
Patterns of drug storage in some Nigerian Health Institutions: A case study of Delta State

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The pattern of drug storage in some Nigerian health institutions was studied using Delta State as a case study. Sixteen hospitals, nineteen pharmacies and fifty-four patent medicine stores located in Asaba, Agbor, Warri and Umunede, all in Delta State were used for the study. The questionnaire was employed as well as oral interview. Indices evaluated included qualification/scope of knowledge of staff in charge of drugs, availability of electricity, nature of storage room/chamber, intensity of light in the storage room/chamber and availability of storage facilities.

Results obtained indicate that the qualifications of the officers in charge of drugs and drug storage in the hospitals and patent medicine stores were low and as such inadequate. Majority of them were First School Leaving Certificate and School Certificate holders. Seventy percent (70 %) of the hospitals, 85 % of the pharmacies and 61 % of the patent medicine stores have refrigerators for the purpose of drug storage. The respective percentages of the institutions equipped with air-conditioners for proper drug storage were 65.0 % (hospitals), 90 % (pharmacies) and 22 % (patent medicine stores). Ninety-three percent of the hospitals, 75 % of the pharmacies and 70 % of the patent medicine stores have access to electricity supply. Eighty-three (83) percent of the hospital staff in charge of drugs are knowledgeable about proper drug storage conditions. The corresponding percentages for pharmacies and patent medicine stores were 90 and 39 respectively. Overall, the storage conditions in the pharmacies and hospitals were found to be adequate but inadequate in the patent medicine stores.

Keywords: Drug storage pattern, hospitals, pharmacies, patent medicine stores, case study.

INTRODUCTION

The need for proper storage of medicaments in our health institutions cannot be overstressed. Adequate drug storage ensures the stability and efficacy of drugs. Most drugs are thermolabile and as such, are so easily destroyed when the storage temperature is high. Similarly, some drugs such as acetylsalicylic acid and penicillin are highly susceptible to hydrolysis in the presence of moisture (1, 2). Acetylsalicylic acid in this case is hydrolysed to salicylic acid and acetic acid, salicylic acid being harmful to the gastrointestinal tract. Storage of such drugs in conditions where they are exposed to high humidity will therefore lead to their decomposition.

Drug instability has been defined by Newton (3) as

the irreversible degradation of a drug producing therapeutically inactive or otherwise toxic product. Solid dosage forms have been shown to lose their effervescent properties, swell, crack, discolour, adhere and fuse due to excessive moisture. Certain other drugs are easily decomposed by light, hence, excessive light into the storage area will trigger off the deterioration of the drugs.

Drug decomposition can manifest in the form of discoloured product, unattractive physical appearance of drugs, formation of inactive or toxic metabolites, microbial contamination, leading to decreased therapeutic activity, and reduced product palatability and acceptability, resulting to economic loss (4 - 6). These changes may be as a

result of loss of volatile constituents (for parenteral and topical preparations), loss of water, crystal growth or polymorphic changes.

The harsh environmental conditions of the tropics require that the issue of proper drug storage should be taken seriously. Incidentally, majority of handlers of drugs in Nigeria and other developing countries may not be sufficiently knowledgeable about the proper storage conditions of various classes of drugs, thereby heightening the problem of improper drug storage. Some of the health institutions may lack the basic storage facilities necessary for proper drug storage like, refrigerators, air conditioners, fans and the like. This equally affects the stability of drugs stored in these institutions.

Some drug handlers may be in the habit of transferring solid and liquid dosage forms from their original containers to fresh ones, thereby disposing the drugs to possible contamination, transference loss, and deterioration of quality (7).

This present study is aimed at assessing the current drug storage patterns and practices obtainable in health institutions in Nigeria, using Delta, a strategic State in the country as a case study.

METHODOLOGY

Population

This study was carried out in four randomly selected representative zones of Delta State namely, Asaba, Umunede, Agbor and Warri. On the whole, sixteen (16) hospitals, nineteen (19) pharmacies and fifty-four (54) patent medicine stores, who responded to the questionnaires were used for the study.

Sampling technique

Questionnaires were employed to obtain primary data. Sample questions asked included the following:

1. What storage facility (ies) do you have for storing your drugs?
2. Does your shop have access to constant electricity supply? If yes, state the source

(s) of your electricity supply.

3. Do you sometimes transfer some drugs from their original containers to a second container? If yes, why?
4. Rate your knowledge of drug storage conditions (a) Excellent (b) Very good (c) Good (d) Average (e) Poor
5. State your sources of drug storage information.

The questionnaires were distributed to the relevant authorities in the health institutions and collected during a repeat visit. Any aspect of the questionnaire not properly understood by any respondent was thoroughly explained, orally. Textbooks, journals, and some unpublished works were also consulted to obtain some secondary data.

Data analysis

Data analysis was carried out using the simple percentage.

RESULTS AND DISCUSSION

Ninety-six (96) percent of the institutions that were administered the questionnaires responded. Table 1 shows the maximum educational qualification of the staff in charge of drugs in the health institutions. The results show that majority of the custodians of drugs in the pharmacies and hospitals are first-degree holders. This was not the case however, with the patent medicine stores where most of the operators were School Certificate holders. This level of education will undoubtedly affect the level of drug storage consciousness and efficiency in these medicine stores.

One hundred (100) percent of the hospitals have ceilings in their drug storage compartments. The equivalent percentage for the pharmacies and patent medicine stores were 90 and 66 respectively. The presence of ceiling will help in controlling the amount of heat falling on the stored drugs hence retarding the rate of thermal degradation. Degradations in some medicaments through oxidation, photolysis and hydrolysis are usually quickened with increase in temperature (8, 9).

Table 1: Educational qualification of staff in charge of drugs in the health institutions

Institution	% of drug-handling staff with the following educational qualifications					
	First School Leaving Certificate	WASC	NCE/ Diploma	1st Degree	Postgraduate	Total
Hospital	3.7	11.1	3.7	56.0	25.5	100
Pharmacy	-	-	-	85.0	15.0	100
Patent Medicine store	11.4	45.8	38.2	4.6	-	100

Table 2 shows the availability of storage facilities in the various institutions studied. Appreciable number of the hospitals and pharmacies are equipped with refrigerators for the purpose of drug storage. The

corresponding percentage of patent medicine stores with this facility was comparatively lower. A high percentage of pharmacies have air-conditioners.

Table 2: Availability of storage facilities in health institutions in Delta State

Institutions	% of institutions having the following storage facilities		
	Refrigerator	Air conditioner	Dark cupboards
Hospitals	70	65	67
Pharmacies	85	90	75
Patent Medicine stores	61	22	18

The corresponding percentage in hospitals was not as high, while the percentage in patent medicine stores was very low. Some drugs like insulin, vasopressin and nitroglycerin injection require storage at refrigerated temperatures hence cannot be effectively stored in these later institutions especially the patent medicine stores (10).

Regrettably, the institutions store these classes of drugs. The air conditioner helps to keep the storage environment in an overall cool state, thus enhancing the stability of the stored drugs. It is obvious from the result obtained that the drugs stored in the pharmacies are likely to be more stable than those stored in either the hospitals or the patent medicine stores. A higher percentage of the pharmacies and hospitals have dark cupboards than the patent medicine stores, indicating that photo-labile drugs would be more stable in the pharmacies and hospitals than in the patent medicine stores. The poor storage conditions of drugs marketed in patent medicine stores had been decried in earlier studies at other parts of the country (11, 12).

Ninety-three percent of the hospitals, 75 % of the pharmacies and 70 % of the patent medicine stores were found to have access to electricity supply, while 81 % of the hospitals, 60 % of the pharmacies and 59 % of the patent medicine stores have stand-by electric generators. The availability of constant electricity supply is very vital since most of the storage facilities are electrically operated. The institutions can be said to have fairly good supply of electricity, especially the hospitals.

Percentages of the institutions where transfer of drugs from their original containers is practiced are 22 % (hospitals), 10 % (pharmacies) and 75 % (patent medicine stores). This practice is unethical and decreases drug stability either through introduction of microbial contamination, interaction of drug with new container, tablet abrasion or by other forms. For instance, some of the institutions

admitted transferring and storing drugs like Vitamin B complex injections into multi-dose vials containing chloroquine injection, for ease of administration, without due consideration of the possible incompatibilities likely to occur.

When asked of their knowledge of storage conditions for the various drug classes, 83 % of hospital staff handling drugs, 90 % of equivalent pharmacy staff and 39 % of patent medical practitioners claimed adequate knowledge. It is obvious from these responses that a high percentage of the pharmacy staff have good knowledge of proper drug storage conditions for the various drug classes, followed by the hospital staff. A very low percentage of the patent medicine practitioners possessed this knowledge. This can be attributed to the level of training of the staff concerned. Certainly, a good knowledge of the storage requirements of drugs is essential for proper drug storage.

Forty-three percent of drug-handling hospital staff, 69 % of the equivalent pharmacy staff and 0 % of patent medicine staff obtain their drug storage information from official monographs, implying that a large number of pharmacy staff consult official monographs for drug storage information unlike the hospital staff and the patent medicine practitioners. The percentages of the practitioners that obtain such information from health personnels/sales representatives are 51 (hospitals), 63 (pharmacies) and 21 (patent medicine stores). Fifty-one percent of drug-handling hospital staff, 49 % of the equivalent pharmacy staff and 2 % of patent medicine dealers obtain drug storage information from textbooks on health, while 5 % of the drug-handling hospital staff, 5 % of pharmacy staff and 84 % of the patent medicine dealers obtain their information from drug labels. These results show over-dependence of the patent medicine practitioners on drug labels for information on drug storage conditions. Unfortunately, label information are usually sketchy and non-detailed, which may account for the shallow knowledge of these

practitioners in proper drug storage requirements.

CONCLUSION

The results of the study show that none of the health institutions possessed very ideal drug storage conditions. Nevertheless, the pharmacies, followed by the hospitals had fairly acceptable facilities and conditions. The patent medicine stores exhibited very poor drug storage patterns and practices, which may be attributable to the low educational background and level of training of the practitioners.

REFERENCES

1. Levine, B. B. (1964) The preparation of penicilloyl polysomes skin test reagents for the clinical evaluation of penicillin hypersensitivity, *J. Med. Chem.* 7: 675 - 676.
 2. Conors, K. A., Gordon, L. A. and Kenon, L. (1979) Chemical stability of pharmaceuticals, John Wiley and Sons Pub, New York, pp. 129 - 137.
 3. Newton, D. W. (1979) Physico-chemical determinants of incompatibility and instability in injectable drug solutions and admixtures, *Amer. Hosp. Pharm.* 35: 1213 - 1222.
 4. Rawlins, E. A. (1982) Bentley's Textbook of Pharmaceutics, 5th edition, Cassel Ltd, London, p. 132.
 5. Okoye, K. (1991) Socio-economic factors militating against prescription-only medicines in Nigeria, Unpublished B. Pharm Project submitted to the Department of Pharmaceutics, University of Nigeria, Nsukka.
 6. The Pharmaceutical Codex (1979) 11 th edition, The Pharmaceutical Press, London, p. 632.
 7. Martindale: The Extra Pharmacopoeia (1978) 27th edition, The Pharmaceutical Press, London, p. 15.
 8. Pickal, M. J. (1977) Thermal decomposition of amorphous β -lactam antibacterials, *J. Pharm. Sc.* 66: 1321- 1327.
 9. Feimester, A. and Discher, C. A. (1964) Photodegradation of chlorpromazine hydrochloride, *J. Pharm. Sc.*, 53: 756 - 760.
 10. Zbylut, J. T. (1983) Nature of insulin binding to plastic bags, *Am. J. Hosp. Pharm.*, 40: 579 - 585.
 11. Anunandu, L. and Ibezim, E. C. (2004) Drug storage practices in health institutions in Nigeria: A case study of Anambra State, *JOPHAS*, 2 (1): 193 - 197.
 12. Nwafor, S. V. (2004) Drug usage patterns by patent medicine stores in a rural community in Nigeria, *JOPHAS*, 2 (1) 144 - 149.
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