



# Evaluation of Sedation and Monitoring for Gastrointestinal Endoscopy among Gastrointestinal Endoscopy Practitioners in Nigeria

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

**Background:** Several guidelines have been developed for the practice of gastrointestinal endoscopy. The rationale for sedation in gastrointestinal endoscopy is the alleviation of pain/discomfort and anxiety experienced by patients during the procedure. The aim of this study was to evaluate the use of sedation for gastrointestinal endoscopy among practitioners of gastrointestinal endoscopy at a conference in Nigeria.

**Materials and Methods:** A cross-sectional descriptive study was carried out among gastrointestinal endoscopy practitioners. The study setting was the 13th annual general meeting and scientific conference of the Society for Gastroenterology and Hepatology in Nigeria (SOGHIN) that held in Port Harcourt Nigeria from 26th to 30th of July 2021.

**Results:** A total of one hundred and four (104) respondents participated in the study. Fifty-two (50.0%) respondents carried out  $\geq 15$  upper gastrointestinal endoscopies per month in their centre.

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It was the opinion of 36 (34.6%) respondents that  $\geq 15$  lower gastrointestinal endoscopies per month were being done in their centre. Twenty-six (25%) respondents used the drug midazolam for sedating patients for upper gastrointestinal endoscopy, and another 26 (25%) use diazepam and pentazocine. Under-sedation was a problem for 44 (42.3%) respondents occasionally led to aborting the procedure. There was significant relationship between achievement of  $\geq 90\%$  sedation adequacy and the type of personnel administering the drug ( $P=0.000$ ).

**Conclusion:** Although better sedation has been reported to be achieved with the use of midazolam, there was no uniformity in the practice of sedation for gastrointestinal endoscopy among the respondents.

*Keywords: Sedation; gastrointestinal endoscopy; gastrointestinal endoscopists; Nigeria.*

## 1. INTRODUCTION

Patients with gastrointestinal diseases have been routinely investigated using upper and lower gastrointestinal endoscopy for diagnosis, treatment and screening purposes. The popularization of fiberoptic for gastrointestinal endoscopy in the 1950s and subsequent advances improved the diagnostic and therapeutic potential of the procedure, though the discomfort that accompanies it was an issue [1]. Several guidelines have been developed for the practice of gastrointestinal endoscopy [2-10]. The rationale for sedation in gastrointestinal endoscopy is the alleviation of pain/discomfort and anxiety experienced by patients during the procedure [11]. Improved quality of procedure and patient satisfaction are twin other reasons that call for patient sedation [12-15]. Sedation has also been reported to increase caecal intubation rate in men and women [14]. However, the elderly, obese, cirrhotic, pregnant women, patients with pulmonary disease and acutely ill patients, are all special conditions that require special consideration in administering sedation for GI endoscopy [1,16].

The agents used for sedation for gastrointestinal endoscopy, often given intravenously, are variable and numerous. The options are known to vary in different centers from light sedation to general anaesthesia, and for some, no sedation. The water soluble, short acting midazolam, metabolized by the liver and excreted by the kidney, is known to surpass diazepam in potency by 1.5-3.5 times, with additional properties of 1-2 minutes onset of action and 15-80 minutes duration of action [17,18]. The effect of midazolam can be reversed by flumazenil, whose onset of action is also 1 – 2minutes [1]. Potentiation of GABA / reduction of rate of GABA-receptor dissociation are mechanism by which propofol, a hypnotic drug, exercises its

effect [19]. Propofol is also metabolized in the liver and excreted by the kidney, and has a 4 – 8minutes duration of action and a quick arm-brain circulation time [20]. Better sedation, shorter recovery with higher post-anaesthesia recovery scores and greater patient cooperation are some of the attractive benefits of the use of propofol, however, the necessity for use of anaesthetist limits generalizability and decreases its safety concerns [21-23]. Also, the associated increased cost appears to be a significant issue [24].

A study done in 2016 had emphasized the insufficiency of endoscopic capacity in West Africa [25]. In the Nigerian setting, a study carried out in 2012 reported that 91.4% of endoscopists practice non-anesthesiologist-directed sedation for routine diagnostic upper gastrointestinal endoscopy, making it different from other climes for lack of guidelines [26]. Another study compared use of propofol & fentanyl with midazolam & pentazocine combination for sedation and analgesia during colonoscopy in Ibadan, and concluded in favor of propofol-fentanyl combination. Few other studies highlighting in part the challenges of endoscopy in Nigeria also do exist [27-30]. What has changed over the years? The subject of deciding which agent is most ideal for sedation and who should administer sedation for gastrointestinal endoscopy has been an issue for discussion, with a wide range from the administration by the anesthetist to patient-controlled or automated sedation [3,31,32]. Also, variation in drug usage and training of endoscopists, and the impact of all these on practice in a low-income or resource-poor setting deserves to be discussed as they affect practice in our environment. Weighing our options and our challenges on issue of sedation and monitoring for gastrointestinal endoscopy is therefore the focus of this study.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

The study was carried out in Port Harcourt the capital of Rivers State, being one of the Niger Delta states in the Federal Republic of Nigeria.

### 2.2 Study Sites

The 13<sup>th</sup> Conference of the Society for Gastroenterology and Hepatology in Nigeria (SOGHIN) that held in Port Harcourt from 26<sup>th</sup> to 30<sup>th</sup> of July 2021 was the study site. The preconference was held in hybrid fashion, and the main conference was virtual.

### 2.3 Research Design

A cross-sectional descriptive study

### 2.4 Study Population

Gastrointestinal endoscopists formed the study population.

### 2.5 Sample Size Determination

Total population of gastrointestinal endoscopy practitioners was targeted.

### 2.6 Sampling Method

All those who gave consent for the study were included in the study.

### 2.7 Study Instrument

Data was collected using semi-structured self-administered questionnaire for physical attendees, while a similar questionnaire in google form was administered to online attendee through their email / WhatsApp platforms.

### 2.8 Bias

Efforts were made to avoid double responses from the respondents

### 2.9 Data Analysis

Information on socio-demographics; agents commonly used for sedation for GI endoscopy; outcome of sedation used for GI endoscopy; safety conditions for gastrointestinal endoscopy; personnel administering the sedation; and

challenges with sedation used for GI endoscopy; was collated and analysed using the Statistical Package for the Social Sciences (SPSS) version 20.0.

### 2.10 Validity/Reliability of Instrument

The study instrument was duly scrutinized by all authors, pre-tested in a similar work environment and corrections made before commencement of study. The Cronbach alpha (in SPSS) was used for the validity of the study instrument.

## 3. RESULTS

A total of one hundred and four (104) respondents participated in the study.

The demographic characteristics of the respondents summarized in Table 1 indicated that 48 (46.2%) were male respondents, while 56 (53.8%) were female respondents. Forty-six (44.2%) respondents were within 30 - 39 years of age, and 28 (26.9%) were within 40 - 49 years. Sixty-eight (65.3%) respondents had been in gastro intestinal endoscopy practice for varying period of 1 – 19years, and 30 (28.8%) respondents had practiced for less than 1 year. The category of respondents included 22 (21.2%) consultants, 28 (26.9%) senior registrars, and endoscopy nurse 38 (36.5%) endoscopy nurses, etc. Sixty-six (63.5%) respondents practiced in public sector, while 14 (13.5%) respondents practice in private sector. There were 46 (44.2%) physicians, 10 surgeons, and 46 nurses (44.2%) among the respondents.

Table 2 shows that 100 (96.2%) respondents asserted positively that they were involved in carrying out gastro-intestinal endoscopy in their health facilities. Fifty-two (50.0%) respondents asserted that they carried out  $\geq 15$  upper gastrointestinal endoscopies per month in their centre, while 16 (15.4%) opined that they did less than 5 procedures per month. It was the opinion of 36 (34.6%) respondents that  $\geq 15$  lower gastrointestinal endoscopies per month were being done in their centre, 28 (26.9%) respondents affirmed to less than 5, and 34 (32.7%) asserted to 5 -14 lower GI procedures. Twenty-six (25%) respondents used the drug midazolam for sedating patients for upper gastrointestinal endoscopy, 26 (25%) use diazepam and pentazocine, 14 (13.5%) use midazolam and pentazocine, and 16 (15.4%) asserted that they usually do no sedate their patients for upper GI endoscopy. A few others used varying other drug combinations. Forty

(38.5%) respondents used diazepam and pentazocine for sedating patients for lower gastro-intestinal endoscopy. Ten (9.6%) respondents used midazolam and pentazocine, another 10 (9.6%) used only diazepam, and 4 (3.8%) respondents did not use any sedative for lower GI endoscopy. A few others used different drug combinations.

Table 3 shows the outcome of sedation usage and safety conditions for GI endoscopy. Fifty-two (50%) respondents asserted to achieving  $\geq 90\%$  sedation adequacy for colonoscopy with their preferred drug, while 12 (11.5%) achieved 80-89%. Forty-four (42.3%) respondents achieving  $\geq 90\%$  sedation adequacy for upper GI endoscopy with their preferred drug, while 28 (26.9%) achieved 80-89%. Monitoring for GI endoscopy procedure, as reported by respondents was done with varied instruments. However, 46 (44.2%) respondents affirmed to using a combination of all of the following: manual blood pressure measurements, automated blood pressure measurements, electrocardiogram and pulse oximeter, and nursing record. Forty-eight (46.2%) affirmed to availability of cardiac arrest trolley in their centre, while 34 (32.7%) did not have any monitoring device. Twenty-eight (26.9%) respondents routinely used supplemental oxygen

for upper GI endoscopy in their centre, while 68 (65.4%) do not. Ninety (86.5%) respondents had recovery room for gastrointestinal endoscopy patients.

Fig. 1 shows the category of staff that administers sedation for GI endoscopy. It was the opinion of 44 (42.3%) respondents that sedation was being done by the endoscopist in their centre, 22 (21.2%) respondents asserted that it was carried out by both endoscopist and the endoscopic nurse, while 10 (9.6%) respondents mentioned the anaesthetist.

Challenges with sedation used for GI endoscopy is indicated in Table 4. Seventy-eight (75.0%) did not encounter over-sedation for GI endoscopy in their centres, however, 8(7.7%) did. Similarly, under-sedation was not a problem for 52 (50.0%) respondents, but for 44 (42.3%) respondents it was an encountered challenge. For 20 (19.2%) respondents, the under-sedation occasionally led to aborting the procedure, while for 2 (1.9%) respondents the case cancellation occurred often. Forty-two (40.4%) respondents did not encounter adverse effects with sedation, while others reported drowsiness (4 = 3.8%), and vomiting (8 = 7.7%).

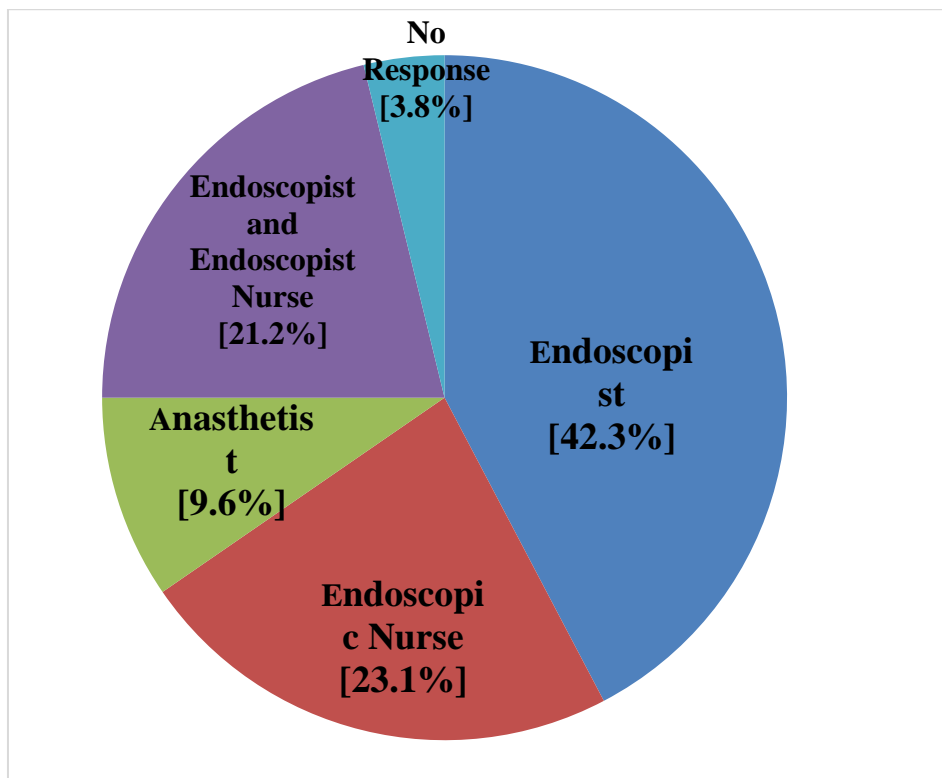


Fig.1. Category of personnel that administer sedation for GI endoscopy

**Table 1. Socio-Demographic Characteristics of Respondents (n = 104)**

<b>Variables</b>	<b>Number</b>	<b>Percentage</b>
<b>Sex</b>		
Male	48	46.2
Female	56	53.8
<b>Age</b>		
Less than 30 years	10	9.6
30 - 39 Years	46	44.2
40 - 49 Years	28	26.9
50 - 59 Years	20	19.2
<b>Religion</b>		
Christianity	92	88.5
Islam	12	11.5
<b>Number of years in endoscopy practice</b>		
Less than 1year	30	28.8
1-4 years	28	26.9
5 - 9 years	26	25.0
10 - 14 years	12	11.5
15 - 19 years	2	1.9
20 years and above	6	5.8
<b>Category of Respondents</b>		
Consultants	22	21.2
Senior Registrar	28	26.9
Registrar	6	5.8
General Practice	8	7.7
Endoscopy Nurse	38	36.5
Dietitian	2	1.9
<b>Institution of Practice</b>		
Public	66	63.5
Private	14	13.5
Both Public and Private	24	23.1
<b>Specialty of Respondents</b>		
Physician	46	44.2
Surgeon	10	9.6
Nursing	46	44.2
<b>Dietitian</b>	<b>2</b>	<b>1.9</b>

**Table 2. Number of procedures and agents commonly used for GI endoscopy sedation (n = 104)**

<b>Variables</b>	<b>Number</b>	<b>Percentage</b>
<b>Performance of Gastrointestinal Endoscopy in Facility</b>		
Yes	100	96.2
No	4	3.8
<b>Number of Upper GI endoscopy carried out per month</b>		
None	4	3.8
Less than 5	16	15.4
5 - 9	10	9.6
10 - 14	22	21.2
15 or more	52	50.0
<b>Number of Lower GI endoscopy carried out per month</b>		
Not done it before	4	3.8
Less than 5	28	26.9
5 - 9	22	21.2
10 - 14	12	11.5
15 or more	36	34.6
No response	2	1.9
<b>Drug Often use for sedation for Upper GI endoscopy</b>		
No Sedation for EGD	16	15.4
Midazolam	26	25.0
Propofol	4	3.8
Diazepam	6	5.8
Diazepam and Pentazocine	26	25.0
Midazolam and Pentazocine	14	13.5
Xylocaine spray	2	1.9
Midazolam, Propofol and Diazepam	4	3.8
Midazolam, Diazepam and Pentazocine	2	1.9
No response	4	3.8
<b>Drug Often use for sedation for Lower GI endoscopy (Colonoscopy)</b>		
No Sedation for EGD	4	3.8
Midazolam	8	7.7
Midazolam and Pethidine	6	5.8
Propofol	4	3.8
Diazepam	10	9.6
Pentazocine	8	7.7
Diazepam and Pentazocine	40	38.5
Midazolam and Pentazocine	10	9.6

Variables	Number	Percentage
Xylocaine spray	2	1.9
Pethidine and Pentazocine	8	7.7
<b>No response</b>	<b>4</b>	<b>3.8</b>

Table 3. Outcome of sedation usage and safety conditions for GI endoscopy (n = 104)

Variables	Number	Percentage
<b>Percentage of sedation adequacy achieved with preferred drug for Colonoscopy</b>		
90% and above	52	50.0
80 - 89%	12	11.5
70 - 79%	14	13.5
60 - 69%	12	11.5
Less than 60%	8	7.7
No response	6	5.8
<b>Percentage of sedation adequacy achieved with preferred drug for Upper GI Endoscopy</b>		
90% and above	44	42.3
80 - 89%	28	26.9
70 - 79%	12	11.5
60 - 69%	4	3.8
Less than 60%	10	9.6
No response	6	5.8
<b>How gastrointestinal endoscopy patients are monitored in respondents' facility</b>		
Manual Blood Pressure Measurements	12	11.5
Automated Blood Pressure Measurements	4	3.8
ECG and Pulse Oximeter	2	1.9
ABP Measurements and Pulse Oximeter	16	15.4
Manual BPM, Pulse Oximeter and Nursing record	18	17.3
All of the above	46	44.2
No response	6	5.8
<b>Cardiac arrest trolley availability</b>		
Yes	48	46.2
No	34	32.7
Not sure	18	17.3
No response	4	3.8
<b>Routinely use supplemental oxygen for upper GI in facility</b>		
Yes	28	26.9
No	68	65.4

Variables	Number	Percentage
Not sure	4	3.8
No response	4	3.8
<b>Availability of recovery room for endoscopy patients</b>		
Yes	90	86.5
No	6	5.8
Not sure	4	3.8
<b>No response</b>	<b>4</b>	<b>3.8</b>

Table 4. Challenges with sedation used for GI endoscopy (n = 104)

Variables	Frequency	Percentage
<b>Encounter challenges with over-sedation for GI endoscopy in centres</b>		
Yes	8	7.7
No	78	75.0
Not sure	14	13.5
No response	4	3.8
<b>Frequency of encounter over-sedation necessitating intervention</b>		
Very rare	60	57.7
Occasional	2	1.9
No response	42	40.4
<b>Encounter challenges with Under-sedation for GI endoscopy in centres</b>		
Yes	44	42.3
No	52	50.0
Not sure	4	3.8
No response	4	3.8
<b>Frequency of encounter under-sedation necessitating aborting the procedure</b>		
Never	16	15.4
Very rare	38	36.5
Occasional	20	19.2
Often	2	1.9
No response	28	26.9
<b>Adverse effect encounter with sedation for GI endoscopy</b>		
None	42	40.4
Drowsiness	4	3.8
Vomiting	8	7.7
No Response	50	48.1
<b>Other challenges encounter with under-sedation for GI endoscopy</b>		



Variables	Frequency	Percentage
Patients experience pain and shout	38	36.5
Patients may be drowsy for longer period	8	7.7
Vomiting	6	5.8
Scarcity of Anesthetist	2	1.9
<b>No Response</b>	<b>50</b>	<b>48.1</b>

**Table 5. Relationship between percentage of sedation adequacy achieved with preferred drug for Colonoscopy and Category of personnel that administer sedation for GI endoscopy**

Category of personnel that administer sedation for GI endoscopy	Percentage of sedation adequacy achieved with preferred drug for Colonoscopy						Total	(X <sup>2</sup> )	P-Value
	90% and above	80 - 89%	70 - 79%	60 - 69%	Less than 60%	No response			
The Endoscopist	20(45.5%)	8(18.2%)	6(13.6%)	4(9.1%)	6(13.6%)	0(0.0%)	44	100.857	0.000
Endoscopic nurse	10(41.7%)	0(0.0%)	8(33.3%)	4(9.1%)	0(0.0%)	2(8.3%)	24		
Anesthetist	10(100%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	10		
Endoscopist and Endoscopic nurse	12(54.5%)	4(18.2%)	0(0.0%)	4(18.2%)	2(9.1%)	0(0.0%)	22		
No response	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	4(100.0%)	4		
<b>Total</b>	<b>52</b>	<b>12</b>	<b>14</b>	<b>12</b>	<b>8</b>	<b>6</b>	<b>104</b>		

**Table 6. Relationship between percentage of sedation adequacy achieved with preferred drug for Upper GI Endoscopy and drug Often use for sedation for Upper GI Endoscopy**

Specialty of Respondents	Percentage of sedation adequacy achieved with preferred drug for Colonoscopy						Total	(X <sup>2</sup> )	P-Value
	90% and above	80 - 89%	70 - 79%	60 - 69%	Less than 60%	No response			
No Sedation for EGD	4(25.0%)	2(12.5%)	2(12.5%)	4(25.0%)	4(25.0%)	0(0.0%)	16	174.655	0.000
Midazolam	16(61.5%)	4(15.4%)	2(7.7%)	0(0.0%)	4(15.4%)	0(0.0%)	25		
Propofol	0(0.0%)	4(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	6(13.0%)	4		
Diazepam	0(0.0%)	4(66.7%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	6		
Diazepam & Pentazocine	12(46.2%)	10(38.5%)	2(7.7%)	0(0.0%)	2(7.7%)	0(0.0%)	26		
Midazolam & Pentazocine	8(57.1%)	2(14.3%)	4(28.6%)	0(0.0%)	2(20.0%)	0(0.0%)	14		
Xylocaine spray	0(0.0%)	2(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	2		
Midazolam, Propofol & Diazepam	4(100.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	4		
Midazolam, Diazepam & Pentazocine	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	2(100.0%)	4		
No response	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	4(100%)	2		
<b>Total</b>	<b>44</b>	<b>28</b>	<b>12</b>	<b>4</b>	<b>10</b>	<b>6</b>	<b>104</b>		

Table 5 show the relationship between percentage of sedation adequacy achieved with preferred drug for colonoscopy and category of personnel that administer sedation for GI endoscopy. Achievement of  $\geq 90\%$  sedation adequacy with preferred drug for colonoscopy was highest when the anesthetist administered the sedation than any other category of personnel, and this relationship was statistically significant ( $P=0.000$ ).

The relationship between drug often used for sedation and percentage of sedation adequacy achieved with preferred drug for Upper GI Endoscopy is shown in Table 6. The drug Midazolam has the highest percentage of sedation adequacy achieved for upper GI Endoscopy, followed by combination of Midazolam and Pentazocine. This relationship was statistically significant ( $P<0.05$ ).

#### 4. DISCUSSION

Majority of respondents were within the age range of 30-49years, and most had been in gastrointestinal endoscopy practice for varying period of 1 – 19years. Almost half of respondents belonged to the consultants and senior registrar cadre. These all give credence to the quality of information provided by the respondents in this study. Featured here is a highlight on the dominant age range for practitioners of gastrointestinal endoscopy in Nigeria. Almost all respondents were being involved in gastrointestinal endoscopy practice. Monthly traffic for upper gastrointestinal endoscopies was about 15 or more among half of the respondents. Less number of respondents asserted to carrying out 15 or more lower gastrointestinal endoscopies per month in their centers.

A quarter of respondents used midazolam, while another quarter used a combination of diazepam and pentazocine for sedation during upper GI endoscopies. Others used varying number of other drugs. More than a quarter of respondents used a combination of diazepam and pentazocine for sedating patients for lower GI endoscopy. Our findings share some similarity with some published works. In a nationwide survey carried out in Spain among endoscopic units, benzodiazepines - most commonly midazolam was used by few units for gastroscopy, midazolam & pethidine were used for colonoscopy and ERCP, while propofol was used by anaesthetists for colonoscopy [11]. Propofol was reported as the most commonly

used agent for colonoscopy in another survey in Portugal [33]. Factors attributed to wide variation in the practice of sedation for gastrointestinal endoscopy has been described to be medical training of endoscopist, legal responsibility, cultural issues, and societal lobbying [1]. However, our findings showed that sedation with midazolam (or midazolam and pentazocine) for upper GI Endoscopy has a statistically significant relationship with sedation adequacy of ninety percent or more.

Anaesthetist administered-sedation for colonoscopy has a statistically significant relationship with sedation adequacy of ninety percent or more. This finding is attractive, and calls for regular use of the anesthetist, in conformity with concerns raised about the likely occurrence of severe respiratory depression and the ability to rescue, when sedation especially propofol, is used without back-up of anaesthetist. Another issue is that of additional staff presence and its associated additional cost, especially when the private sector is involved in a low-income setting such as ours. Limited number of anaesthetists in our setting is also a cause for concern. It is not surprising therefore, as almost half of our respondents asserted that sedation was carried out by the endoscopist in their centre, and very few by the anaesthetist.

Monitoring is a very important aspect of gastrointestinal endoscopic practice, and most respondents had recovery room for their GI procedures. Almost half of respondents were using a combination of manual blood pressure measurements, automated blood pressure measurements, electrocardiogram and pulse oximeter, and nursing record for monitoring during GI endoscopy. However, a few respondents used supplemental oxygen. Although majority of respondents asserted to not having challenges with sedation for GI endoscopy procedures, a few others reported so. Only half of respondents asserted to achieving sedation adequacy of ninety percent or more for colonoscopy with their preferred drug. Likewise, less than half of respondents achieved  $\geq 90\%$  sedation adequacy for upper GI endoscopy with their preferred drug. Undersedation in particular had resulted to aborting procedures occasionally. A few adverse effects of sedative drugs were reported, including drowsiness and vomiting. With these findings, it becomes obvious that all may not be well with sedation for gastrointestinal endoscopy as currently practiced in Nigeria. It seems therefore apparent that the concerns

raised by an earlier researcher about lack of guidelines in the practice some ten years ago still appears valid [26].

## 5. STUDY LIMITATION

This study has some limitations usual of questionnaire-based studies. Additionally, the opinions provided are those of gastrointestinal endoscopists and other support staff involved in the practice.

## 6. CONCLUSION

Although better sedation has been reported to be achieved with the use of midazolam, there was no uniformity in the practice of sedation for gastrointestinal endoscopy among the respondents. Effort at ensuring uniformity of practice is therefore highly recommended.

## CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

The approval of the Research Ethics Committee of the University of Port Harcourt Teaching Hospital was obtained before commencement of the study.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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