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Research Article

Epidemiological Analysis of Patients Undergoing Upper Gastrointestinal Endoscopy in a Short-Term Health Unit

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Abstract

Background: The Upper Gastrointestinal Endoscopy (UGE) represents the most common endoscopic morality and it is usually made with conscious sedation. Among the adverse events of this procedure, the cardiovascular events are the most relevant, comprising around 60% of overall events. It is known that some adverse events are related to patient's risk factors, such as obesity, age and pulmonary disease. Thus, considering the importance of risk factors and their impact in the morbimortality related to the procedure, the aim of this study is to know the epidemiological profile of the patients that need an endoscopy in Brazil.

Methods: It is a sectional study with an aleatory sample of 974 patients that was submitted to an elective UGE in the period of January of 2013 and June of 2013. A questionnaire was applied to each individual.

Results: The average age of the study was 40,88 years old, with 11,50% being over 60 years old. The body mass index (BMI) average was 26,21 kg/m2 among which 53,18% of the interviewed could be classified as overweight or obese. The morbidities founded were high blood pressure (N = 152); other cardiac diseases (N = 35); respiratory diseases (N = 599); diabetes mellitus (N = 43); thyroid diseases (N = 68). The most used drugs were benzodiazepines (4,93%) or other psychiatric drugs, comprising 11,59%. The use of alcohol was mentioned by 37,39% and 5,54% were smokers. Only 19,40% amongst the patients did not mention any comorbidity or risk factor to the procedure.

Conclusion: Considering the endoscopy and the sedation involved in the procedure, knowing the demographic and epidemiological differences between populations are of special importance, since they are related to the cardiorespiratory adverse events that can occur during and after an UGE. The conclusions of this study should be interpreted considering that it was made in an ambulatory unity.

Keywords: *Daily pH-Metry; Hydrogen Ion Concentration H+*

Introduction

With its remarkable accessibility, the gastrointestinal tract, perhaps more than any system in the body, was particularly benefited by the endoscopic approach. In comparison with the contrasted radiological exams, the main advantages of endoscopy in the evaluation of diseases of the digestive tract are direct visualization, resulting in a more accurate and sensitive assessment of mucosal lesions, the ability to obtain biopsy specimens of the lesions found and the possibility of carrying out therapeutic interventions. These advantages make upper gastrointestinal endoscopy (EDA) the procedure of choice in most cases where there is a suspicion of lesions seen in the upper digestive tract light [1]. Portraying its importance, studies from the 1990s showed that more than 10 million endoscopic procedures were performed annually in the United States of America for several reasons [2].

EDA represents the endoscopy method most used by patients, with an estimated frequency of 8.6 per 1,000 inhabitants [3]. In general, the procedure is performed under conscious sedation, [4] which results in the greater diffusion and acceptance of this technique, generating greater satisfaction of the patient and the endoscopist physician [5,6]. However, EDA is not without risks, and there is a slight increase in morbidity and mortality associated with the use of sedation [7] Therefore, when using any sedative or medication similarly, it becomes safer that this is done by another doctor, keeping the endoscopist focused only on his examination, thus avoiding the exposure of unnecessary risks to the patient.

Large studies report a frequency of adverse effects, ranging from 1 in 200 procedures to 1 in 10,000, as well as mortality rates from 0 to 1 per 2000 [8-12]. The variability in adverse event rates reported in this procedure can be attributed to the data collection method, studied population, post-procedure follow-up duration, definition used to classify adverse effect, among other variables [13]. In addition, most publications are based on data collected only in the immediate periprocedural period; therefore, the rate of adverse effects and mortality may be underestimated by these data [13,14].

The adverse effects of the procedure are mainly attributed to cardiorespiratory complications, infections, perforation and bleeding [15,16] and cardiorespiratory events account for the largest share, representing about 60% of the adverse effects of EDA when related to sedation and analgesia [8-11,18]. Furthermore, it is known that cardiopulmonary events related to sedation have predictors related to the patient, unlike the other adverse effects of EDA, which are related to the procedure to be performed [17]. The most common predictors are aspiration, hypoventilation/respiratory depression, airway obstruction, hypoxia, cardiac and hemodynamic complications, as well as cardiac arrhythmias [19]. Some of the known risk factors for the occurrence of adverse effects after EDA are shown in table 1 [20].

Risk factors	(OR)*
Age	1.02/ano
ASA	1.8/3.2/7.5(ASAIII/IV/V)
APACHE II	12
Lung disease	-
Heart disease	5.2 (para IM** recente)
Obesity	1.5 para hipoxemia
Hospitalized patient	1.5
Supplemental oxygen	1.2
Trainee involvement	1.3

Table 1: *Risk factors predictive of adverse cardiorespiratory effects related to endoscopic procedures.*

**: Odds ratio. **: Myocardial infarction.*

Source: Adapted from Identifying and reporting risk factors for adverse events in endoscopy. Part I: cardiopulmonary events, 2011.

It must be considered that the response to sedation is individual, making each patient need different levels of sedation for the same procedure [4]. In view of this, the American Society of Gastroenterology (ASGE) has proposed a list of questions and aspects in the physical examination that should be investigated in patients who will undergo endoscopy, with an emphasis on problems related to sedation:

- Abnormalities in the main physiological systems.
- Snoring, stridor or sleep apnea.
- Drug allergies, medications in use and potential drug interactions.
- Previous adverse reactions to sedatives or anesthetics and
- Use of tobacco, alcohol or others [21].

Considering the importance of the known risk factors in the possible outcomes of patients undergoing endoscopy with sedation, and their effects on the general morbidity and mortality of the procedure, the present epidemiological work is justified to outline the profile of the patient who undergoes EDA in the Brazil in a health facility for short stay procedures (independent hospital unit), which is in great demand in the city of Belo Horizonte.

Methodology

The cross-sectional study was carried out with a sample of 974 patients, carried out between January 2013 and June 2013. The selected participants were patient candidates to undergo EDA on an elective basis and on an outpatient basis, in an independent clinic, considered by the CFM resolution No. 1,886/2008, a type II unit [22]. The participation of patients was optional after an invitation, and after signing the Free and Informed Consent Form, the survey questionnaire was filled out. The study excluded participants who did not complete the entire questionnaire or did it in an inappropriate or incomprehensible way to researchers, and those who opposed participating. The questionnaire was completed by the patient himself.

The variables evaluated were age, height, weight, smoking and drinking habits, use of illegal substances, hypertension, diabetes, heart disease, respiratory diseases, thyroid diseases, allergies, use of medications, surgeries, anaesthesia and previous hospitalizations.

It was also asked if the patient was undergoing medical follow-up and if the last laboratory tests had been done more than a year ago. Data analysis was performed with the results of percentage, average and standard deviation. The research was approved by the Ethics and Research Committee of the Medical Sciences Faculty of Minas Gerais/University Hospital of Medical Sciences.

Results

The total of questionnaires analysed was 974, completed in 2013. Of these, 608 (64.42%) belonged to women and 366 (35.58%) to men. The most prevalent age group was under 60, with an average of 40.88 (standard deviation of 15.28), as shown in table 2.

Age range (years)	Number of patients	Percentage
< 60	845	86.76%
60 - 69	80	8.21%
70 - 79	33	3.39%
80	16	1.64%

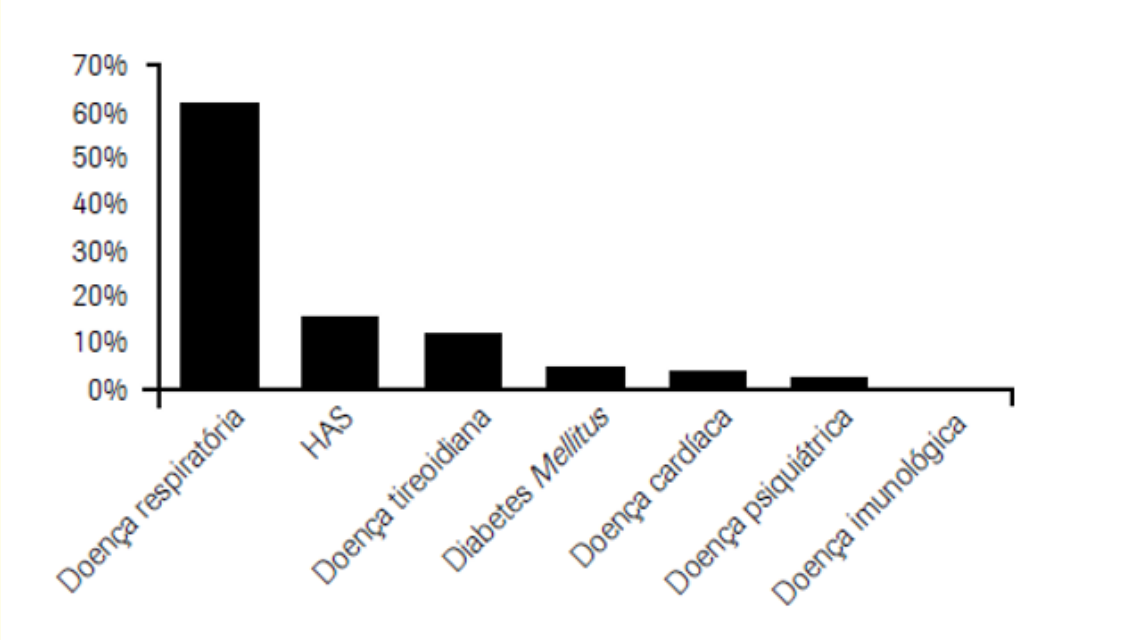
Table 2: *Distribution of patients according to age group.*

The Body Mass Index (BMI) was distributed according to the classification of the Brazilian Society of Obesity [23] (See table 3). The group with normal weight was the most prevalent, with 437 patients (44.87%). The mean BMI was 26.21 (kg/m^2) (standard deviation of 5.43) with a minimum value of 15 and a maximum of 53.

IMC	Number of patients	Percentage
< 18	19	1.95%
18 - 24.9	437	44.87%
25 - 29.9	332	34.09%
30 - 34.9	112	11.49%
35 - 39.9	45	4.62%
> 40	29	2.98%

Table 3: *List of patients according to weight and BMI (kg/m^2).*

The comorbidities found included systemic arterial hypertension (SAH) (N = 152); other heart diseases (N = 35); respiratory diseases (N = 599), which include asthma (N = 72), sinusitis (N = 256), rhinitis (N = 233), bronchitis (N = 32), past tuberculosis (N = 2), and others not specified (N = 4); diabetes mellitus (N = 43); thyroid disease (N = 68), with hypothyroidism being the most prevalent (N = 50 versus N = 6 in hyperthyroidism), despite 12 cases of unspecified thyroid diseases; psychiatric illness (N = 24) and immunological illness (N = 1). The most common ones were, therefore, respiratory diseases (61.50% of the total number of patients) and SAH (15.60% of the total number of patients) (Graph 1).



Graph 1: *Incidence of diseases in candidates for EDA in an outpatient unit.*

Regarding the presence of allergies or intolerances, the most commonly found were dipyrone (N = 21), metoclopramide (N = 18), crustaceans (N = 26), insect bites (N = 80), sulfa (N = 17) and penicillin (N = 43) (Table 4). It is important to note that allergies to iodine (N = 9), egg (N = 3), contrasts (N = 2; without specifying their nature), midazolam (N = 1), promethazine (N = 1), formaldehyde (N = 1) and morphine (N = 1).

Allergy	Absolute number
Insect bite	80
Penicillins	43
Crustaceans	26
Dipyrone	21
Metaclopramide	18
sulphonamide	17

Table 4: *Most prevalent allergies and/or intolerances.*

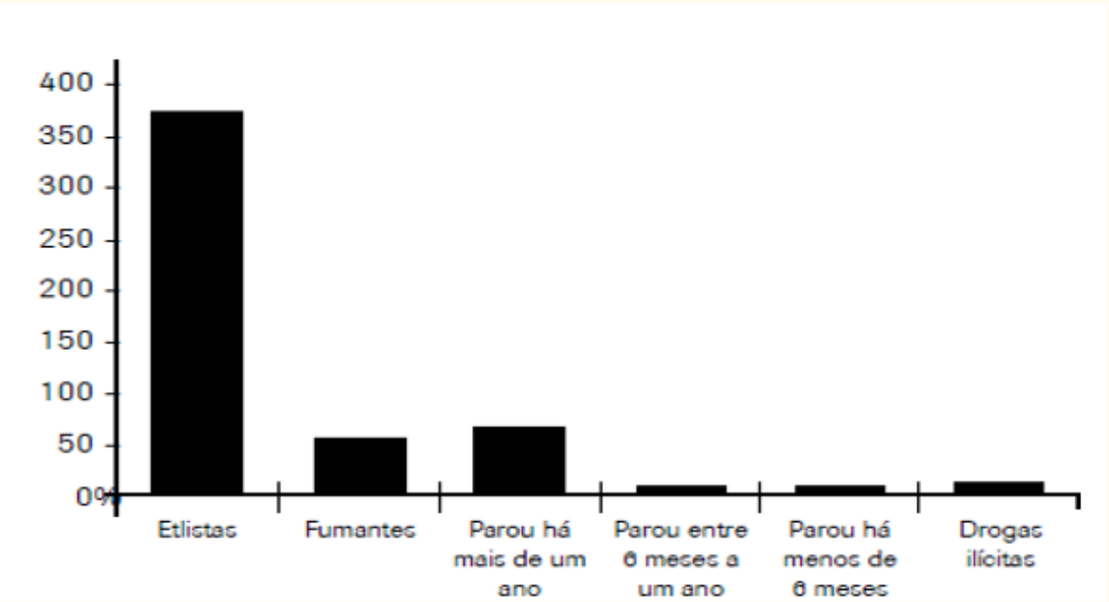
The drugs used by patients and reported were from different groups, as can be seen in table 5.

Medicine	User Number	Percentage
IBP	138	14.17%
ISRS	60	6.16%
Hypnotics	52	5.54%
Beta blocker	42	4.31%
Diuretics	40	4.11%
Thyroxine	40	4.11%
BRA	38	3.90%
Outros antidepressants	23	2.36%
ECA	21	2.16%
Antibiotics	21	2.16%
Metformin	21	2.05%
Anticonvulsants	13	1.33%
BCC	13	1.33%
Corticosteroids	9	0.92%
Antidepressants	7	0.72%
Insulin	6	0.62%
Beta 2 agonist	6	0.62%
Antipsychotics	4	0.41%
Sibutramine	4	0.41%
Propafenone	1	0.10%
Barbiturates	1	0.10%
amiodarone	1	0.10%

Table 5: *Medicines used by patients.*

Caption: SSRI: Selective Serotonin Reuptake Inhibitor; PPI: Proton Pump Inhibitor; BCC: Calcium Channel Blockers; ACEI: Angiotensin-Converting Enzyme Inhibitor; BRA: Angiotensin II Receptor Blockers.

The prevalence of smokers was 5.54% (N = 54). In addition, 0.72% (N = 7) reported smoking up to six months before, 0.92% (N = 9) quit between six months to a year, and 6.67% (N = 65) quit more than one year. Regarding alcoholism, the prevalence was 37.99% (N = 370). However, this habit has not been quantified. Eleven patients reported using illicit substances, without specifying them (Graph 2).



Graph 2: *Prevalence of alcoholism, smoking and illegal substances (not specified) in the studied population.*

The passage through surgeries and some type of anaesthesia in the past was found in 720 questionnaires (73.92%), ranging from local anaesthesia and simple procedures, such as tooth extraction, to major surgeries under general anaesthesia. 378 patients with previous hospitalization (38.81%) were also found. After analyzing the comorbidities, which were considered to be risk factors for the occurrence of adverse effects during EDA, it was possible to bring together the participants in the groups: those who had only one comorbidity, two or more, or none (See table 6). However, this study did not address a quantitative assessment of alcohol intake, and any intake reported by the patient was considered a risk factor. The risk factors considered were the most reported in the literature.

Risk factor	Number of patients	Percentage
Age > 60 years	113	11.50%
Overweight	518	53.18%
Use of benzodiazepines	48	4.93%
Neuropsychiatric use	113	11.59%
Alcohol	370	37.39%
Smoking	54	5.54%
HAS	152	15.60%
DM	43	4.40%
Heart Disease	35	3.60%
Allergy	3	0.30%
Penicillin allergy	43	4.40%
Presence of 1 risk factor	332	34.09%
Presence of 2 or more risk factors	453	46.50%
No risk factors	189	19.40%

Table 6: *Main comorbidities and/or risk factors for adverse effects during EDA.*
The amount of alcohol ingested was not considered, since there was no qualitative or quantitative research on this data.

Discussion

In this study, we covered patients who underwent EDA without restriction as to the indication or outcome of the procedure. We only sought to gather data from the literature as independent risk factors for the endoscopic procedure and, mainly, for analgesia and sedation, with the aim of alerting the performers about possible adverse effects (AEs), mainly cardiovascular, approaching this population sample.

From the population group studied, 974 cases were considered eligible for the study, after analysing the questionnaires; predominantly female (64.42% vs. 35.58%) and under 60 years old (86.76%). There is no data in the literature comparing the studied sample, but another epidemiological study carried out with patients undergoing low digestive endoscopy also showed a predominance of females, with a mean age of 54.55 years [24].

The present study found 8.21%, 3.39% and 1.64% of patients aged 60 to 69 years, 70 to 79 and over 80 years respectively, totalling 13.24% of elderly patients who underwent the endoscopic procedure.

No scientific evidence was found to counter the epidemiological data found in this study, but it is believed that the number of elderly patients who undergo endoscopic procedures is increasing, following the growth of this portion of the population in Brazil [25].

Age should be a reason for special attention, since the elderly are more sensitive to drugs used in anesthesia and are at greater risk with the use of these substances for a variety of mechanisms: oxygen saturation naturally declines with aging, for several reasons, as well as a worsening of the ventilation-perfusion ratio; central cardiorespiratory reflex responses secondary to hypoxia and hypercapnia are reduced and slowed; central nervous system depressants (narcotic and non-narcotic) produce a more severe depression of the respiratory system, which increases the occurrence of transient apnea, in addition to a greater risk of aspiration by increasing the threshold at which the glottal reflex occurs.

It is also noted that the decrease in the mechanisms of renal and hepatic clearance of these drugs causes a prolongation of their action in the elderly, which also increases the occurrence of AE [26].

In relation to BMI, 53.18% of the studied group were overweight, according to the classification made by the WHO, of which 34.09% were pre-obese, 11.49% obese I, 4.62% obese II and 2.98% obese III. The increase in BMI is also considered an independent risk factor for the occurrence of adverse effects related to sedation, especially respiratory.

The American Society of Anaesthesiology considers that these patients are prone to airway collapse, being more susceptible to respiratory depression and the effects of sedatives, opioids and inhaled anesthetics on the airway [20,27,28] therefore, it should be given special attention to this population, since the majority is above the ideal weight.

Recently, several studies have emphasized obstructive sleep apnea and hypopnea syndrome (OSAHS) as an independent risk factor for adverse cardiorespiratory effects related to sedation in endoscopic procedures [29,30].

In the study by Paresh., *et al*. no relationship was found between the Stop-Bang score (used to predict obstructive sleep apnea with sensitivity of 83.6% for mild and 92.9% to 100% for moderate to severe, when the cut was greater than or equal to 332) and the occurrence of adverse respiratory effects. However, increased BMI, age, smoking and higher doses of propofol were found to be independent risk factors for the occurrence of adverse cardiorespiratory effects.

In this study, there was a prevalence of 5.54% of smokers, despite not having been informed of the smoking burden; however, the questionnaire to predict the prevalence of OSAHS in the population studied was not applied.

Regarding the use of medication, the routine use of hypnotics was documented in 5.54% (N = 52), the use of neuropsychiatric drugs was found in 10.37% (N = 101) and that of alcohol in 37.99% (N = 370). Alcohol abuse, regular use of benzodiazepines or opioids, and neuropsychiatric medications [33] may require an increase in the required dose of medication in EDA, which could also cause an increase in levels considered safe for conscious sedation. In addition, the patient's phenomenon of tolerance to sedation may generate greater dissatisfaction, incomplete examination, and possible lower adherence to recommendations for future endoscopic examinations [34].

Regarding the presence of comorbidities, the prevalence of systemic arterial hypertension (SAH) was 15.6%; other heart diseases 3.6%; respiratory diseases, 61.5%, which include asthma 10.6%, sinusitis 26.3%, rhinitis 23.9%; diabetes mellitus 4.4%; thyroid disease 7%, with hypothyroidism being the most prevalent (5.1%).

One study analysed the following risk factors for the occurrence of hypoxemia in the population undergoing endoscopy: SAH (odds ratio: 2.28; 95% CI: 1.44 - 3.60; P = 0.0004), diabetes mellitus (odds ratio: 2.37; 95% CI: 1.29 - 4.34; P = 0.005), heart disease (odds ratio: 1.97; 95% CI: 1.06 - 3.68; P = 0.0325) [27].

Serious and acute changes, such as myocardial infarction, vasovagal reaction, arrhythmias and congestion due to heart failure, although infrequent, have an increased incidence in the population with other underlying diseases (especially ASA 3 or more) [35].

In this study, the most described allergies were insect bites (8.2%) and penicillin (4.4%). These are not related to the risk of adverse events with sedation but represent a potential risk when the need to use prophylactic antibiotic therapy that contains penicillin or similar [35]. Although rare, serious reactions can occur during sedation or anaesthesia, and may vary from a local reaction to others of a systemic nature. In the series of this study, 80.59% of the patients were found with at least one of the risk factors already discussed.

Conclusion

Population demographic changes, in particular aging, the increasing prevalence of obesity and substance abuse, lead to changes in approach methodologies in all areas of medicine. Considering endoscopy and the sedation involved, attention to these population variations is especially important, since they are directly related to the increased probability of occurrence of adverse cardiorespiratory effects during and after the procedure, especially considering that the majority this population has at least one of the risk factors mentioned in the literature for their occurrence.

The conclusions of this work must be understood in the light of an independent outpatient unit. Therefore, there may be a bias of possible underreporting in relation to the population that undergoes EDA in hospital units, due to a greater possibility of comorbidities in hospitalized patients. More studies are needed to get to know the general population, considering the new publications to address variables not covered in the present study.

Bibliography

1. Goldman L. "Internal Medicine Treaty". 23rd Edition Rio de Janeiro: Elsevier 1 (2010): 1116.
2. Morrissey JF and Reichelderfer M. "Gastrointestinal Endoscopy". *The New England Journal of Medicine* 325 (1991): 1142-1149. e1214-1222.
3. Scott BB. "Gastroenterology in the Trent region in 1992 and a review of changes since 1975". *Gut* 36 (1995): 468-472.
4. Fanti L and Testoni PA. "Sedation and analgesia in gastrointestinal endoscopy: What's new?" *World Journal of Gastroenterology* 16 (2010): 2451-2457.

5. Froehlich F., *et al*. "Conscious sedation, clinically relevant complications, and monitoring of endoscopy: results of a nationwide survey in Switzerland". *Endoscopy* 26 (1994): 231-234.

6. Lieberman DA., *et al*. "Cardiopulmonary risk of esophagogastroduodenoscopy. Role of endoscopic diameter and systemic sedation". *Gastroenterology* 88 (1985): 468-472.

7. Keefe EB and Schrock TR. "Complications of gastrointestinal endoscopy". Em: Sleisenger MH, Fordtran JS -Gastrointestinal disease: Pathophysiology/diagnosis/management, 5th Edition, Philadelphia, Saunders (1993): 301-308.

8. Silvis SE., *et al*. "Endoscopic complications: Results of the 1974 American Society for Gastrointestinal Endoscopy Survey". *The Journal of the American Medical Association* 235 (1976): 928-930.

9. Quine MA., *et al*. "Prospective audit of upper gastrointestinal endoscopy in two regions of England: safety, staffing, and sedation methods". *Gut* 36 (1995): 462-467.

10. Sieg A., *et al*. "Prospective evaluation of complications in outpatient GI endoscopy: a survey among German gastroenterologists". *Gastrointestinal Endoscopy* 53 (2001): 620-627.

11. Wolfsen HC., *et al*. "Complications of endoscopy of the upper gastrointestinal tract: a single center experience". *Mayo Clinic Proceedings* 79 (2004): 1264-1267.

12. Heuss LT., *et al*. "Changing patterns of sedation and monitoring practice during endoscopy (): results of a nationwide survey in Switzerland". *Endoscopy* 37 (2005): 161-166.

13. Cotton PB., *et al*. "A lexicon for endoscopic adverse events: report of an ASGE workshop". *Gastrointestinal Endoscopy* 71 (2010): 446-454.

14. Zubarik R., *et al*. "Prospective analysis of complications 30 days after outpatient upper endoscopy". *The American Journal of Gastroenterology* 94 (1999): 1539-1545.

15. Mallery JS., *et al*. "Complications of ERCP". *Gastrointestinal Endoscopy* 57 (2003): 633-638.

16. Adler DG., *et al*. "ASGE guideline: complications of EUS". *Gastrointestinal Endoscopy* 61 (2005): 8-12.

17. Abraham N., *et al*. "Predicting which patients can undergo upper endoscopy comfortably without conscious sedation". *Gastrointestinal Endoscopy* 56 (2002): 180-189.

18. Sharma VK., *et al*. "A national study of cardiopulmonary unplanned events after GI endoscopy". *Gastrointestinal Endoscopy* 66 (2007): 27-34.

19. Yamada T. "Textbook of Gastroenterology". 5th Edition. Volume 1. Oxford: Blackwell (2008): 2888-2889, 2899.

20. Romagnuolo J., *et al*. "Identifying and reporting risk factors for adverse events in endoscopy. Part I: cardiopulmonary events". *Gastrointestinal Endoscopy* 73.3 (2011): 579-585.

21. Practice guidelines for sedation and analgesia by non-anesthesiologists. "An Updated Report by the American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists". *Anesthesiology* 96 (2002): 1004-1017.

22. Federal Council of Medicine (Brazil). Resolution No. 1,886 of November 21, 2008. Approves the medical code of ethics. D Of Union (2008): 271.

23. Brazilian Association for the Study of Obesity and Metabolic Syndrome (Abeso). "Brazilian obesity guidelines". Itapevi, AC Pharmaceutical, 3rd Edition (2009/2010): 11.

24. Ribeiro JBS., *et al*. "Epidemiological Profile of 702 Patients Undergoing Low Digestive Endoscopy at the Endoscopy Service of Hospital Geral César Calls". *Gastrointestinal Endoscopy* 31 (2012): 57-59.

25. Amornyotin S., *et al*. "Age-dependent safety analysis of propofol-based deep sedation for ERCP and EUS procedures at an endoscopy training center in a developing country". *Clinical and Experimental Gastroenterology* 5 (2012):123-128.

26. Long Y., *et al*. "Pre-Existing Diseases of Patients Increase Susceptibility to Hypoxemia during Gastrointestinal Endoscopy". *Plos one* 7 (2012): 1.

27. Berzin TM., *et al*. "A prospective assessment of sedation-related adverse events and patient and endoscopist satisfaction in ERCP with anesthesiologist administered sedation". *American Society for Gastrointestinal Endoscopy* 73 (2011): 716.

28. Coté GA., *et al*. "A screening instrument for sleep apnea predicts airway maneuvers in patients undergoing advanced endoscopic procedures". *Clinical Gastroenterology and Hepatology* 8 (2010): 660-665.

29. Corso RM., *et al*. "Clinical use of the STOP-BANG questionnaire in patients undergoing sedation for endoscopic procedures". *Minerva Anestesiologica* 78 (2012): 109-110.

30. Chung F and Elsaid H. "Screening for obstructive sleep apnea before surgery: Why is it important?" *Current Opinion in Anesthesiology* 22 (2009): 405-411.

31. Mehta PP., *et al*. "Can a validated sleep apnea scoring system predict cardiopulmonary events using propofol sedation for routine EGD or colonoscopy? A prospective cohort study". *Gastrointestinal Endoscopy* 79 (2014): 442.

32. Kang HS. "Preparation and Patient Evaluation for Safe Gastrointestinal Endoscopy". *Clinical Endoscopy* 46 (2013): 212-218.

33. Gorospe EC and Oxentenko AS. "Preprocedural considerations in gastrointestinal endoscopy". *Mayo Clinic Proceedings* 88 (2013): 1010-1016.

34. Cena M., *et al*. "Safety of endoscopic procedures after acute myocardial infarction: A systematic review". *Cardiology Journal* 19 (2012): 447-452.

35. American Society for Gastrointestinal Endoscopy -ASGE Guideline. "Antibiotic prophylaxis for GI endoscopy". *Gastrointestinal Endoscopy* 67 (2008): 791-798.

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