ORIGINAL ARTICLE

A Cross-sectional Study of Medication Identification Patterns among Patients Attending the Medicine Outpatient Department in a Tertiary Hospital in Rural Gujarat

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Abstract

Background: The number of people living with multiple chronic medical conditions has risen, and with it, the number of medications taken by them. In addition to adherence to medications, it is extremely important to correctly identify the medications. Medication errors occur at all steps, with polypharmacy, low literacy, language barriers, old age, and lack of communication as contributing factors. Many of the patients may not be identifying medications themselves or may be doing so incorrectly. Hence, this study is aimed to check the methods used by patients to identify medications.

Materials and methods: A total of 150 patients attending the outpatient department (OPD) of the medicine department were interviewed using a structured questionnaire, which had multiple-choice questions and one open-ended question. Sociodemographic data, level of education, data on type and number of clinical conditions, groups of medications taken, and methods used for identification of medications were collected. Statistical analysis was done using Stata 14.2.

Results: Most (85.33%) of the patients had a chronic medical condition, out of which 37.33% had two or more clinical conditions. Physical attributes of the tablets (60%) and packaging (39.33%) were used most commonly to identify medications. About 10.67% did not identify the medications themselves. Again 45.33% of the patients depended on the doctor's prescription for the dosing of medications. Patients felt that identification of medications would be easier if the content on packaging included indication, was written in the local language, and was in bold font. They also felt that healthcare professionals spending more time explaining would help them.

Conclusion: Irrespective of the level of education, language known, and number of comorbidities, physical attributes and packaging were most commonly used to identify medications.

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Introduction

India's population stands at 142.86 crores. With average life expectancy at birth of 67.74 years in 2022,[1] the burden of chronic diseases is increasing. Over 100 million people in India are living with diabetes[2] and an estimated 220 million adults with hypertension.[3] Furthermore, the prevalence of prediabetes ranges from 6 to 14.7%.[4] According to the Indian Council of Medical Research–India Diabetes (ICMR-INDIAB) study, the overall prevalence of dyslipidemia was 81.2%.[5] To add to this burden, coronary artery disease and strokes occur earlier in Indians compared to the West.[6] Multimorbidity is common, which necessitates lifelong use of medications, mostly polypharmacy. Polypharmacy is defined as regular use of five or more medications at the same time[7] or intake of more than prescription or intake of more drugs than clinically appropriate.[8] It is estimated to be high in our country. A study showed it to be 8.37% among patients in Bhopal, Madhya Pradesh.[9] Another study focusing on elderly population found that polypharmacy, hyperpolypharmacy, and potentially inappropriate medication use were present in 49, 31, and 28%, respectively.[10] Polypharmacy elevates the risks of medication errors. Errors can occur at any stage of medication delivery—from manufacturing and prescribing to dispensing and administration. It is very important to identify these errors or the scope for them so that corrective steps can be taken. A particularly vulnerable step is the identification of medications by patients or caregiver prior to administration. This step relies heavily on the individual's capacity to interpret and process basic health information, and low level of health literacy in our country may interfere with this.[11] Health literacy is defined as the degree of ability of individuals to obtain, process, and understand basic health information and services which are needed to make appropriate healthcare decisions.[12] Individuals with adequate health literacy demonstrate a combination of functional skills (ability to read and understand educational written materials), interactive skills (ability to communicate with healthcare professionals), critical skills (ability to make appropriate health decisions), and numeracy skills (ability to measure medication dosages).[13,14] Low health literacy hence may interfere with medication self-management.

While multiple studies have assessed the prevalence of polypharmacy, its health outcomes, and the role of health literacy at a global level, there remains a significant gap in the Indian context with regard to how patients identify and differentiate medications. The present study aims to evaluate the strategies employed by patients in India to identify medications, the challenges faced by them in doing so, and the impact of literacy and language barriers on this process. Studying this may give valuable inputs for improving pharmaceutical labeling, medication packaging, prescription practices, and patient education methods in the Indian healthcare system.

Materials and Methods

Study Design

The study employed a cross-sectional design and was conducted using a researcher-administered, questionnaire-based survey. The survey was administered to patients attending the outpatient department (OPD) of the general medicine unit at a tertiary care hospital affiliated with a medical college in rural Gujarat, India.

Sample Size, Data Collection, and Analysis

The study is a type of survey. It followed a nonprobability sampling approach, specifically judgment sampling. Eligible participants were interviewed using a

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structured questionnaire after verbal informed consent. Data were collected under sociodemographic details, number and type of medications the patients reported to be taking, number and nature of clinical conditions reported by patients, and methods used by patients to identify the medications. The majority of the questions were multiple-choice questions, allowing for multiple responses. One open-ended question was included to gather qualitative insights. Data collected were entered into an Excel sheet and analyzed using Stata version 14.2.

Ethics Committee Approval

The study protocol was reviewed and approved by the Institutional Ethics Committee. Participation in the survey was voluntary, and the participants did not receive any monetary or material compensation for participating.

Results

A total of 150 patients participated in the study. Of them, 56 were males and 94 were females. The average age of the participants was 57.8 years, and age ranged from 27 to 98 years. Table 1 shows the sociodemographic characteristics of the participants. It is important to note that 54% of the participants had less than secondary education, and only 25.33% had English reading skills.

Table 2 lists the clinical history of participants, with hypertension as the most common clinical condition at 68%. About 14.67% were either not aware of what clinical condition they had or reported that they did not have any chronic medical condition. The number of clinical conditions reported by each participant may not reflect the actual picture, as many may not have been aware of all the clinical conditions for which they were being treated.

Table 3 lists the medications reported to be taken by participants, with antihypertensives being the most common group at 68.67%. It also reports the awareness about medications observed among participants. Awareness here means the ability to identify the indication and group of the medication correctly. It is worth noting that none of the medications were identified correctly by 20% of the participants.

Table 4 lists information about the personnel who provided information about medications to the participants. Here, providing information means explaining the indication, group, and dosing of the medications.

Table 5 gives data on the methods used by participants to identify medications. It is to be noted that the physical attributes of the tablet and packaging of the medication were used as methods for identification much more commonly than the content of the medication.

Table 6 lists the methods used by participants to know the dosing of the medications. Data reveal that they relied on the doctor's prescription, followed by the pharmacy label, for the same.

Data was also collected on the methods used to identify medications by participants and the language read. Table 7 lists the data regarding the same. It is to be noted that irrespective of the language reading ability, physical attributes of the tablet and/or packaging were most commonly used to identify medications rather than content and brand name.

Data collected on methods used to identify medications and the education level of the participants shows that irrespective of the education level, physical attributes of tablets and/or packaging were most commonly used to identify medications rather than content and brand name. Table 8 lists the data regarding the same.

Table 9 shows that irrespective of the number of clinical conditions present,

Table 1: Sociodemographic characteristics of participants

Variables	*Frequency*	*Percentage (%)*
Age-group		
25–50	44	29.33
51–75	93	62
76–100	13	0.086
Minimum age: 27 years		
Maximum age: 98 years		
Median age: 57.8 years		
Gender		
Male	56	37.33
Female	94	62.67
Education		
Postgraduate	5	3.33
Graduate	24	16
Secondary school	40	26.67
Primary	64	42.67
Not educated	17	11.3
Languages read		
Gujarati	40	26.67
Gujarati and English	2	1.33
Gujarati and Hindi	51	34
Gujarati, English, and Hindi	31	20.67
Hindi	4	2.67
Hindi and English	5	3.33
None	17	11.33

Table 2: Clinical history of participants

Variables	*Frequency*	*Percentage (%)*
Clinical conditions reported		
Hypertension	102	68
Diabetes	70	46.67
Dyslipidemia	3	2
CAD	11	7.33
Stroke	7	4.6
CKD	3	2
CLD	3	2
Thyroid disorder	28	18.66
Malignancy	3	2
PAD	1	0.67
Not known/ none	22	14.67
Number of clinical conditions reported		
1	72	48
2	46	30.67
3	7	4.67
4	2	1.33
5	1	0.67
Not known/ none	22	14.67

Table 3: Medication history and awareness among participants

Variables	*Frequency*	*Percentage (%)*
Medication groups reported to be taking		
Antihypertensives	102	68.67
Oral antidiabetics	65	43.33
Insulin	8	5.33
Antiplatelets and anticoagulants	17	11.33
Statins	9	6
Thyroid medications	26	17.33
Diuretics	1	0.6
Antibiotics	5	3.33
Pain killers	5	3.33
Multivitamins	9	6
Antacids	12	8
Awareness about medications—expressed as percentage—50% means participant could correctly identify 50% of the total medications		
0%	30	20
25%	2	1.33
50%	7	4.67
75%	1	0.6
100%	110	73.33

physical attributes and packaging were most commonly used to identify medications.

Table 4: Personnel who provided information about medications

Variables	*Frequency*	*Percentage (%)*
Doctors	119	79.33
Doctor and pharmacist	18	12
Doctor and family member	2	1.33
Nurse	2	1.33
Doctor, nurse, and pharmacist	1	0.67
Pharmacist	6	4
Family member	2	1.33

Table 5: Methods used by patients to identify medications

Variables	*Frequency*	*Percentage (%)*
Packaging	59	39.33
Content	10	6.6
Physical attribute of tablet	90	60
Brand name	41	27.33

Note: 16 (10.67%) did not identify the medications by themself

Participants were asked if they had difficulty reading the print on the package and if a bigger and bolder font size on the packaging would help them overcome the problem. About 60.67% replied in the positive. Table 10 shows the data related to this.

The participants were asked to respond to an open-ended question on what they thought would help them identify medications better. They were allowed to give more than one response. Most felt that having content in the local language on the packaging and having the indication mentioned would help them identify medications better. Many others felt that content in bold font would help them, while a few felt that healthcare personnel spending more time explaining and a self-explanatory pharmacy label would help (Table 11).

Table 6: Methods used by patients to know the dosing of medications

Variables	*Frequency*	*Percentage (%)*
Doctor's prescription	68	45.33
Doctor's prescription and pharmacy label	26	17.33
Pharmacy label	56	37.33

Table 7: Methods used by patients to identify medications and language (reading ability)

Variables (Language)	*Number of patients*	*Identification methods*				
		Packaging	*Content*	*Physical attributes of tablets*	*Brand name*	*Not identifying by themselves*
Gujarati	40	20	0	26	3	5
Gujarati and English	2	0	0	0	2	0
Gujarati and Hindi	51	23	2	36	11	4
Gujarati, English, and Hindi	31	9	8	15	21	0
Hindi	4	1	0	3	0	0
Hindi and English	5	1	0	0	4	0
None	17	5	0	10	0	7
Total	150	59	10	90	41	16

Table 8: Methods used by patients to identify medications and education level

Variables (Education)	*Number of patients*	*Identification patterns*				
		Packaging	*Content*	*Physical attributes of tablets*	*Brand name*	*Not identifying by self*
Postgraduate	5	1	2	0	3	0
Graduate	24	6	6	9	18	0
Secondary	40	13	0	20	13	6
Primary	64	36	2	51	7	3
No formal education	17	3	0	10	0	7
Total	150	59	10	90	41	16

Table 9: Methods used by patients to identify medications and number of clinical conditions

Variables (No. of clinical conditions)	*Number of patients*	*Identification patterns*				
		Packaging	*Content*	*Physical attributes of tablets*	*Brand name*	*Not identifying by self*
0	22	13	3	18	8	3
1	72	26	4	42	17	7
2	46	15	2	24	14	5
3	7	5	0	5	1	0
4	2	0	1	1	1	0
5	1	0	0	0	0	1
Total	150	59	10	90	41	16

Table 10: Response to close-ended question

Question	*Response*			
	Yes		*No*	
	Number of patients	*Percentage (%)*	*Number of patients*	*Percentage (%)*
Did you find difficulty in reading the print on the packaging and do you think it would help if the font size was bigger and bolder?	91	60.67	59	39.33

Table 11: Response to open-ended question

Question	*Responses*	*Number*	*Percentage (%)*
What do you think will help you identify your medications better?	Nurses spending more time in explaining	1	1.33
	Self-explanatory pharmacy label	5	3.33
	Doctors spending more time in explaining	10	6.67
	Content written in bold font	55	36.67
	Indication written in bold on packaging	105	70
	Content on packages written in local language	118	78.67

Discussion

With increasing population and improved life expectancy in our country, a substantial number of individuals are living with one or more chronic health conditions, resulting in high pill burden. Accurate identification of medications is critical for this population, as errors in medication use can lead to significant harm—even in high-income countries. In the Indian context, low levels of literacy and health literacy can interfere with these skills. In addition, old age, polypharmacy, decreased vision, and decreased ability to read English, a language in which the content on packaging of medications is written, may further hinder patients' ability to safely manage their medications.

To explore how patients identify their medications and the difficulties faced by them, a cross-sectional study was conducted at our hospital, a 900-bedded tertiary hospital attached to a medical college in rural Gujarat. The aim was to understand patients' practices and perceptions regarding medication identification and to assess the impact of factors such as literacy and language barriers.

Review of literature reveals that while many studies have been conducted to understand medication errors, very few focus on the patients. A review studying patients' role in errors highlighted that, though they are the people most affected by them, little is known about how they make attributions of the adverse effects that arise from medication errors and suggested that better communication is needed between healthcare providers and patients.[15] Our study chose to fill this gap and involved interaction with the patients through a questionnaire-based interview, which allowed patients to give suggestions through open-ended questions, giving insight into what they feel would help reduce errors. Most of our patients felt that having the content on the packaging in the local language and the indication for the drug written in bold letters would help them identify medications better. Many felt that having the content in bold font would help, while a few opined that doctors and nurses spending more time to explain and self-explanatory pharmacy labels would make identification easy. With content on all medicine packaging in English in our country and a significant number of people with no ability to read the language, it would be worth considering adding content in Hindi on the packaging and mentioning the indication along with it. In general, the packaging needs to be more informative and clear, considering the fact that patients rely on it when no professionals are around for advice. The need to bring in more effective communication between patients and doctors and/or nurses during drug reconciliation cannot be stressed enough and is the need of the hour.

The results of studies on medication errors have varied based on where they are conducted. While one in South India reported an overall prevalence of medication errors to be 80%,[16] another in Austria found at least one error in 56.2% of the studied population.[17] Another descriptive observational study to estimate the types and incidence of dispensing errors found 1.4% of dispensing errors, concluded that the incidence was higher for prescriptions on chronic diseases, and noted that there were fewer prescription errors when the average number of drugs in the prescription was <5.[18] It may be noted that most studies focus on dispensing and prescription errors, and there are no studies that aim to see how patients identify their

medications and if this has the potential to be a reason for medication errors. Our study goes beyond the steps of prescription or dispensing and focuses on methods used by patients to identify medications. This information can be a valuable tool to redesign the steps of the drug delivery chain—from manufacturing to the doctor's desk and from the doctor's desk to the patient's mouth.

Level of literacy contributes to errors directly or indirectly, and studies have been done in this area. A cross-sectional study with the aim to identify medication self-administration errors (MSE) and the contributing factors among illiterate and low-literate, community-dwelling older adults with polypharmacy found the frequency of MSE over 6 months to be 69.2%, with 18% reporting adverse events following their mistakes.[19] Another multisite cross-sectional study to identify the role of health literacy in chronic disease self-management found that 15% of the patients could not identify their medications despite the fact that half of them had adequate literacy levels.[20] In our study, we saw if the level of education among literates affected the way they identified medications and hence classified them into those with primary education, secondary education, graduate, and postgraduate education. We found that irrespective of the level of literacy, physical attributes and packaging were used to identify medications most commonly, which is similar to other studies. This finding underscores the importance of the appearance of pills and packaging and stresses the need to have a standardized system pertaining to the physical attributes of tablets and packaging. This also shows why look-alike, sound-alike drugs contribute to medication errors.

Further to these findings, a review of the literature showed studies that have explored whether the appearance of pills affected adherence and reduced medication errors. These studies have called for instituting a more organized and consistent system of appearance, which would increase adherence, simplify medical regimens, reduce medication errors, and encourage the rational use of bioequivalent generic drugs.[21] Our study endorses the same. Another study that explored the utility of using color and shape to differentiate drug strength information on over-the-counter medicine packages found that it improved drug strength identification performance.[22] In our study, we also noted that most patients relied on the physical attributes of pills to identify them, and by bringing in policies to standardize and regularize the appearance of pills, one can reduce medication errors.

A study to analyze the medication self-management process in polypharmacy revealed that patients continue to have problems in medical management, among other areas. The study suggested that improving medication literacy would help patients integrate medication management into their daily life and that future research should focus on developing effective intervention strategies to further enhance self-management abilities.[23]

While most of the studies are centered around quantifying medication errors and their point of occurrence, they stop short of studying what patients think and how they themselves identify medications. The study reveals that current practices are often unscientific, inconsistent, and a significant proportion of patients rely on others to identify or administer their medications. These findings, together with polypharmacy, low literacy, vision impairment, old age, and inability to read a nonnative language, create a high-risk environment for medication errors. Importantly, our study captures patient-driven insights and practical suggestions for improving medication identification—from using local language and including indication on packaging to using bold font for content; from better communication to self-explanatory pharmacy labels, patients provide us with starting points from which newer strategies can begin.

Strengths

The study was conducted in a rural area, where most of India's population lives, and hence the findings can be said to be relevant and applicable to real-world settings. By taking a patient-centered approach, we have addressed a critical yet overlooked component in the prevention of medication errors. Our study provides valuable contextual information that can be used to design patient-friendly medication management systems. It also contributes to raising awareness of how medication packaging design and communication practices can impact patient safety.

Limitations

It was conducted in a specific geographic region, and the findings may not be entirely generalizable to the urban population or other countries. Self-reporting by patients may have introduced recall bias or underreporting. The sample size was small, and studies with larger sample size may help increase the representativeness of the findings.

Conclusion

Medication errors have remained a significant challenge in the healthcare system. Time and again, we have quantified them; the need of the hour, however, is to develop and implement strategies to minimize their occurrence. A critical step toward this is to understand how the consumers of these medications—our patients—identify them. This study represents a step in that direction. The findings underscore the need to reevaluate and reconsider multiple facets of medication management, including the physical appearance and packaging of medications, the clarity and language on the packaging, the design and format of prescriptions, communication practices among healthcare providers, the process of drug reconciliation, and the labeling practices used by pharmacists. A comprehensive and patient-centered approach is essential to enhance medication safety and reduce the risk of errors.

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