

Assessment of Drug-Related Problems and Health-Related Quality of Life in Medication Management of Hypertensive and Diabetic Patients at Two Referral Health Facilities: A Prospective Study

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ABSTRACT

Evaluation of drug-related problems (DRPs) and patients' health-related quality of life (HRQoL) are important in determining outcomes of medication management of hypertension and/or diabetes mellitus (DM). The study assessed the impact of pharmacist-led health educational intervention in reducing incidence of DRPs and improvement of HRQoL in the management of hypertensive and/or diabetic patients attending clinics at the two main tertiary health facilities in Bayelsa State, Nigeria. In a prospective study, 430 hypertensive and/or diabetic patients who attended clinics in 2011 – 2015 at the study centers were purposively recruited, and their medication use and HRQoL data gathered using pretested data collection form and Short form-12v2™ Health Survey questionnaire, respectively. Prescribed medications and patients' HRQoL were assessed for DRPs and physical/mental health status, accordingly. Patient- and healthcare professional- (comprising physicians, pharmacists, and nurses) focused health-educational intervention was conducted and followed up for a 10-month period. The 307 patients not lost to follow-up were re-evaluated for DRPs and HRQoL and compared with their pre-intervention data. P-value < 0.05 at 2-tail was considered significant. General population norm (mid-point score) of 50 ± 10 and minimal important difference (MID) of 3.0 units were adopted for the determination of HRQoL status and improvement, respectively. Average DRP number per encounter decreased from 1.24 ± 1.02 to 0.48 ± 0.67 ($p < 0.0001$) following intervention, with percentage DRP decrease of 60.0%. Virtually all MID for all subscales of physical/mental health summary scores indicated no improvement in the patients' HRQoL. Twenty one and 36.0% of the report sample were at risk of screening positive for depression before and after intervention, respectively. The intervention produced substantial decrease in the DRPs observed in the patients' medication therapy, though, there was no improvement in their HRQoL.

Keywords: Diabetes, drug therapy problem, health-educational intervention, hypertension, Niger Delta

INTRODUCTION

Prevalence of hypertension and diabetes mellitus (DM) in Nigeria is currently estimated to be 28.9 and 4.3%, respectively (Adeloye *et al.*, 2015; World Health Organization, 2016) and has been projected to increase further with time. Regrettably, there are no working measures to reverse this trend presently, given that the country's public health response to these diseases is poor (World Health Organization, 2017). Thus, outcomes of medication management of hypertension and/or DM have ever remained largely suboptimal in Nigeria as reported in several quarters (Fasanmade and Dagogo-Jack, 2015; Ogaji *et al.*, 2016). In addition, prescribers often face challenges in making appropriately informed drug therapy decisions due to the complex natures of these disease conditions, especially in the presence of co-morbidity. Consequently, prescribing practices in the

management of hypertension and/or DM are often fraught with avoidable drug-related problems (DRPs), (Cipolle *et al.*, 2007; Huri and Wee, 2013; James *et al.*, 2014). Negative impacts posed by poorly controlled elevated blood pressure and/or diabetic cases on patients' health-related quality of life (HRQoL) have also been noted (Poljicanin *et al.*, 2010).

Available guidelines for the management of hypertension and DM favour combination of requisite medications for the purpose of achieving optimal outcomes of therapy (James *et al.*, 2014; American Diabetes Association, 2015). However, incidence of DRPs which is inevitable in conditions requiring multi-drug therapy is often an issue to contend with in medication management of hypertension and/or DM (Huri and Wee, 2013).

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A DRP is said to exist “when a patient experiences or is likely to experience either a disease or symptom having an actual or suspected relationship with drug therapy” (Strand *et al.*, 1990). Drug related problems prevent or delay patient recovery from disease condition(s), (Alves *et al.*, 2014). Nevertheless, certain measures have been suggested to prevent or resolve problems that may arise from drug therapies. They include drug therapy monitoring (Alves *et al.*, 2014), careful medication review (usually by the pharmacist), appropriate education for patients and their caregivers (including their nurses), as well as structured health education for prescribers to improve their prescribing practices. Importantly, there is a need for healthy collaboration among patients, their prescribers, pharmacists, nurses and other caregivers to address issues relating to DRPs (Hepler and Strand, 1990; Reddenna and Nagavalli, 2014).

Health-related quality of life has been identified as an important health determinant in a given individual or group of individuals (Bhandari, 2012). It is defined as “an individual’s or a group’s perceived physical and mental health over time” (Centers for Disease Control and Prevention, 2016). In essence, an individual with ideal HRQoL indices is said to exhibit optimal health status, both physically and mentally. On the other hand, less than ideal indices indicate impaired health status (Ware *et al.* 2009). Meanwhile, evidences exist which proclaim that hypertension and DM comparably depress the HRQoL of affected patients (Poljicanin *et al.*, 2010). Of particular importance is the established link between hypertension and/or DM and the depression which may result from poor HRQoL in a given patient (Goldney *et al.*, 2004; Studer and Migliore, 2012). Given that hypertension and DM require life-long management, regular monitoring of HRQoL of the concerned patients is necessary in order to achieve improved outcomes of therapy (Dahlof, 1991; Borrott and Bush, 2008).

Interestingly, no study has ever been conducted in Bayelsa State, South-South Nigeria to assess the impact of pharmacist-led health educational intervention in reducing incidence of DRPs and improvement of patients’ HRQoL in the medication management of hypertension and/or DM. Hence, the need for the present study among hypertensive and/or diabetic patients attending Cardiology and Endocrinology clinics at the two main tertiary health facilities in Bayelsa State, which is located in the Niger Delta Area of Nigeria.

MATERIALS AND METHODS

Setting

This study involved evaluation of DRPs and HRQoL in medication management of hypertension and diabetes mellitus among patients attending outpatient cardiology and endocrinology clinics at Federal Medical Centre (Yenagoa) and Niger Delta University Teaching Hospital (Okolobiri) both of which are currently equipped with 334 and 146 functional bed spaces, respectively. The two hospitals are located in Yenagoa Local Government Area, the capital of Bayelsa State, in the Niger Delta Area, South-South Nigeria.

Design

The study was a prospective evaluation of 430 purposively selected hypertensive and/or diabetic patients of ≥ 25 years old who attended scheduled clinics at the study centers, and on prescribed medications for ≥ 4 months in the years 2011 – 2015. Following ethical approval, the patients were administered Short Form-12 Version 2TM (SF-12v2TM) questionnaire and their case notes subsequently assessed for requisite baseline data. Information gathered included patients’ demographics, diagnoses, drug prescribing and inherent DRPs as well as data on physical and mental components of their HRQoL. The patients and their healthcare professionals (physicians, pharmacists, and nurses) were then provided with structured health educational intervention and followed-up for a period of 10 months after which the DRPs and the HRQoL data belonging to the 307 patients not lost to follow-up were reevaluated and compared with the pre-intervention data. Those patients who failed to attend scheduled clinics more than once consecutively and females who became pregnant in the course of the study were considered to have been lost to follow-up. Details of the intervention have been presented elsewhere (Ganiyu and Erah, 2017) and they included patients counseling on medication use (including medication review), and health education backed with provision of educational materials while targeting patient contact at each clinic attendance. Also, group seminar was presented to the healthcare providers followed by monthly academic detailing while the intervention lasted. They were also provided with extract from requisite treatment guidelines and DRPs assessment tools – Beers criteria (American Geriatrics Society, 2012) and Screening Tool of Older Persons’ Prescriptions/Screening Tool to Alert to Right Treatment (STOPP/START) criteria version 1 (Gallagher *et al.*, 2008; Gail, 2011).

Patients’ pertinent data including medication prescribed were collected using pretested data

collection form. The DRPs inherent in drug prescribing were determined by means of clinical judgments and some selected hypertension and diabetes treatment guidelines. Beer's and STOPP/START criteria were employed for DRPs assessment in the elderly population. For this study, patients aged, ≥ 50 years old were categorized as elderly. This is in line with the World Health Organization's minimum data set (MDS) on ageing and older persons in sub-Saharan Africa given their particular health-related vulnerabilities (Ferreira and Kowal, 2006). The DRPs were classified as earlier reported by Strand *et al.* (1990) to include unnecessary drug therapy, wrong drug, dosage too low, dosage too high, adverse drug reaction, drug interaction, non-adherence to therapy, and additional drug therapy needed.

The SF-12v2™ questionnaire which was employed for generation of patients' HRQoL data contains 12 questions in 8 Health Domains i.e. sub-scales - Physical Functioning, Role-Physical, Bodily Pain, and General Health which collectively measure a patient's physical health component, including Vitality, Social Functioning, Role-Emotional, and Mental Health which measure the patient's mental health status. The population norm was based on the mid-point, 50 ± 10 (Mean \pm Standard Deviation) norm based score on a scale of 0 – 100 in relation to scores obtained for the subscales and the overall HRQoL data. Healthy observations were considered $>$ norm while unhealthy observations were deemed $<$ norm (Ware *et al.* 2009).

Data Analyses

Patients' medication and HRQoL data were analyzed with the aid of Statistical Package for Social Sciences (SPSS) version 20.0 and QualityMetric Health Outcomes™ Scoring Software 4.5 (QualityMetric Incorporated, Lincoln, RI, USA), respectively and presented using descriptive statistics. GraphPad InStat version 3.10 for windows (GraphPad Software, San Diego California USA) was employed for the generation of mean values of data and compared using student t-test. Categorical variables were compared by means of Chi-squared test as appropriate. A p-value < 0.05 at 2-tail was considered significant.

The HRQoL data generated were estimated from the subscales of the physical component summary (PCS) and mental component summary (MCS) scores, and their average values compared with the general population norm based score (NBS) of 50 ± 10 . Observations < 50 indicate worse health, while

observations > 50 indicate better health. Also, proportion (%) of the report sample at risk of First Stage Positive Depression Screening (i.e. respondents whose reported MCS scores are "at" or "below" 42 in the sample studied) was estimated (Ware *et al.*, 2009). The mean difference between the respondents' HRQoL before and after intervention was calculated to determine whether there was an improvement based on the Minimal Important Difference (MID).

Minimal Important Difference (MID) was set at 3.0 (Mean difference [i.e. Mean value after intervention – Mean value before intervention], Observations > 3.0 points (above initial value) indicate improved HRQoL, while Observations < 3.0 points (below initial value) indicate deteriorating HRQoL, and Observations ± 3.0 points (within 0 - 3 points above or below initial value) indicate no change in HRQoL), (Yarlas *et al.*, 2011).

RESULTS

Out of the 307 patients who were not lost to follow-up, 159 (51.8%) were females and majority (77.5%) were the elderly persons aged, ≥ 50 years. Average patients' age was 58.49 ± 12.56 years. Most of the patients presented with hypertension alone (66.1%). Those who presented with concurrent hypertension/diabetes and DM alone were 26.1 and 7.8%, respectively (Table 1).

In all of the case notes vetted, a total of 378 DRPs detected before intervention were significantly reduced to 152 after intervention ($\chi^2 = 11.862$, $df = 3$, $p = 0.0079$) with corresponding decrease in average DRP number per encounter from 1.24 ± 1.02 to 0.48 ± 0.67 ($p < 0.0001$), respectively. Percentage DRP decrease ($378 - 152$) was 60.0%. The application of Beer's and STOPP/START criteria reduced the DRPs in the elderly and very old patients from 78 DRPs prior to intervention to 53 DRPs post-intervention. The respective 155 and 64 DRPs identified with the aid of hypertension and DM treatment guidelines before intervention reduced to 50 and 21 DRPs following intervention. DRP reduction using other guidelines was from 81 to 28. Of all classes of DRPs detected before the intervention, unnecessary drug therapy (40.0%) and need for additional drug therapy (26.2) were more outstanding in the study (Table 2).

Comparison of the average HRQoL data generated for the patients before and after intervention are provided in Table 5 and it revealed the following: All 8-Health Domain scales obtained in the post-intervention survey (i.e. Physical Functioning (PF, 41.06 ± 11.75), Role-Physical (RP, 41.50 ± 7.40), Bodily Pain (BP, 42.22 ± 9.05), and General Health

(GH, 39.96 ± 9.14) which constitute the respondents' physical health status as measured by the PCS (41.30 ± 8.01) as well as the patients' Vitality (VT, 49.36 ± 8.39), Social Functioning (SF, 40.39 ± 8.83), Role-Emotional (RE, 39.69 ± 10.16), and Mental Health (MH, 45.37 ± 8.17) which collectively measure the patients' mental health status, MCS (44.56 ± 7.29) were all lower than corresponding values previously recorded for the patients before the intervention (i.e. PF (46.32 ± 10.13), RP (43.00 ± 7.88), BP (47.36 ± 9.79), and GH (43.59 ± 10.21) which jointly compute the subjects' PCS (44.59 ± 7.72), as well as the VT (56.02 ± 9.34), SF (46.70 ± 9.68), RE (42.65 ± 9.41), and MH (52.55 ± 9.00) which constitute the patients' MCS (50.65 ± 9.02)), respectively. In the same vein, there was no improvement in the overall average HRQoL score for the patients' after intervention (42.44 ± 9.69) when compared with that before intervention (47.62 ± 8.91), (p < 0.0001). The above cited observations were corroborated by Minimal Important Differences (MIDs) for HRQoL summary scores and all domains reported which were all in excess of 3.0 points below respective initial values obtained for sample studied though, with exception of Role-physical (RP) of PCS and Role-emotional (RE) of MCS which were estimated to have 1.5 and 2.96 points (i.e. 0 - 3 points), respectively below their respective pre-intervention values (Table 3). Twenty one percent and 36.0% of the report sample were observed to be at risk of screening positive for depression (i.e. proportion of respondents with reported MCS scores "at" or "below" 42) before and after intervention, respectively.

Following the intervention, average PCS and MCS scores for patients who presented mainly with hypertension (42.69 ± 8.20 vs 45.47 ± 7.18), diabetes (41.56 ± 6.94 vs 45.01 ± 7.68) and concurrent hypertension/diabetes (37.83 ± 6.83 vs 42.19 ± 6.98) were all below the midpoint norm. Hypertension alone and co-morbid hypertension/diabetes impact more on respective patients' PCS scores compared to their MCS scores (p < 0.05). On the other hand, there was no difference in the PCS and MCS scores (p > 0.05) reported for patients with diabetes alone. With the exception of vitality (VT [50.06 ± 8.41]) reported for hypertension alone, all other specific 8 health domain scales for the disease conditions studied were all less than the norm. In all, there was no statistical difference in average overall HRQoL scores estimated for patients with mainly hypertension (43.68 ± 9.60) or diabetes (42.81 ± 9.31), (p > 0.05). However, concomitant hypertension/diabetes produced further suppression of HRQoL scores (39.29 ± 9.36) reported for the patients (Table 4).

Table 1: Patients' demographics and diagnoses

Patients' characteristics (n = 307)	N (%)
<i>Gender</i>	
Male	148 (48.2)
Female	159 (51.8)
<i>Age</i>	
25 - 49	69 (22.5)
≥ 50	238 (77.5)
<i>Primary diagnoses</i>	
Hypertension alone	203 (66.1)
Diabetes alone	24 (7.8)
Comorbid hypertension/diabetes	80 (26.1)

n, total number of subjects in the population studied; N, number of observations; Mean ± SD; SD, standard deviation

Table 2: Drug-related problems (DRPs) identified in the study

	Pre-intervention Number of DRPs, N (%)	Post-intervention Number of DRPs, N (%)
<i>DRPs identifying tools</i>	<i>n = 378, N (%)</i>	<i>n = 152, N (%)</i>
Hypertension management guidelines	155 (41.0)	50 (32.9)
Beer's, STOPP/START criteria	78 (20.6)	53 (34.9)
Diabetes management guidelines	64 (16.9)	21 (13.8)
Others	81 (21.4)	28 (18.4)
Chi-square test for DRPs tools	$\chi^2 = 11.862, df = 3, p = 0.0079$	
<i>Categories of DRPs</i>	<i>n = 378, N (%)</i>	<i>n = 152, N (%)</i>
Unnecessary drug therapy	151 (40.0)	58 (38.2)
Additional drug therapy needed	99 (26.2)	23 (15.1)
Wrong drug therapy	84 (22.2)	55 (36.2)
Drug interaction	22 (5.8)	11 (7.2)
Dosage too low	14 (3.7)	1 (0.7)
Adverse drug reaction	5 (1.3)	4 (2.6)
Dosage too high	3 (0.8)	0 (0.0)
<i>Average number of DRPs per encounter, (mean ± SD)</i>	1.24 ± 1.02 ^a	0.48 ± 0.67 ^b

^{a, b} p < 0.0001 (Student-t test); %DRP reduction, 60%

Table 3: Comparison of norm based scores (NBS) of physical and mental component summaries for patients before and following intervention

Domains	HRQoL Scores before and after intervention		Student t-test (p-value)	Mean Difference†
	Before, n = 307, (Mean ± SD)	After, n = 307, (Mean ± SD)		
Physical/Mental Component Summaries				-3.29
PCS	44.59 ± 7.72	41.30 ± 8.01	< 0.0001	
MCS	50.65 ± 9.02	44.56 ± 7.29	< 0.0001	-6.09
<i>Student t-test</i>	p < 0.0001	p < 0.0001		
Physical Health Domain Scales				
PF	46.32 ± 10.13	41.06 ± 11.75	< 0.0001	-5.26
RP	43.00 ± 7.88	41.50 ± 7.40	0.0153	-1.5
BP	47.36 ± 9.79	42.22 ± 9.05	< 0.0001	-5.14
GH	43.59 ± 10.21	39.96 ± 9.14	< 0.0001	-3.63
Mental Health Domain Scales				-6.66
VT	56.02 ± 9.34	49.36 ± 8.39	< 0.0001	
SF	46.70 ± 9.68	40.39 ± 8.83	< 0.0001	-6.31
RE	42.65 ± 9.41	39.69 ± 10.16	< 0.0002	-2.96
MH	52.55 ± 9.00	45.37 ± 8.17	< 0.0001	-7.18
Average HRQoL	47.62 ± 8.91	42.44 ± 9.69	< 0.0001	-5.180

HRQoL (Health Related Quality of Life), PF (Physical Functioning), RP (Role-Physical), BP (Bodily Pain), GH (General Health), VT (Vitality), SF (Social Functioning), RE (Role-Emotional), and MH (Mental Health). Each scale and summary measure is scored to have a mean (i.e. Norm) of 50 and a standard deviation of 10 (observations < 50 indicate worse health, while observations > 50 indicate better health)

†Minimal Important Difference (MID) is set at 3.0 (Mean difference [i.e. Mean value after intervention – Mean value before intervention], Observations > 3.0 points (above initial value) indicate improved HRQoL, while Observations < 3.0 points (below initial value) indicate deteriorating HRQoL, and Observations ± 3.0 points (within 0 - 3 points above or below initial value) indicate no change in HRQoL)

Table 4: Presentation of norm based scores (NBS) of physical and mental component summaries including the 8-health domain scales generated for respondents with different disease conditions

Domains	HRQoL Scores, (Mean ± SD)			One-Way ANOVA, p-value
	Hypertension alone	Diabetes alone	Hypertension/diabetes	
Physical/Mental Component Summaries Scores				
PCS	*42.69 ± 8.20	**41.56 ± 6.94	***37.83 ± 6.83	< 0.0001
MCS	*45.47 ± 7.18	**45.01 ± 7.68	***42.19 ± 6.98	0.0026
<i>Student t-test</i>	*p = 0.0003	**p = 0.1093	***p < 0.0001	
Physical Health Domain Scales				
PF	43.75 ± 11.41	39.92 ± 11.94	34.91 ± 10.12	< 0.0001
RP	42.48 ± 7.62	41.45 ± 6.55	39.13 ± 6.63	0.0027
BP	42.83 ± 9.24	44.52 ± 7.56	39.91 ± 8.67	0.0212
GH	41.09 ± 9.52	41.01 ± 8.23	36.83 ± 7.73	0.0015
Mental Health Domain Scales				
VT	50.06 ± 8.41	49.07 ± 8.47	47.73 ± 8.19	0.1074
SF	41.27 ± 8.56	40.38 ± 7.92	38.23 ± 9.50	0.0330
RE	41.56 ± 10.04	40.13 ± 10.43	34.98 ± 8.88	< 0.0001
MH	46.42 ± 7.95	45.98 ± 8.98	42.61 ± 7.87	0.0016
Average HRQoL	43.68 ± 9.60 ^a	42.81 ± 9.31 ^b	39.29 ± 9.36 ^c	0.0025

^{a,b} p > 0.05; ^{a,c} p < 0.05; ^{b,c} p > 0.05

DISCUSSION

The DRPs observed in the medication therapies for the hypertensive and diabetic patients studied decreased substantially following intervention with percentage DRP decrease of 60.0%. The patients generally exhibited low HRQoL, and there was no improvement in both physical and mental aspects of HRQoL domains reported. Also, appreciable proportions of the report sample were at the risk of screening positive for depression both before and after intervention. Meanwhile, hypertension and diabetes impaired respective patients' HRQoL similarly while individuals with concomitant hypertension/diabetes reported further suppression in their overall HRQoL.

The decline in numbers of DRPs in the patients studied after the intervention corroborates the points raised by Kamarudin and colleagues (2013) as to the importance of structured health educational interventions in mitigating drug related problems which are often of major concerns in medication management of diseases. Overall, % DRP reduction of 60.0% out of the total DRPs observed at baseline survey is comparable to that related by de Lyra *et al.* (2007) in a group of patients with chronic disease conditions. Of all categories of DRPs reported in this study, unnecessary drug therapy featured prominently both before and after interventions.

Reminiscent of a report by Huri and Wee (2013), high rate of occurrence of DRPs was observed in the

elderly hypertensive and/or diabetic patients second to those specific to the general hypertensive population studied prior to the intervention. Expectedly, the least number of DRPs was seen in therapy for diabetics relative to other conditions similar to the finding by Cipolle *et al.* (2007). Percentages of DRPs observed in the foregoing were remarkably reduced following the instituted intervention with judicious use of the selected criteria and treatment guidelines. This supports the rationality for healthcare professionals to comply with the principles contained in such guides for the purpose of optimizing therapy in their patients as pointed out by Seedat and Rayner (2012). Of particular importance were drug related issues in the elderly patients which were higher in relation to those in general hypertensive or diabetic patients subsequent to the intervention. This was in spite of the application of the Beer's/STOPP/START criteria provided to guide therapy in older patients. This observation points to the fact that therapies in old patients require utmost attention which is in agreement with the position of Ruths and her colleagues (2003) who reported very high rate of presentation of DRPs in the use of medications by similar group of subjects in selected centers in Norway.

Before the intervention, the average HRQoL for the patients studied was low compared to the standard NBS (of 50 ± 10) which indicated that their physical and mental health status have been depressed by the disease conditions. The lower scores recorded for the components of the specific 8-health domains subscales further corroborated the finding above. In addition, the average MCS score estimated for the patients was higher compared to the PCS score. This suggests that hypertension and/or DM impact more on the patients' physical health status than their mental health status which is in consonance with a finding among a related sample of subjects elsewhere (Poljicanin *et al.*, 2010). Other researchers have also reported similar findings which further expounded the pronounced suppression of patients' physical health component relative to their mental health status by hypertension and/or DM (Soni *et al.*, 2010; Ucan and Ovayolu, 2010).

Findings following the intervention revealed generally low average HRQoL relative to the midpoint norm among the hypertensive and diabetic subjects studied which is comparable to findings obtained earlier in the pre-intervention study. This showed that structured health educational intervention as adopted in this study may not be that effective in improving respective patients' HRQoL as

already noted by Gallefoss *et al.* (1999) and Wong *et al.* (2015).

It was noted that hypertension and diabetes separately impaired overall HRQoL of corresponding patients similarly. Furthermore, those with coexisting hypertension and diabetes reported further limitation in their generally perceived wellbeing. These findings are in line with the findings by Poljicanin *et al.* (2010) among similar subjects in a study conducted in Croatia. Overall, burden of the diseases on all patients surveyed was more on their physical health status compared to their mental health component. Unfortunately, reports comparing effect of hypertension and/or diabetes specifically on respective patients' physical and mental health often contradict one another as pointed out by Soni *et al.* (2010). Meanwhile, most of the afore-cited studies have been noted to relate cases in which hypertension and/or diabetes impact negatively more on the concerned patients' physical health status (Soni *et al.*, 2010).

The non-improvement in the patients' HRQoL is reflected in the minimum important differences (MIDs) derived from the comparisons of the data before and after the intervention which were generally below the 3-point standard. This finding is similar to reports elsewhere (Gallefoss *et al.*, 1999; Wong *et al.*, 2015). Furthermore, hypertension and diabetes have been noted to be associated with depression (Goldney *et al.*, 2004; Studer and Migliore, 2012). Thus, 21.0 and 36.0% of the total sample report with the tendency to screening positive for depression as observed before and following intervention are high and require utmost attention.

From the findings above, it is important that hypertensive and/or diabetic patients are treated holistically to foster optimal therapeutic outcomes. In this vein, several measures have been proposed for the purpose of optimizing patients HRQoL among which include: appropriate health education for patients, their healthcare providers and caregivers, coupled with prevention of possible development of complications in the patients (Soni *et al.*, 2010). Patients are also to be advised to exercise regularly (Ucan and Ovayolu, 2010). Given the possibility of impairment of patients' HRQoL by unwanted side effects which may result from medication use, Olsson *et al.* (2011) have advised that rational prescribing be enforced among prescribers. This is in addition to instituting appropriate medication management of diseases and auditing by suitably skilled health professionals owing to the reported adverse effects of

medications on patients' HRQoL (Hepler and Strand, 1990).

An important limitation of the HRQoL data evaluation in this study is the Response Shift effect – i.e. “the tendency for respondents to recalibrate their perspective of their health status over time” (Turpin and Waters, 2013) as related to outcomes of comparison of patients' HRQoL data before and after intervention. Also, the prevailing economic downturn as a confounding factor among others at the time of re-evaluation of the patients' HRQoL might have played a role in bringing about the non-improvement in all domains of quality of life measured given the link between respondents' economic situation and their quality of life (Davalos and French, 2011). Another limitation is the fact that the instrument employed for the measurement of HRQoL among the respondents is yet to be validated in Nigeria. Hence, there is presently non-availability of a general population average score. The norm of 50 ± 10 was therefore used which may not give room for appropriate comparisons of individuals with better health (QoL score > 50) as against those with worse health (QoL score < 50), locally. Thus, it is important that the SF-12v2 questionnaire be validated among Nigerian population for more effective assessment of patients HRQoL in the future.

CONCLUSION

The DRPs observed in the medication management of hypertension and/or DM in the patients studied decreased substantially following the instituted intervention. However, the patients generally had poor HRQoL and the intervention adopted was not useful in improving their perceived functional status and well-being. The disease conditions impact negatively more on the patients' physical health status than their mental component. In addition, the risk of screening positive for depression among the total sample report is high and requires further investigations.

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CONFLICTING OF INTEREST

There is no conflict of interest in this work.

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AUTHORS' CONTRIBUTIONS

The study was conceived and designed by KAG. Data collection and analysis as well as manuscript preparation were also done by KAG. POE supervised the work, revised the manuscript critically and made necessary corrections. Both of the authors read and approved the final manuscript for publication.

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