

**An Investigation of Drug Information Needs of Doctors and Nurses in Benin City, Nigeria.**

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**ABSTRACT**

Drug information (DI) constitutes an integral part of modern day medicine and it is essential for healthcare providers to have a good knowledge of DI. The study objectives were to determine the DI needs of Nigerian Doctors and Nurses as well as the DI resources they often use and to ascertain the extent to which they use these resources. A questionnaire with three distinct sections was developed and administered to participants. First section collected the demographic data, the second section consists of 24 practice problems while the third consists of DI resources. Indication ( $5.31\pm 1.00$ ), route of drug administration ( $5.30\pm 1.20$ ), contraindication ( $5.22\pm 1.14$ ) and side effects ( $5.24\pm 1.10$ ) were the most common practice problems that require Nurses and Doctors to seek DI. Drug package/labels ( $4.97\pm 1.12$ ), internet ( $4.90\pm 1.22$ ), my professional colleagues ( $4.82\pm 1.17$ ) and textbooks ( $4.58\pm 1.33$ ) were the most used sources of DI. The use of EMDEX ( $P=0.0077$ ), textbooks ( $P=0.0437$ ) and Pharmacists ( $P=0.0148$ ) are influenced by age. Doctors have a higher preference for EMDEX ( $P=0.0001$ ) while Nurses prefer the use of Pharmacists ( $P=0.0001$ ) and drug package/labels ( $P=0.0015$ ).

**Keywords:** Drug Information, Doctors, Nurses, Nigeria

**INTRODUCTION**

Drug information (DI) is the provision of written and/or verbal information or advice about drugs and drug therapy in response to a request from other healthcare providers, organizations, committees, patients or members of the public (Kelra et al, 2011). Doctors and Nurses require excellent DI to be able to take appropriate decision for optimum patient care. Pharmacists as DI specialists are saddled with the responsibility of providing DI to other healthcare professionals. Adequate DI provision have been associated with a reduction in the mortality rate of patients (Bond et al, 2002). Recently, its generally recommended that medicine should be defined as active substance plus information (Anyim, 1992). In time past the number of drugs available for use in the medical world was minimal hence there was no much need for DI. But in recent times, there seem to be a significant increase in available drug products and a tremendous increase in the number of biomedical journals published on yearly basis. Since it is not humanly possible to remember such a large amount of information, there is a need to develop a system to retrieve specific and credible drug DI. The provision of timely and accurate DI to healthcare professionals

is very important in promoting safe and effective use of drugs by improving patient outcome, enhancing the quality of patient care and ensuring the prudent use of resources (Udezi et al., 2007). It appears most developing countries lack adequate DI and this may be due to insufficient amount of current literature or poor dissemination or use of available ones (Laskshmi et al, 2003). Quality source of DI has to be made available to Nurses and Doctors because investigations have revealed that availability and accessibility rather than integrity of source determine the source of DI used by healthcare professionals (Anna et al, 2007). Access to DI may assume different forms which may include sourcing from textbooks, internet and verbally from professional colleagues (Covel et al., 1985). In order to be able to practice at the highest level of patient care, Doctors and Nurses need to constantly update their clinical knowledge and keep themselves abreast with the increasing number of new drugs and ever increasing DI (Wang et al, 2006). Unjustified use and prescription of medication pose hazardous consequences on the health of patients and society at large and this constitutes the reason for the increase use of medication (Kazeem et al., 2011).

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Scientific literature are enormous as there is an annual estimate of approximately 10,000 new randomized trials in MEDLINE and over 450,000 clinical trials identified by the Cochrane collaboration (The Cochrane Library, 2005 and Chassin, 1998). Healthcare professionals must be able to gain unfettered access to authoritative and independent information source which must be presented in suitable formats and must be relevant to current trend in healthcare (Godilee et al, 2004). Making available a functioning and pharmacist-operated drug information center (DIC) where DI queries can be channeled by Doctors and Nurses can proffer solution to this challenge. Engaging the service of a Clinical Pharmacist during daily ward rounds is another good approach.

WHO recognizes independent DIC as a core component of National programs to promote the rational use of drugs (WHO, 2002) but unfortunately there are very few DICs in Nigeria and the available ones are barely functional. This makes the process of searching for DI very cumbersome. Medical representatives are not a very reliable source of DI as the information provided are often aimed at promoting their commercial interest hence doubt arise about its credibility. Also, the unethical and inappropriate approach to the promotion of pharmaceutical products have become a source of concern for WHO and relevant NGOs because of the irrational, inappropriate and sometimes harmful prescribing associated with it (Hogerzeil, 1995).

Drug use in Nigeria is widespread therefore information to ensure safety, efficacy and appropriateness of their use is needful. Previous study revealed that in Nigeria, DI is mainly obtained from sources such as journals, medical representatives, reference books, colleagues and internet (Adibe, 2010). This may be due to the ease of accessment and relatively cheaper cost. However, the dissemination of drug and DI is poorly co-ordinated. This is seen as a huge responsibility for pharmacy profession as there is need to live up to expectation and ensure that an efficient and effective DI dissemination system is put in place. This can be achieved through a concerted effort of the Federal Government and other relevant stakeholders by:

- Setting up adequately staffed and functional DICs in Teaching and Specialist Hospitals.
- Providing a stable internet and intranet system for staff to enable them have a timeous access to DI at little or no cost.

- Making available current and relevant textbooks, journals, newsletters and other reference books to healthcare practitioners at practice sites.

The purpose of this study were to investigate the DI needs of Doctors and Nurses; to determine the DI resources used and the extent to which they use these resources and to investigate any relationship between Demographic Data and most commonly used resources.

## **METHODS**

### **Study Setting**

The study was done in Benin City, the capital of Edo State, Nigeria. Facilities used for the study were University of Benin Teaching Hospital (UBTH), Central Hospital, University of Benin Health Center, Faith Mediplex and St Philomina Hospital. This represents a mix of Federal, State and Missionary health facilities in the state.

### **Study Instrument**

Data was collected by the use of a previously validated questionnaire which was standardized and found reliable with a Cronbach alpha of 0.913 (Udezi et al, 2007). The questionnaire consists of three distinct sections. Section one collected the Demographic Data of respondents which are: age, sex, work experience, practice setting and area of specialty. The second section consists of 24 practice problems and respondents were to indicate the practice problems which make them seek DI and how often they encounter such practice problems. The frequency of encounter with the practice problem was also to be indicated on a response scale anchored in the following format:

Not at all=1, very rarely =2, rarely=3, not quite often=4, often=5, very often=6.

In section three are 16 DI resources where respondents are expected to indicate how often they use them in practice. The frequency of use of these resources was to be indicated on a response scale which was anchored in same format as the first.

### **Study Design and Data Collection**

The study was a cross-sectional study. A roster of prospective participants from each department was obtained and the questionnaire was administered to every other participants. In situation where participants were not available or unwilling to participate in the study, the next participant was considered.

### **Sampling Technique and Sample Size Determination**

Sample is made of Doctors and Nurses practicing in Benin. Convenience sampling was done and the sample size was determined to be 370 by using the formula where population size is unknown. However, 412 participants (to account for attrition) were approached.

### **Data Analysis**

Questionnaires were retrieved and coded. This was stored in Microsoft excel, sorted according to demographics and transferred to SPSS version 16 for analysis to obtain descriptive statistics, factor loading and cronbach alpha. A likert type summation of scores was done in section two and three of the instrument and the mean score of each of the 24 items and the mean utilization scores for the 16 DI resources were calculated on a scale of 1.0-6.0. Items with a mean score of 3.5 and above were considered to have a high frequency which means that they are more favored. The cronbach alpha was computed and principle component analysis was used to extract the second section into 5 distinct components and they were named accordingly. With the aid of graph pad instat, an exploration of a possible association between demographic variables and the sources of DI with mean scores that reveal them as the most used was determined using the student's T-test or one way analysis of variance as appropriate. The exact P-value was obtained and where  $P < 0.05$ , it was considered significant.

### **RESULTS**

Out of 412 questionnaires administered, 376 were found useful for study analysis giving a final response rate of 91.3%. The cronbach alpha was 0.919 and factor loading ranged from 0.522-0.824. The socio-demographic characteristics of respondents are shown in table 1. Respondents between 30-39 years accounted for 46.54%, female were 242(64.36%) and 149(39.63%) had 5 years or less of practice experience. Majority 310(82.45%) work in Teaching and Specialist Hospital while the remaining work in health center and private hospitals. Of the respondents, 205(54.52%) were Doctors. The practice problems that prompt respondents to seek DI along with their corresponding mean scores and P-values are shown in table 2. The extracted components were identified. Component one was

identified as safe use of medication. This is the largest component with 8 items. Component 2 was identified as General use of drugs in patients and it consists of six items. Component 3 was identified as drug specific characteristics and also has 6 items. Component 4 was named drug handling and consists of 3 items. The last component was named counseling and has just an item (patient counseling).

Although none of the 24 practice problems had a mean score below 3.5, four of them (pharmacokinetic parameters  $3.99 \pm 1.5$ , dose titration/tapering  $3.85 \pm 1.54$ , drug-laboratory test interaction  $3.53 \pm 1.49$ ) had lower mean scores. This implies that they are less likely to make Doctors and Nurses seek DI. The practice problems which have higher mean score (above 5) are duration of drug therapy, indication, contraindications, side effects, dosage confirmation and route of administration. These are the practice problems that mainly make respondents seek DI in practice. From calculated P-values, it is observed that Doctors have a higher need for DI than Nurses as seen from items such as prophylactic effects, drug-drug interaction, toxic effects, microbial sensitivity, synergistic effect, efficacy comparison, pharmacokinetic parameters and therapeutic equivalence. However, Nurses tend to need more information on storage condition and route of administration than Doctors. Table 3 shows the various sources of DI used by respondents and their corresponding mean scores and P-values. Seven of the DI sources with highest mean score are: Pharmacists, drug package labels, internet, professional colleagues, textbooks, EMDEX and drug package insert. It means they are most likely used by the respondents. The least used are Martindale, British Pharmacopoeia (BP), British Pharmaceutical Codex (BPC). Table 4 reveal the association between socio-demographic factors of respondents and the DI sources with higher mean scores. Respondents in the age bracket (20-29) and ( $\geq 50$ ) tend to use Pharmacists and textbooks more often. It's also observed that females tend to depend on Pharmacists more while males use EMDEX more. Respondents with most ( $\geq 1$  yrs) and least ( $\leq 5$  yrs) work experience tend to patronize drug package and labels as source of DI. Finally, Nurses tend to depend more on Pharmacists and drug package insert as compared to Doctors who tend to favor the use of EMDEX as observed from their various P-values.

Table1: Demographic Characteristics of Respondents (n = 376)

Variable	Frequency	Percentage
<b>Age (years)</b>		
20-29	99	26.33%
30-39	175	46.54%
40-49	67	17.82%
≥50	35	9.31%
<b>Gender</b>		
Males	134	35.64%
Females	242	64.36%
<b>Work Experience (years)</b>		
≤5	149	39.63%
6-10	112	29.79%
≥ 11	115	30.59%
<b>Practice settings</b>		
Teaching hospital	260	69.15%
Specialist hospital	50	13.3%
Others	66	17.55%
<b>Profession</b>		
Doctors	205	54.52%
Nurses	171	45.48%

Table 2: Component Distribution of Identified Practice Problems Requiring Drug Information and their Extent of Occurrence.

Items	Mean Score ± SD		Total mean score ± SD	P value
	Doctors	Nurses		
<b>Component 1: Safe Use Of Medication</b>				
Prophylactic effects	4.66±1.34	4.40±1.49	4.53±1.42	0.0379
Adverse drug event	4.95±1.38	4.74±1.42	4.85±1.4	0.0739
Drug-drug interaction	4.69±1.53	4.24±1.49	4.47±1.51	0.0021
Drug- food interaction	4.38±1.62	4.20±1.50	4.29±1.56	0.1357
Drug- alcohol interaction	4.38±1.65	4.13±1.54	4.26±3.19	0.0642
Toxic effects	4.97±1.55	4.38±1.55	4.68±1.55	0.0001
Duration of drug therapy	5.20±1.54	5.01±1.22	5.11±1.38	0.0960
Poison antidote	4.02±1.91	3.94±1.70	3.98±1.81	0.3355
Sub-Total Mean Score	4.66±1.57	4.38±1.49	4.52±1.53	
<b>Component 2: General Use Of Drugs In Patients</b>				
Generic/brand name confirmation	4.81±1.19	4.67±1.46	4.74±1.33	0.1532
Indications	5.34±0.86	5.27±1.15	5.31±1.00	0.2502
Contraindications	5.27±1.01	5.17±1.26	5.22±1.14	0.8541
Side effects	5.31±0.94	5.17±1.26	5.24±1.10	0.1093
Dosage confirmation	5.20±1.14	5.08±1.26	5.14±1.20	0.1666
Route of administration	5.26±1.31	5.34±1.09	5.30±1.20	0.2627
Sub-Total Mean Score	5.20±1.08	5.12±1.25	5.16±1.17	
<b>Component 3: Drug Specific Characteristics</b>				
Microbial sensitivity	4.79±1.05	3.81±1.63	4.30±0.89	0.0001
Drug-laboratory test interaction	3.63±1.34	3.40±1.63	3.53±1.49	0.0670
Dose titration/tapering	3.92±1.40	3.77±1.67	3.85±1.54	0.1736

Synergistic effect	4.43±1.16	3.49±1.60	3.96±1.38	0.0001
Efficacy comparison	4.66±1.15	4.25±1.47	4.46±2.62	0.0013
Pharmacokinetic parameters	4.30±1.38	3.67±1.62	3.99±1.5	0.0001
Sub-Total Mean Score	4.29±1.25	3.73±1.60	4.01±1.43	
<b>Component 4: Drug Handling</b>				
Storage condition	3.76±1.34	4.48±1.54	4.12±1.44	0.0001
Labeling	4.76±1.23	4.74±1.57	4.75±1.40	0.4451
Therapeutic equivalence	4.44±1.19	4.07±1.53	4.26±1.36	0.0044
Sub-Total Mean Score	4.32±1.25	4.43±1.55	4.36±1.4	
<b>Component 5: Counseling</b>				
Patient counseling	4.96±1.14	4.84±1.32	4.90±2.46	0.1724
Sub-Total Mean Score	4.96±1.14	4.84±1.32	4.90±2.46	

Table 3: Identified Sources of Drug Information and their Extent of use.

Drug information sources	Mean Score ± SD		Total mean score ±SD	P value
	Doctors	Nurses		
Monthly Index of Medical Specialties(MIMS)	2.82±1.54	2.74±1.60	2.78±1.57	0.3112
Merck manual	2.55±1.49	2.46±1.39	2.51±1.44	0.2740
British National Formulary (BNF)	3.97±1.50	2.65±1.56	3.31±3.06	0.0001
Journals	3.62±1.36	3.56±1.61	3.59±1.49	0.5000
Textbooks	4.50±1.21	4.66±1.45	4.58±1.33	0.1221
My professional colleagues	4.86±1.03	4.77±1.31	4.82±1.17	0.2282
Drug package/labels	4.78±1.08	5.15±1.16	4.965±1.12	0.0008
Internet	5.00±1.09	4.80±1.34	4.90±1.22	0.0557
Index of Essential Medicines (EMDEX)	4.63±1.36	3.91±1.82	4.27±1.59	0.0001
British Pharmaceutical Codex (BPC)	2.42±1.48	2.50±1.48	2.46±1.48	0.3010
British Pharmacopoeia (BP)	2.32±1.46	2.50±1.55	2.41±1.51	0.1239
Drug information center	2.48±1.59	2.98±1.65	2.73±1.61	0.0015
Drug package insert	4.29±1.34	4.31±1.73	4.30±1.54	0.4498
Martindale	1.83±1.17	2.31±1.50	2.07±1.34	0.0003
Medical representatives	3.50±1.61	3.73±1.60	3.62±1.61	0.0837
Pharmacists	3.63±1.50	4.49±1.45	4.06±1.48	0.0001

## DISCUSSION

Irrational drug use is considered a public health menace and can have a huge negative impact on individuals and the community at large. Adequate provision of DI is considered one of the ways to stem this untoward development. Doctors and Nurses have

to be adequately informed about drugs because in Nigeria a majority of patients who consult Doctors usually have medicine(s) recommended for them (Odusanya et al., 2000; Jimoh et al., 2014 and Fadare et al., 2013).

Table 4: Comparison of Mean Scores of the most Frequently used Sources of Drug Information based on Demographic Factors of Respondents

Variable	Number Reporting	Mean Score ± SD						
		Pharmacists	Drug Package Labels	Internet	Professional colleagues	Text Books	EMD EX	Drug Package Insert
<b>Age</b>								
20-29	99	4.28±1.35	4.96±1.13	5.10±1.11	4.92±1.16	4.77±1.31	4.18±1.71	4.12±1.62
30-39	175	3.78±1.58	4.91±1.07	4.95±1.16	4.77±1.18	4.58±1.29	4.58±1.42	4.30±1.48
40-49	67	4.03±1.48	4.84±1.26	4.67±1.28	4.64±1.24	4.19±1.40	4.09±1.65	4.48±1.37
≥ 50	35	4.49±1.72	5.29±1.13	4.53±1.48	5.09±0.92	4.69±1.28	3.69±2.03	4.4±1.77
P		0.0148,	0.2827	0.0332	0.2114	0.0437	0.0077	0.4050
<b>Gender</b>								
Male	134	3.50±1.50	4.79±1.08	5.10±1.01	4.75±1.06	4.58±1.21	4.56±1.32	4.17±1.42
Female	242	4.30±1.48	5.03±1.15	4.80±1.29	4.85±1.22	4.56±1.38	4.17±1.75	4.37±1.59
P		0.0001	0.0484	0.0206	0.4261	0.8883	0.0251	0.2260
<b>Work experience</b>								
≤ 5	149	4.12±1.47	5.03±1.05	5.03±1.21	4.93±1.17	4.77±1.23	4.41±1.62	4.12±1.65
6-10	112	3.82±1.44	4.71±1.14	4.78±1.20	4.63±1.08	4.40±1.35	4.32±1.51	4.23±1.39
≥ 11	115	4.10±1.70	5.06±1.19	4.85±1.24	4.88±1.22	4.50±1.37	4.14±1.72	4.59±1.48
P		0.2429	0.0314	0.2260	0.0994	0.0598	0.4022	0.404
<b>Practice setting</b>								
Teaching hospital	260	3.98±1.50	5.00±1.08	4.98±1.13	4.84±1.13	4.59±1.29	4.27±1.61	4.39±1.49
Specialist hospital	50	3.92±1.76	4.80±1.41	4.66±1.29	4.66±1.22	4.56±1.40	4.32±1.74	4.12±1.44
Others	66	4.15±1.55	4.83±1.1	4.79±1.47	4.85±1.31	4.41±1.44	4.37±1.70	3.94±1.73
P		0.6710	0.3486	0.1666	0.5938	0.6185	0.9008	0.772
<b>Profession</b>								
Medical doctors	205	3.63±1.49	4.78±1.08	5.00±1.09	4.86±1.03	4.50±1.21	4.63±1.36	4.29±1.34
Nurses	171	4.49±1.45	5.15±1.16	4.8±1.34	4.77±1.31	4.66±1.45	3.91±1.82	4.31±1.73
P		0.0001	0.0015	0.1114	0.4564	0.2442	0.0001	0.8996

From the self-report of the respondents, it is observed that indication have the highest mean score which is an indication that they are more concerned about the function and usefulness of drugs for their patients and how much it can improve general outcome. Following indication are route of administration, side effects, contraindication, dosage confirmation and duration of drug therapy in that order. This further buttresses the finding of a previous study that the most important areas of DI are pharmacological actions, indication, dosage confirmation and contraindication (Ain et al, 2006). All of these items are part of component 2 (General use of drugs in patients) except duration of drug therapy which is a part of component 1 (safe use of medication). Doctors and Nurses would want to acquire general background knowledge of drug in order to make informed decision because the safe management of patient by using the right drug on the right patient at the right dose is of paramount

importance to healthcare professionals (Pia et al, 2011).

Items with lowest mean score are drug-laboratory test interaction, dose titration/tapering and poison antidote. It's logical to assume that since cases of poisoning are referred to the emergency unit of a health facility, a majority of Doctors and Nurses will not frequently encounter such cases. This could be responsible for the low mean score as practitioners in other units rarely handle such cases thereby causing them to have a minimal need for information to address the practice problem. Component 2 (General use of drugs in patients) and 5 (counseling) have the highest subtotal mean score.

Proper patient counseling have a significant impact on medication adherence which is essential for optimizing health outcomes (Osterberg et al, 2005 and Lava et al, 2011) especially when predictors of

non-adherence such as depression, cognitive impairment, visual problems, complex medication regimen etc. are evident (Anan et al, 2014; Subho, 2017).

Component 3 (drug specific characteristics) have the lowest subtotal mean score. Items in this component are of lesser concern to Doctors and Nurses since they have lesser information need to meet these practice problems. From the estimated P-values, it's observed generally that Doctors have greater need for DI than Nurses except for route of drug administration and storage condition. This is even so because the various duties they discharge play a huge role in determining the DI that is most relevant to them. This can be seen in virtually all practice settings as Doctors are more often saddled with the responsibility of prescription generation while Nurses often play the role of drug administration, counseling and medication storage in the ward before use.

Healthcare professionals use a variety of DI resources to meet their DI needs. Drug package/labels, internet, professional colleagues and textbooks were found to be the most commonly used sources of DI. Drug package apart from providing a decent housing and a means of carriage to pharmaceutical products also provide some useful information about drug which can be found useful in identifying, obtaining information about generic name, dose, strength, storage condition, expiration date etc. Healthcare practitioners are highly dependent on the use of internet however, the authenticity and reliability of the information found on the internet is a huge source of concern (Huh et al, 2005).

Humans (as sources of information) are social and represent an informal way to obtain DI because it is quick, easy and cheap to use (Mckibbon, 1998). However, they are not evidence based and may be ranked at the bottom of the evidence hierarchy.

Textbooks are considered to be the DI source to be consulted first by healthcare practitioners (Mckibbon, 1998) as it helps to provide a broad spectrum of DI on many topics and also provide sufficient background information. However, textbooks have a major drawback of time obsolescence. Index of Essential medicine (EMDEX), British National Formulary (BNF) and Monthly Index of Medical Specialty (MIMS) are all pocket reference books but only EMDEX appear to enjoy a high level of patronage due to its wide spread availability in Nigeria and relative affordability in comparison to the others. Although drug package insert recorded a reasonable

level of use and considered a primary source of drug data, it is difficult to establish a DI database on the basis of this information because the expression used in package insert are not guided by strict rules and not standardized (Ryo et al, 2013).

Pharmacists who are believed to have the professional responsibility of providing DI to healthcare professional and the general public (Chan et al, 1996 and Himanshu et al, 2015) was a highly used source of DI in this study. Medical representatives who are known to highly influence prescribers' decision (Jones et al, 2001; Britten, 1994; Birhanu et al, 2016 and Siddiqi et al, 2011) were rated low in this study. This may be due to the belief that DI provided by Pharmaceutical companies are intended to favor their commercial interest thereby making it not completely reliable. The low mean scores of DIC and journal may be due to the inactivity, non-existence and poorly publicized activity of DIC and the constraint of subscribing to current and relevant journals (Ariffin and Abubakar, 2013).

The comparison of mean scores of the most frequently used sources of DI based on demographic factors of respondents is revealed in this study. Although it is well known that health professionals use different sources of DI, not so much is known whether source preference have any significant relationship to other characteristics of medical practice (Lawrence et al, 1972). Doctors and Nurses between age 20-29 and those of age 50 and above depend more on Pharmacists and textbooks for DI whereas EMDEX is more frequently used by those within the age bracket 30-39.

The male folks appear to use more of internet and EMDEX while their female counterparts rely more on Pharmacists. It is also observed that Doctors consult EMDEX more. This finding is at variance with that of a study which shows that physicians rely more on information provided by pharmaceutical companies (Gaither et al, 1994). Nurses have a higher preference for Pharmacists and drug package/labels. This shows that Nurses hold Pharmacist with a higher esteem when in need of DI than do Doctors (Gettig et al, 2009). This may not be unconnected to the age-long professional rivalry (quest for supremacy) and pride among Doctors and Pharmacists in the hospital setting in Nigeria.

## **CONCLUSION**

Drug indication and safety of medicines constitute the most required drug information needs of Doctors

and Nurses in this study. The commonly used sources of drug information are drug package/labels, internet, textbooks and professional colleagues. Doctors significantly use EMDEX while Nurses use Pharmacists more than Doctors as a source of drug information. Much older and younger practitioners significantly obtain their drug information from pharmacists and textbooks compared to those aged 30-49 years.

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