

Impact Assessment Of Unit Dose Dispensing System Among Medical Inpatients Of A Nigerian Federal University Teaching Hospital

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Abstract

Introduction: Unit dose dispensing system (UDDS) is a direct patient care service of dispensing medicines to inpatients for 24 hours. As shown in this study, an appropriate drug dispensing system is vital for preventing, reducing and resolving medication errors by minimising actual or potential drug-related problems of medical inpatients.

Objectives: To compare the benefits of UDDS to the traditional system; to identify drug-related problems; to compare patients' and Nurses' assessments of Pharmacists' Clinical Impacts; to assess for overprescribing and drug allergies; to investigate patients' discharge status and length of hospital stay.

Method: A structured and pre-tested patients' medication profile of the inpatient pharmacy of Federal University Teaching Hospital (formerly FMC), Owerri, and Patients' case files (folders) were used for the study. Inpatient Patient Medication Profile completed data collection that was not exhaustive in patients' folders. The study was a cross-sectional observational and prospective research conducted on 108 patients for four months. Analysis was done using student's t-test, descriptive and Pearson correlation of statistical package for the social sciences version 20.

Results: The folder (supposed traditional drug bill) drug bill of the patients was ₦4,874,025 (75.9%) compared to the UDDS drug bill of ₦1,169,142 (18.2%). The need for additional drugs amongst Drug Related Problems (DRPs) was 52(48.1%), while the dose too low was 2(1.9%). The correlation between pharmacists' impact assessment by patients and pharmacists' impact assessment by Nurses was positively strong ($r = 1; 0.28$) but not statistically significant ($P < 0.188$). The mean drugs per prescription was 6.77 ± 2.6 , while non-known drug allergies (NKDA) were recorded highest. Ciprofloxacin, paracetamol, and quinine had the most minor drug allergies of 1(0.9%), which is not statistically significant ($p < 0.000$). The length of hospital stay was 20.77 ± 2.22 days; a greater number of patients were stable at discharge from the hospital, 55(50.9%), while the referred patients for further care was 31(28.7%) as mean age and mean body mass index of patients were 52.82 ± 1.79 and 25.33 ± 0.42 respectively.

Conclusion: The study exposed the need to implement the Unit Dose Dispensing System in the inpatient services of our healthcare system.

Keywords: Impacts, Medical Inpatient, Unit Dose Dispensing System, Federal University Teaching Hospital, Owerri, Nigeria.

Introduction

Unit dose dispensing system is a clinical pharmacy-organised structure and coordinated direct patient medicines dispensing system for twenty-four hours for elimination or reducing potential and

actual drug therapy problems. It may differ in form, depending on the organisation's specific needs. Mid-20th century studies showed that the traditional drug dispensing systems, on average, resulted in 1(one) wrong delivery for every 6 doses delivered to patients. A further North American study in 1969 comparing the traditional and the unit dose dispensing systems found a 50% reduction in nursing time involved with drug use and control and a drastic reduction in the medication error rate, from 26% to 2%^[1].

The unit dose dispensing system as a revolution activating and expanding the role of pharmacists in the hospital during the distribution system was created and investigated at the University of Arkansas Medical Centre in the 1960s and soon afterwards at the University of Iowa^[2,3,4,5,6,7]. Drug product acquisition, distribution and control of Pharmaceutical services were marginal essentials to hospitals fifty to sixty years ago. Pharmacy was perceived as a complementary service department^[8]. Fewer than half the hospital beds in the nation (47%) in the late 50s were located in facilities with the essential services of a full-time pharmacist^[9]. This performance declined sharply with decreasing hospital size. Today, most hospitals in the United States of America domesticated the services of one or more Pharmacists. The clarion call to professionalism in Hospital Pharmacy in recent times has been the patient safety imperative. The history of the evolution of Pharmacy practice in the USA has influenced today's professionalism and sound practice, leading to the adoption of a new practice model^[10,11]. Stages in the profession's evolution from product to patient orientations were summarily unveiled^[12]. These models are the Apothecary^[12], compounding, and distribution models^[12]. Clinical pharmacy model^[13], pharmaceutical care model^[14,15] and total pharmacy care model^[12,16].

The advantages of UDDS over alternative distribution were cited in USA^[17]: reduction in the incidence of medication errors, decrease in the total cost of medication-related activities, elimination or minimisation of drug credits; more accurate patient billing for drugs; improvement in control and monitoring; improved patient assistance among others. With the demerits of a laborious system, apathy by some pharmacists, need for extra staff, Nurses resistance and Hospital Chief Executive (Physicians) interference and denial. A drug-related problem is an undesirable patient experience involving drug therapy that actually or potentially interferes with a desired patient outcome^[18].

This study aimed to assess the impact of unit dose dispensing system services on inpatients admitted into medical wards of Federal University Teaching Hospital, Owerri, Imo State.

Methods

Study setting

The study was conducted at inpatient medical wards of FUTH Owerri in Owerri metropolis of Imo State. The hospital has 618 beds and is an accredited centre for intern and resident training in medicine and pharmacy. It has 13 wards, 4 operating theatres and a research-based institution. It is located in the South-Eastern Geopolitical zone of Nigerian with an estimated land area of 100 sq./km lying between latitude 5.4682°N and longitude 7.0176°E boarded by Otamiri River to the East and Nworie River to the South with a population of approximately 1,401,873 according to 2016 data^[19].

Study sample

The patient medication profile of the Pharmacy Department of Federal University Teaching Hospital Owerri and the patient case file (folders) of the same tertiary hospital were used as study samples for the research. The remaining information in folders was completed by items on the Patient Medication Profile; therefore, the two tools complemented each other in the study.

Sample size calculation/population

About 108 medical inpatients of both sexes whose consents were sorted and given were recruited for the study. The study recruited an average of 9 patients per week. The sample size calculation was determined as described by Yamane (1967) as:

$$n = N / 1 + N (e)^2$$

$$n = \text{Sample size}$$

$$e = \text{Margin of error (0.05)}$$

$$N = \text{Population size}$$

$N = 108$

$e = 0.05$

$n = 108/1 + 108 (0.05)^2 = 85.04$ this is equal to 85

The size 85 will add up to make 108. Patients' folders were used for data collection, and non-existent ones were completed with PMP. The study was conducted between April and July 2019.

Data collection forms

Folders of patients were used, and pieces of needed information absent in the folders were retrieved from PMP. Participants' consent forms from the hospital were issued, and consent was granted by the patients. Chart and score assessment forms of impact assessment designed in pharmacy were issued to Patients and Nurses for Pharmacist impact scoring. The grading rates from fair to excellent were items in the score assessment sheet.

Inclusion and exclusion criteria

The study included inpatients with medical cases and adults of both sexes and excluded children, pregnant women and surgical patients. The exclusion of the mentioned population was to obviate unforeseen biochemical and physiological changes that might affect the data collection.

Study design and sampling

The study was a cross-sectional observational and prospective research among 108 inpatients admitted to different medical wards of Federal University Teaching Hospital, Owerri.

Data collection procedure

Admitted patients with medical cases were recruited for this study using patients' medication profile of the pharmacy department commonly used in UDDS for Drug Related Problems Identification and resolution with these features: patient ward, bedside, name, date of admission, date of discharge, sex, age, weight, patient's hospital number, chief complaints, diagnosis, name and signature of pharmacist, attending consultant physician, laboratory data, allergies, total medication; medications and its strength and daily administration and others alongside with hospital case files.

Data analysis

The data collected were entered into Microsoft Excel Spread Sheet and double-checked. The Statistical Package for Social Science (SPSS) version 20 was used. Results expressed in tabular formats, percentages, mean and standard error mean, pie chart, using student's t-test, a p-value less than 0.05 was considered statistically significant and Pearson correlation compared.

Ethical approval

Ethical clearance was sought from the Federal University Teaching Hospital Owerri Human Research and Ethics Committee with approval number FMC/OW/ETHICAL/VOL.1/931. An informed consent form was given to the respondents to sign before being enrolled. The consent form explained the purpose of the study, clarifying questions and concerns, and respondents were allowed to decline participation. Retrieved data were entered into a password-protected computer.

Results

One hundred and eight respondents were recruited for this study. More of the respondents were males (59; 54.6%) than females (49; 45.4%), while respondents that were single were (23; 21.3%). The mean age was 52.82 ± 1.79 ; the body mass index was 25.33 ± 0.42 ; and the length of hospital stay was 20.77 ± 2.22 days, as expressed (Table 1).

Table 1: Patient characteristics (n = 108)

Characteristics of Inpatient	N (%)
Gender	
Male	59 (54.6)
Female	49 (45.4)
Marital Status	
Married	85 (78.7)
Single	23 (21.3)
Mean Demographics (Mean \pm SEM)	
Age	52.82 \pm 1.79
Body mass index	25.33 \pm 0.42
Drugs prescription	6.77 \pm 2.60
Length of hospital stay	20.77 \pm 2.22

The identification and resolution of drug-related problems expressed that the need for additional drugs was more (52; 48.1%) than the closest problem (inappropriate adherence) (20; 18.5%), while dosage too low was identified as the lowest DRP (2; 1.9%) (Table 2).

Table 2: List of Drug-related problems witnessed by the inpatients.

N = 108; Drug Related Problems		
DRPs	Frequencies	Percentage (%)
Adverse Drug Reaction	12	11.1
Dose too high	5	4.6
Dose too low	2	1.9
Inappropriate Adherence	20	18.5
Need additional Drug	52	48.1
Wrong drug	3	2.8
Unnecessary drug therapy	8	7.4
None	6	5.6

DRPs = drug-related problems; ADR = Adverse drug reactions

Impact assessment of the Pharmacists by the patients in this study in the wards displayed excellent scores (50; 46.3%), very good scores (24; 22.2%) and fair scores (3; 2.8%) (Table 3).

Table 3: Pharmacists impact assessment by the patients

N = 108; Pharmacists impact assessment by the patients		
PIAPs	Frequency	Percentage (%)
Excellent	50	46.3
Very Good	24	22.2
Good	31	28.7
Fair	3	2.8

PIAPs = Pharmacists impact assessment by the patients

The Nurses' assessment of Pharmacists' impact on inpatients expressed an excellent score of (49; 45.4%) while the fair rating score was (0; 0%)

Table 4: Pharmacist Impact Assessment by the Nurses

N = 108; Pharmacist impact assessment by the Nurse		
PIAN	Frequency	Percentage (%)
Excellent	49	45.4
Very Good	39	36.1

Good	20	18.5
Fair	0	0

PIAN = Pharmacists impact assessment by the Nurses

The study equally observed drug allergies experienced by the patients while on their medication. The majority of the patients (73; 67.60%) had no known drug allergy; few participants expressed reactions (Weakness of joint, itches, and little blisters) while on Ciprofloxacin (1; 0.9%), Paracetamol (1; 0.9%) and Quinine (1; 0.9%). The remaining allergies are tabulated below (Table 5)

Table 5: Drug allergies

N = 108; Drug allergies			
Types	Frequency	Percentage	P = Value
Ciprofloxacin	1	0.9	P – Value
Chloroquine	10	9.3	0.000
NKDA	73	67.6	df = 107
NSAIDs	15	13.9	95% Confidence
Paracetamol	1	0.9	Interval of the
Quinine	1	0.9	Difference at
Sulpha	7	6.5	Student t-test

P-Value not significant at 0.000; NKDA = No Know drug allergy; NSAIDs = Non-Steroidal Anti-inflammatory drugs. The P-value of all the drug allergies was not statistically significant at 0.000

Table 6: Drug Billings

N = 108; Drug Billings		
Billing type	Amount(₦)	Percentage (%)
Emergency	377,951	5.9
UDDS Bill	1169142	18.2
Folder drug Bill	4874025	75.9
Total	6,421,118	-

UDDS = Unit dose dispensing system

The correlation between PIAP and PIAN ($r = 1; 0.128$) while the p-value was not statistically significant ($P < 0.188$).

Table 7: Correction of PIAP and PIAN

Correlations of PIAP and PIAN		
PIAP	Pearson Correlation	P. Value
PIAP	1	0.188
PIAN	0.28	0.188

The relationship between the two assessors (PIAN and PIAP) was positively strong and relatively close.

The diagnosis of the inpatients was investigated, and it found that more of the patients had fewer co-morbidities (25; 23.1%) than non-co-morbid conditions (83; 76.9%) (Figure 1).

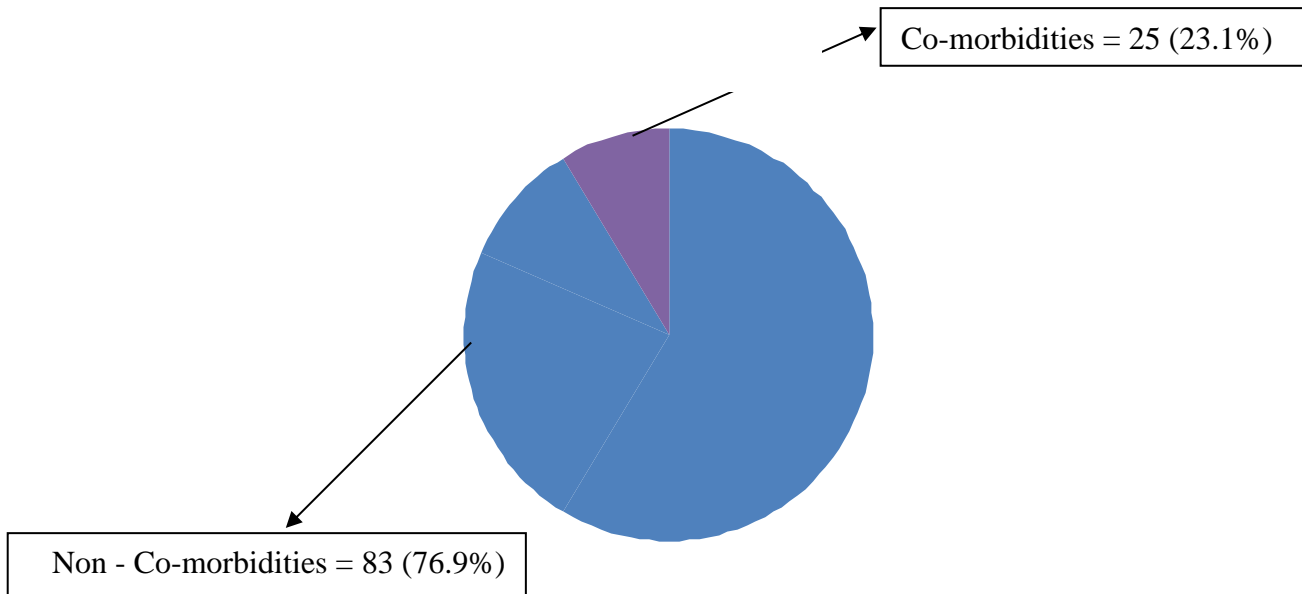


Figure 1: the pie chart shown above demonstrates disease morbidities.

Discussion

The impact assessment study exposed many interesting issues. The mean body mass index of the inpatients was 25.33 ± 0.42 , which is beyond the ideal body mass index of $18.9 - 24.9 \text{ kg/m}^2$. This established that most respondents were either overweight or obese, partly traced to their cardiovascular, endocrine, and renal diseases, to mention a few [20,21]. The mean age of the patients was 52.82 ± 1.79 , indicating the admission of more elderly patients who are mainly prone to diseases or disorders in different global studies [22,23]. More respondents were married (85; 78.7%), while few were single (23; 21.3%). The length of hospital study of the inpatients was 20.77 ± 2.22 days, which corroborated with morbidities of the patients as malignant hypertension, degenerative joint disease, chronic diabetes, Parkinson's disease and others [22,23]. The number of drugs per prescription was 6.77 ± 2.6 , which increased the chances of resolving drug-related problems and adverse drug events as the number agreed with poly prescribing [24,25,26,27,28].

A drug-related problem, defined as a drug therapy problem, is any undesirable event experienced by a patient that involves or is suspected to involve drug therapy and interferes with achieving the desired goals of therapy [18]. The highest incidence of drug-related problems was the need for additional drugs (52; 48.1%), which indicated that some untreated indications worsening the cases of the patients were not considered for treatment [29]. The other drug-related problems recorded and resolved were adverse drug reaction (12; 11.1%), dose too high (5; 4.6%), dose too low (2; 1.9%), inappropriate adherence (20; 18.5%), wrong drug (3; 2.8%), unnecessary drug-related problems identified resolved and documented agreed with similar studies done on patients' quality of life, length of hospital stay and clinical outcomes [14,30,31,32]. Assessment of the impacts of the pharmacist by the patients displayed the highest score (50; 46.3%) and fair as (3; 2.8%), while that of Nurses' assessment almost corroborated that of the patients' assessment score (49; 45.4%). This assessment exposed the relevance of the Pharmacists' services in offering unit dose dispensing systems to the inpatients as drug-related problems were identified, resolved and documented [29].

In Pharmacotherapy, different noxious effects of medicines are always experienced by patients. These effects often lead to disorders and are now the third leading cause of death [33]. The majority of the population experienced no known drug allergy (73; 67.6%), non-steroidal anti-inflammatory drugs effects as stomach irritation, gastritis and peptic ulcer disease (15; 13.9%), chloroquine (10; 9.3%), sulpha drugs (Nitrofurantoin, sulphadoxine, pyrimethamine with effects of singultus, swollen & lips) (7; 6.5%) and Ciprofloxacin (1; 0.9%) which manifested joint weakness and paracetamol (1; 0.9%) with swollen lips. Pieces of advice on these effects to the physicians improved the patient's quality of life [34,35]. The drug billings of patients showed that with UDDS, the patients paid less compared to

traditional practice. The patients' bill would have been above N4 million naira as less than N1.5m naira was paid after UDSS services. This established the benefits of pharmaceutical care, which improved the quality of lives of the patients^[36]. The UDSS practice, even though laborious, is a more potent tool for direct patient service and guidelines for DRP resolution^[31,37]. This was deepened in a correlation of inpatient Pharmacists' assessment by patients and Nurses ($r = 1$, $r = 0.128$, $P = 0.188$) as not statistically significant, but the correlation was strong. UDSS reduced the chances of co-morbidities (25; 23.10%) in patients without co-morbid conditions (83; 76.9%).

The scheme has proven beneficial to the patient's quality of life and assured activities of daily living.

Conclusion

The study concluded that UDSS is much better than a more expensive and error-prone traditional system that worsens the quality of life and activities of daily living of patients, and this exposed that the most occurring drug-related problem was the need for additional drugs. It was equally seen that most diseases were non-co-morbid ones. More of the patients witness no known drug allergies. The assessment of the impact of the Pharmacists by the Patients and Nurses was encouraging. The objective of this research was justified as over ₦2.5 million was saved for the patient.

Recommendation

There is a need to officially domesticate the practice and services of unit dose dispensing services in our public, private and non-governmental hospitals to help reduce actual and potential drug-related problems.

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Conflict of Interest

The authors hereby declare that there is no conflict of interest in this study.

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