Prescribing Pattern of Antihypertensive and Antidiabetic Agents in a Secondary Healthcare Institution in Nigeria

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Abstract
Objective: A drug utilization study conducted to evaluate the prescribing pattern of antihypertensive and antidiabetic drugs in a secondary health care Centre in Nigeria.
Method: A total of 878 prescriptions randomly selected from January 2009 to August 2011 were used for the study. Prescription details were recorded and analysed accordingly.
Result: The study revealed that 93.4% of the prescriptions had the patients names indicated. The patients' gender was indicated in 70.5% consisting of 44.9% males and 55.1% females. The prescribers' names, signature and dates of prescriptions were indicated in 21.6%, 78.8% and 73.3% of the prescriptions respectively. The mean number of drugs per prescription was 3.64. Parental route of administration was seen in 2.3% of the antihypertensive drugs and 10.4% of the antidiabetic drugs. Calcium channel antagonists (33.5%) were the most commonly prescribed antihypertensive agent and Angiotensin receptor blocker the least prescribed. Among the antidiabetics, Biguanides (42.3%) were the most prescribed. The percentage of the total drugs prescribed by their generic names and trade names were 38.7% and 61.3% respectively.
Conclusion: This study showed that calcium channel blockers were the most prescribed antihypertensive agents while biguanides were the most prescribed antidiabetic agents and that generic drugs prescribing were poorly practiced.
Key words: Drug utilization, Antihypertensive, Secondary healthcare, Antidiabetics.

INTRODUCTION

Hypertension is one of the major risk factors for cardiovascular morbidity and its prevalence is high in most countries of the world. In Nigeria, the prevalence of hypertension range from a minimum of 12.4% to a maximum of 34.8% [1]. High blood pressure can succinctly be defined as the persistent elevation of blood pressure above the normal range of 140/90 mmHg. Hypertension is most times referred to as a silent killer probably because it may be asymptomatic for many years until it finally damages certain critical organs. The organs mostly involved include the blood vessels in the heart, brain, kidney and eyes with its resulting complications including heart attacks, hardening of the arteries, kidney failure and cerebrovascular accident.

However lifelong management with lifestyle modification and pharmacotherapy [2] are needed in the management of hypertension and the ultimate goal of this is to reduce morbidity and mortality through a reduction in hypertension associated complications. Meanwhile, there have been variations in the choice and use of antihypertensive agents but, evidence support the use of Angiotensin converting enzyme inhibitors (ACEI), Angiotensin receptor blocker (ARB), Calcium channel blockers (CCB), Thaizide diuretics or a two drug combinations as first line therapy for primary prevention patients [3, 4]. On the other hand, JNC 7 guidelines placed preference on the use of thiazide diuretics over other agents and also included beta blockers (BB) as a potential first line option [5].

Diabetes mellitus is an important endocrine and metabolic disease causing considerable mortality and morbidity and it requires comprehensive patient care because of the complexity of its treatment and chronic nature. An estimated 135 million people worldwide were diagnosed diabetes in 1995, and this number is expected to rise to at least 30 million by 2025 [6].

Diabetes mellitus has no cure but effective and strict control of blood glucose level is beneficial. Patients must be educated properly to comply with management procedures as this is necessary to maintain normal life and reduce complications which include retinopathy, neuropathy, nephropathy and hypertension. The approaches to the management of diabetes include diet, drugs and exercise.

Hypertension mostly co-exists with diabetes and has earlier been stated to be one of the complications of diabetes. More than 70% of adults with diabetes have blood pressure greater than 130/80 mmHg or use medication to treat diagnosed hypertension [7]. Treatment in this class of patients include the use of both antihypertensive and antidiabetic drugs together with other management therapies like weight reduction and exercise among others with the ultimate goal of bringing down blood pressure (BP) to less than 130/80 mmHg [8].

The use of drugs in these patients must be rational; this implies that the appropriate drugs must be prescribed in the right dose, at correct time interval and for a sufficient duration of time. This study was conducted in order to evaluate the drug prescribing pattern of anti-hypertensive and antidiabetic agents in a secondary healthcare centre in Nigeria.

METHODS

The study was an evaluation of drug prescribing pattern in the management of hypertension and diabetes in the University of Nigeria Medical centre in southeast Nigeria between January 2009 and August, 2011. The inclusion criterion of any prescription was the presence of an antihypertensive, antidiabetic drug or both.

Eight hundred and seventy eight prescriptions were randomly selected from the pharmacy section prescription pool of the medical centre, recorded and analysed. The data from the prescriptions were entered into a specially designed profoma. The prescriptions were assessed on the basis of prescribers' information (prescribers name, signature and date), patients' information (patients name and gender) name of antihypertensive and antidiabetic drugs and their pharmacologic classes. Other information recorded includes other drugs prescribed with the antihypertensive and antidiabetic agents, routes of administrations, and prescriptions with generic or brand names. The data were coded and entered into excel spreadsheet (Microsoft office, 2007) and analysed using SPSS version 14.

RESULT

A total of eight hundred and seventy eight (878) prescriptions containing antihypertensives, antidiabetics or both were selected. One hundred and ninety prescriptions (21.6%) had the prescribers names indicated while 699 (78.4%) of the prescriptions did not have the prescribers names indicated. This is shown in fig 1. On the prescribers' signature, 692 (78.68%) and 643 (73.3%) of the prescriptions had the signatures of their prescribers' and prescription dates indicated respectively; whereas 186 (21.2%) and 234 (26.7%) respectively of the prescriptions did not contain signatures and date of prescriptions.

In the patients information section, 820 (93.4%) of the prescriptions had the patients names indicated while 58 (6.6%) did not contain the patients name. Patients gender were indicated in 620 (70.5%) of the prescriptions while it was not indicated in 258 (29.4%). Of the 620 prescriptions where the gender were indicated, 279 (44.9%) were male while 341(55.1%) were female.

A total of 3197 drugs were prescribed with a mean of 3.64 drugs per prescription. Of the 3197 drugs, 986 (30.8%) were antihypertensives, 321 (10.0) were antidiabetics while 1890 (59.1) drugs were other drugs. Seven hundred and thirty six (98.1%) of the antihypertensives contained up to 3 antihypertensives and 29 (3.8%) contained 4 to 5 antihypertensives. On the antidiabetic drugs, whereas 230 prescriptions (99.5%) contained at most 2 antidiabetics, only 1 (0.5%) contained 3 antidiabetics.
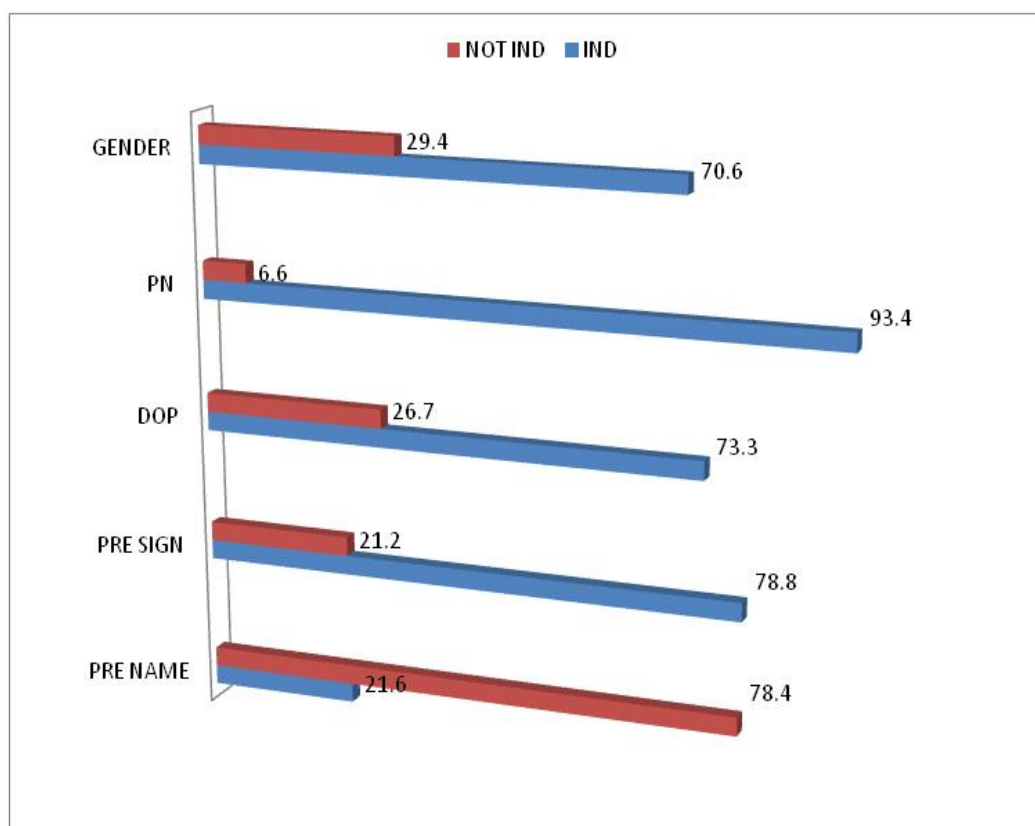
FIG 1: **Percentage number of prescriptions with patients' details and prescribers' information indicated and not indicated**

PN is Patients name, DOP is date of prescription, PRE SIGN is Prescribers signature, PRE NAME is Prescribers name.

Fig. 2, shows the percentage of prescriptions written with either the generic or trade names. The percentage of drugs prescribed with the generic name was 38.7% while 61.3% were prescribed with Trade or Brand names respectively.
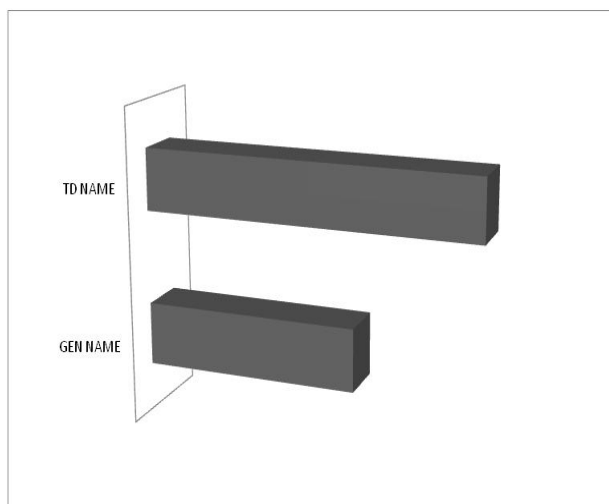
**Fig 2: Percentage of drugs prescribed with either generic or trade names.**
TD NAME means Trade name and GEN name means Generic name.

Further more, 2.3% of the antihypertensive drugs were parenterally administered while 97.7% were orally administered. Similarly, more of the antihypertensives were orally indicated (89.6%) and about 10.4% parenterally indicated as shown in Fig 3.
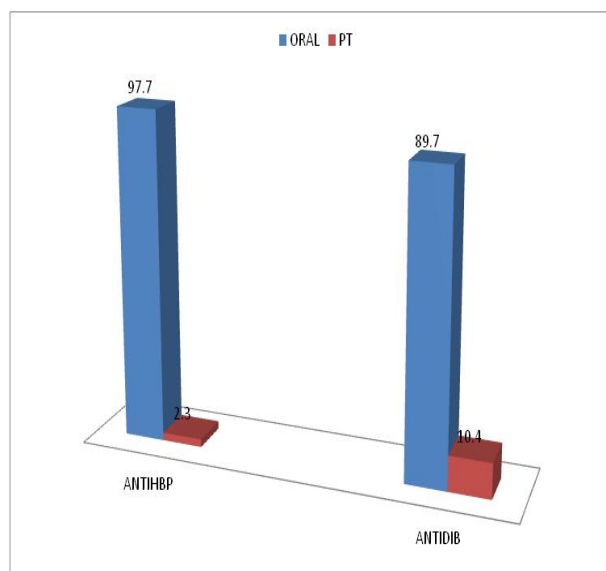

Fig 3: Percentage route of drug administration.
ANTIHBP means Antihypertensives, ANTIDIB means Antidiabetics and PT means parenteral.

The class of the antihypertensive agents indicated are as shown in Fig 4. Calcium channel blockers (CCB) were the most frequently prescribed class of antihypertensives (33.5%) followed by Angiotensin converting enzyme inhibitors (ACEIs) which is 26.7%, Diuretics (16.7%), Drugs altering central sympathetic activity (2.5%), Beta blockers (2.3%), Angiotensin receptor blockers (1%) and α-Blockers that is AB (0.1%) being the least prescribed.
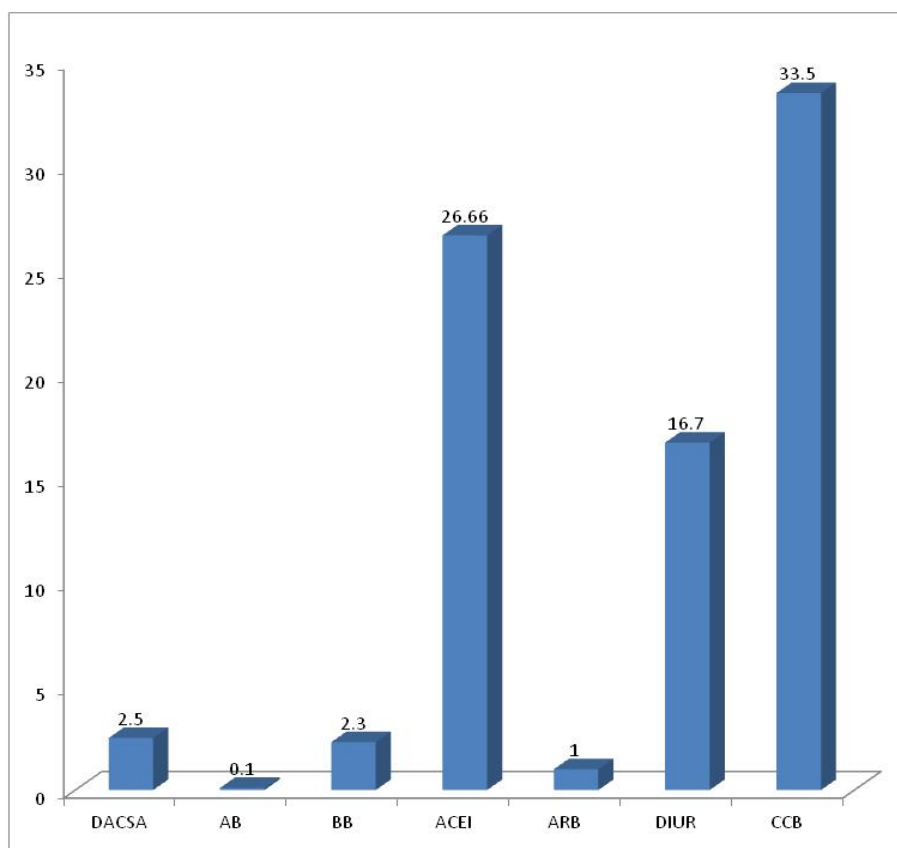
Fig 4: Percentage class of Antihypertensive agents prescribed.
DACSA is drugs altering central sympathetic activity, AB is Alpha blockers, BB is Beta blockers, ACEI is Angiotensin converting enzyme inhibitors, ARB is Angiotensin receptor blockers, DIUR is Diuretics and CCB is Calcium channel blockers.
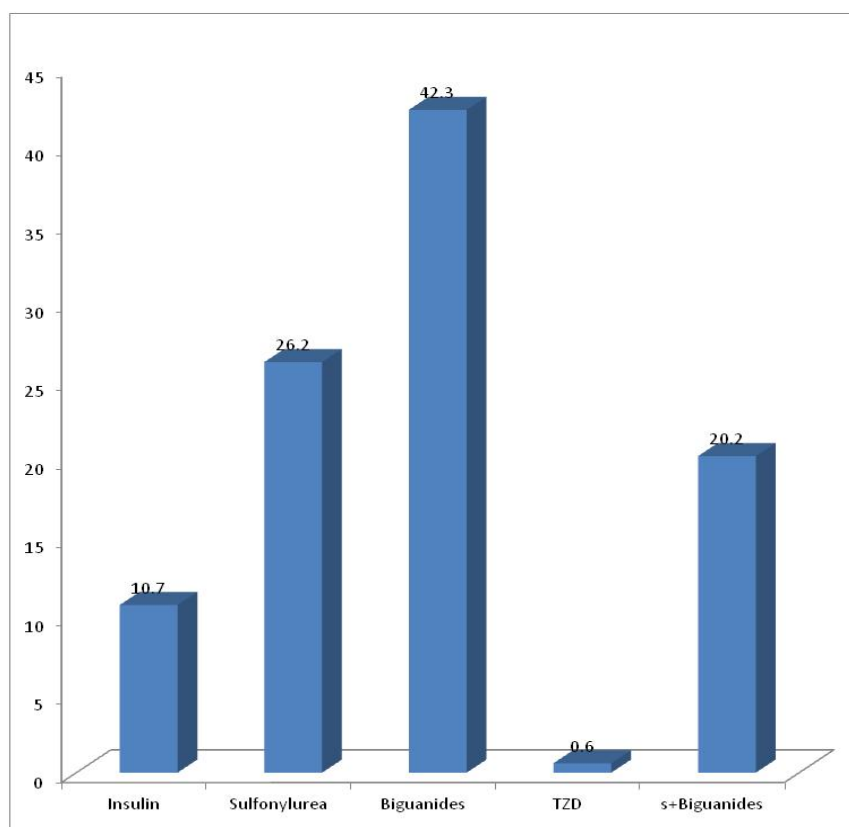
Fig 5: Percentage of different classes of Antidiabetic agents prescribed.
S is Sulfonylurea and TZD is Thiazolidinediones.

Table 1: Class of other medications prescribed.

Class	Frequency	Valid Percent(%)
Drugs for anxiety and sleep disorders	54	3.9
Antiulcer drugs	36	2.6
Laxatives	50	3.6
Antiarrhythmic drugs	56	4.1
Lipid regulating drugs	7	0.5
Antianemia drugs	2	0.1
Multivitamins	170	12.4
Antiasthimatic and COPD	50	3.6
Antidepressants	6	0.4
Antiallergics	9	0.7
Antibacterial drugs	110	8
Antimalarial drugs	153	11.2
Antiamoebic	25	1.8
Corticosteroids	10	0.7
Anticonvulsants	6	0.4
Cytotoxic drugs	2	0.1
Analgesics	447	32.6
Antirheumatiod agents	74	5.4
Miscellaneous anti-inflammatory	15	1.1
Muscle relaxants	71	5.2
Systemic antifungal	5	0.4
Expectorants and cough syrups	3	0.2
BCG vaccine	1	0.1

Fig 5 shows the different classes of antidiabetic agents prescribed. While 89.3% of the antidiabetic drugs prescribed were oral hypoglycaemic agents, 10.7% were insulin. The most prescribed oral hypoglycaemic agents were the biguanides (42.3%) followed by the sulfonylureas (26.2%), a combination of sulfonylureas and biguanides (20.2%), and thiazolidinediones (0.6%) is the least prescribed. Table 1 shows the percentage distribution of other drugs prescribed alongside the antihypertensive/antidiabetic agents. The most commonly prescribed category of drugs among these medications was analgesics (32.6%) followed by multivitamins (12.4%) and anti-malarial (11.2%) and, Cytotoxic drugs and BCG vaccines (0.1%) respectively being the least prescribed.

DISCUSSIONS

Drug utilization research is the marketing, distribution, prescription and use of drugs in a society with special emphasis on the resulting medical, social and economic consequences [9]. Quality indices of drug use may include among others, choice of drug, drug cost, drug dosage, drug interaction, and adverse drug reaction awareness. The aim of drug utilization is to facilitate rational drug use in a population and drug utilization studies conducted at regular interval helps to guide the physician in prescribing drugs rationally [10].

A prescription is an order that is written by the physician or a medical signature by a physician to tell the pharmacist what medication he/she wants for his/her patients at a particular time in the management of such patients' disorder. A prescription is expected to reflect some elemental components as the name, phone number and signature of prescriber, and the name and age of patient [11]. The result of this study showed that most prescriptions lack prescribers' information as seen from the fact that 78.4 % of the prescriptions do not contain the prescribers' names. The result also showed that patients' information such as their names, gender and age were missing in some of the prescriptions. The result of this study on prescribers' information and patients' details is in accordance with the result by Sultana et al [12] that reported that several prescriptions in their study lacked even basic information such as the identity of the practitioners and patients. However, the lack of some patient information in the prescription may be due to lack of standardization of prescription formats [12]. But, according to the Joint Commission on Accreditation of Healthcare Organisations (JCAHO) [13] national patient safety goals, at least two patients' identifiers should be used in various clinical situations during prescription writing.

The result also showed that an average of 3.64 drugs was prescribed per patient which is higher when compared to similar studies [14]. Of the total number of drugs prescribed, 30.8 % were antihypertensives, 10.0 % antidiabetic while, 59.1 % were other drugs. The high number of the other drugs used along side with the diabetic and hypertensive drugs may be due to the co-morbid diseases. However, the high use of antibiotics, vitamins and analgesics as seen in this study corroborate the study by Ranjeeth Kumari et al [15]. Also, Builders et al, 2011 reported that analgesics are the most prescribed group of drugs [16]. Furthermore, a study from North India revealed the indiscriminate use of analgesics, antibiotics and vitamins [17] in Indian population which is similar to Nigerian population except for the skin colour and geographical locations. More so, many studies have demonstrated the benefits of use of antihypertensive combinations which is usually due to the co-morbidity nature of the diseases [18, 19] and so, combination therapy seems to be a more rational approach to reduce cardiovascular risk factor [20] in hypertension. This study showed that 93.4% of the prescriptions with antihypertensives contained up to three antihypertensive drugs and 3.8 % contained 4 to 5 drugs. Similarly, 99.5 % of the antidiabetics contained two antidiabetic drugs.

Greater percentage of the antihypertensives (97.7 %) were prescribed to be administered orally which is a good and rational approach to the use of drugs since pharmacokinetics and clinical trials indicated that oral forms of drugs are as effective as injections with oral medications being more cost effective and safer when a patient is still conscious [21, 22].

Calcium channel blockers were the most commonly prescribed drugs among the antihypertensives which agreed with the result published by kulkami et al and Manolio et al [23,24] but, differs from the reports from other countries like Canada, Italy, South Africa and Britain where diuretics were popular treatments for hypertension [25, 26, 27]. The Calcium channel blockers were followed by Angiotensin converting enzyme inhibitors and then, diuretics and Beta blockers with Angiotensin receptor blockers being the least prescribed. Although the favoured use of Calcium channel blockers was not in accordance with the JNC 7 guidelines that supported diuretics as first line therapy for the treatment of hypertension, its use may be due to the fact that Calcium Channel blockers have been found to lower blood pressure more than diuretics when both were used as monotherapy [5]. On the other hand, the second Australian National Blood Pressure trials reported better outcomes with regimen starting with ACEI compared to diuretics although the study was conducted among the whites. Meanwhile, the high use of ACEI is in agreement with the study by Ukwe et al [28] who demonstrated that ACEI remained favourite for prescribers probably due to its benefits of preventing cardiovascular events and target end organ damage in patients with diabetes mellitus, heart failure, hypertensive renal insufficiency and diabetic nephropathy [29]. The lower use of BB and ARB in this study may be due to adverse effects associated with their use. Meanwhile, BB has been shown not to be effective in blacks [30]. The underutilization of ARB may also be due to cost implication thus, the prescription for ARBs in health care center being reserved for patients who are not able to tolerate ACEI [31].

Although, diuretics are generally recommended as first line therapy for treatment of hypertension (JNC V and VII), utilization of diuretics in this present study was 16.7 %. The lower use of this compared to ACEI and CCBs may be due to adverse effect of diuretics on glucose homeostasis and lipid profile [32].

Furthermore, the most prescribed oral hypoglycaemic agent was the biguanides followed by the sulfonylurea and then, a combination of the two. This is in agreement with the report of Pooja et al who reported that metformin and glimepiride were the most prescribed drugs in diabetes management [6]. According to the study, the use of metformin may be due to its effects on cardiovascular risk factors especially on the lipid profile and also due to the fact that metformin has been shown not to promote weight gain. As such, metformin has been reported as first drug of choice for most patients with type 2 diabetes mellitus.

CONCLUSION

The assessment of the existing prescribing pattern helps to identify specific drug use problems which need to be understood before any meaningful intervention can take

place. The percentage of prescriptions by generic name was low which is considered irrational. Although the patients detail and prescribers' information contained in the prescriptions might be said to be considerably good, the lack of some of this information on some of the prescriptions may be due to lack of standardization of prescription formats and as such prescription formats should be standardized. Furthermore, educational sessions for the doctors at different levels to encourage good prescribing practices such as prescribing by generic names and correct writing of prescriptions should be encouraged.

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