comparison of clinical pharmacy analysis results between electronic and manual prescriptions shows that both types of prescriptions had discrepancies specifically in the area of drug interactions and side effects. This indicates that clinical medication errors—particularly those related to drug interactions and adverse effects—can occur in both electronic and manual prescribing systems. Therefore, careful clinical evaluation remains essential regardless of the prescribing method used.

Table 4. Drug Interaction Data

No.	Drug 1	Drug 2	Mechanism of Interaction	Severity Level
1	Amlodipine	Simvastatin	Pharmacokinetic	Major
2	Captopril	Ibuprofen	Pharmacodynamic	Moderate
3	Ciprofloxacin	Potassium Diclofenac	Pharmacodynamic	Minor
4	Ciprofloxacin	Methylprednisolone	Pharmacodynamic	Minor
5	Metronidazole	Ibuprofen	Pharmacodynamic	Minor
6	Sucralfate	Antacid Doen	Pharmacokinetic	Minor
7	Ferrous Sulfate	Calcium Lactate	Pharmacokinetic	Major

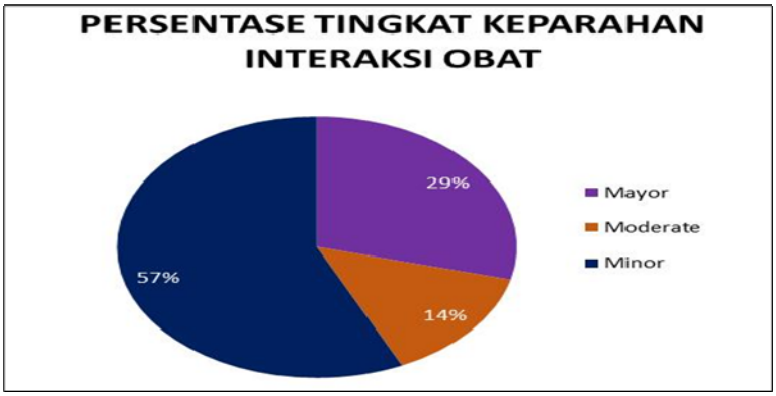
Based on Table 4, drug interactions identified in the prescriptions involve combinations between different medications, with interaction mechanisms occurring either pharmacokinetically or pharmacodynamically. The severity levels of these interactions vary and are categorized as major, moderate, or minor, indicating the potential clinical impact and the need for monitoring or intervention.

Pie Chart 1. Drug Interactions Identified in Prescriptions



Based on Pie Chart 1, the majority of drug interactions found in the prescriptions involved Ferrous Sulfate and Calcium Lactate, accounting for 45% of the total cases. This was followed by the interaction between Amlodipine and Simvastatin at 20%, and Sucralfate with Antacid Doen at 15%. Other interactions, each comprising 5%, included Captopril with Ibuprofen, Ciprofloxacin with Potassium Diclofenac, Ciprofloxacin with Methylprednisolone, and Metronidazole with Ibuprofen. These findings indicate that pharmacological vigilance is particularly needed for the more frequent combinations, especially those with higher severity risks.

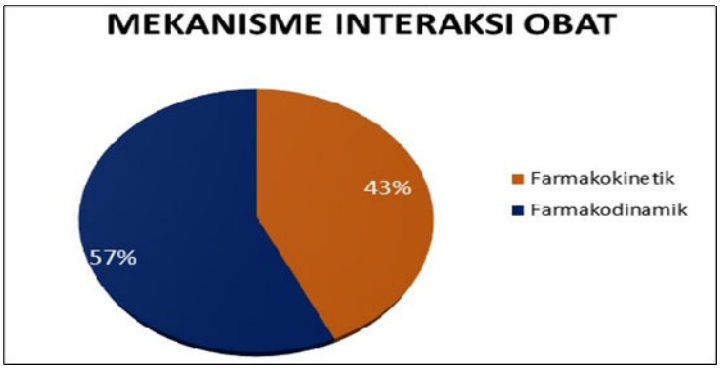
Pie Chart 2. Severity Levels of Drug Interactions Identified in Prescriptions



Based on Pie Chart 2, the percentage distribution of drug interaction severity levels identified in the prescriptions is as follows: major interactions account for 29%, moderate interactions for 14%, and minor interactions for the largest share at 57%. Drug interaction severity is categorized based on the potential clinical impact and risk of adverse effects. Major interactions are those that may cause serious or even life-threatening outcomes and typically require immediate intervention. Moderate interactions may result in noticeable but less severe side effects and often need dose

adjustment or monitoring. Minor interactions, on the other hand, are generally mild, with minimal clinical impact and usually do not require a change in therapy.

Pie Chart 3. Mechanisms of Drug Interactions



Based on Pie Chart 3, the percentage of drug interaction mechanisms identified in the prescriptions shows that pharmacodynamic interactions account for 57%, while pharmacokinetic interactions make up 43%.

Pharmacokinetic interactions occur when one drug affects the absorption, distribution, metabolism, or excretion (ADME) of another drug, potentially altering its concentration and effectiveness in the body. In contrast, pharmacodynamic interactions involve the combined effects of drugs on the body's biological systems, either by enhancing or opposing each other's pharmacological actions. These types of interactions often arise when drugs have similar or opposing mechanisms of action, influencing the overall therapeutic effect or risk of side effects.

Discussion

This study utilized prescription analysis parameters based on the Regulation of the Minister of Health No. 74 of 2016 concerning Standards of Pharmaceutical Services at Community Health Centers (Puskesmas). The analysis included an assessment of prescription completeness and validity, covering elements such as the doctor's name, prescription date, doctor's initials, patient's name, address, age, gender, and weight. Pharmaceutical suitability was also evaluated, including dosage form, dose, strength, availability, method, and duration of drug administration.

The clinical aspect was examined through patient assessments, focusing on allergies, side effects, drug interactions, dose accuracy, special conditions, patient complaints, and other clinically relevant factors. The assessment also identified the presence of Drug-Related Problems (DRP) and supported professional decision-

making, including communicating any prescription-related issues with the prescribing physician when necessary.

The total data analyzed consisted of 10,127 electronic prescriptions and 1,447 manual prescriptions. The analysis of electronic prescriptions showed no discrepancies in the administrative and pharmaceutical aspects, but clinical pharmacy analysis revealed discrepancies in drug interactions (11%).

For manual prescriptions, administrative discrepancies were found in several components: date of birth (6%), gender (16%), body weight (32%), patient address (24%), doctor's name (41%), prescription date (35%), and originating unit (38%). In the pharmaceutical analysis, discrepancies were identified in drug strength (19%) and availability (12%). In the clinical pharmacy analysis, discrepancies in drug interactions (10%) were also observed.

In conclusion, electronic prescribing significantly reduces medication errors, especially in the administrative and pharmaceutical aspects, compared to manual prescribing. However, both methods still demonstrated clinical discrepancies, particularly related to drug interactions and side effects, indicating the ongoing need for thorough clinical review in pharmaceutical services.

Conclusion

Observations indicate that electronic prescriptions showed no discrepancies in the administrative and pharmaceutical aspects. In contrast, manual prescriptions still exhibited discrepancies across all three aspects: administrative, pharmaceutical, and clinical. These findings suggest that electronic prescribing can significantly reduce medication errors in the administrative and pharmaceutical domains compared to manual prescriptions. However, both electronic and manual prescriptions still show discrepancies in the clinical pharmacy aspect, particularly related to drug interactions and potential side effects.

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