

Title:

The current situation of digestive endoscopy units in the Valencian Community

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The current situation of digestive endoscopy units in the Valencian Community

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Hospitals that took part in the survey:

1. Public hospitals: Hospital Comarcal de Vinaròs, Hospital General Universitario de Castellón, Hospital Universitario de La Plana, Hospital Provincial de Castellón, Consorcio Hospital General Universitario de Valencia, Hospital Arnau de Vilanova-Llíria de Valencia, Hospital Clínico Universitario de Valencia, Hospital Universitario Dr. Peset, Hospital Lluís Alcanyes de Xàtiva, Hospital Universitari i Politècnic La Fe, Hospital Francisc de Borja de Gandía, Hospital General de Requena, Hospital de Sagunto, Hospital Virgen de los Lirios de Alcoy, Hospital General Universitario de Elda, Hospital General Universitario de Alicante, Hospital Marina Baixa de La Vila Joiosa, Hospital Universitario de San Juan, Hospital General Universitario de Elche and Hospital Vega Baja de Orihuela.

2. Privately managed public hospitals: Hospital Universitario de la Ribera, Hospital de Manises, Hospital Universitario de Torrevieja and Hospital Universitario del Vinalopó.

ABSTRACT

Introduction and objectives: in view of the advances made over the past few years, digestive endoscopy units must adapt to an increased demand and the development of novel techniques. However, the actual status of these units is virtually unknown and is limited to few surveys from over a decade ago. Thus, a new survey was performed of the current situation of endoscopy units in the Valencian Community.

Material and methods: a specific survey was designed to assess the status of endoscopy units within public hospitals and privately managed public hospitals in the Valencian Community. The survey included the following items: hospital data, unit architectural structure, equipment, human resources, functional structure, sedation, procedures performed, advanced therapies and ongoing care.

Results: twenty-four of the 25 public hospitals or privately funded public hospitals in the Valencian Community responded to the survey, corresponding to a 96% participation. The number of physicians in gastroenterology services or sections ranged from 2 to 21. Endoscopist-controlled propofol sedation was used in 13 hospitals (54.2%). Most centers performed 1,000 to 3,000 gastroscopies per year. Fourteen units (58.3%) performed 2,000 to 3,000 colonoscopies and endoscopic retrograde cholangiopancreatography (ERCP) was performed in 22 hospitals (91.7%).

Conclusions: the results of the survey revealed large differences in infrastructure and organization among public hospital endoscopy units in the Valencian Community. Organization is highly heterogeneous and independent of hospital size.

Key words: Digestive endoscopy. Survey.

INTRODUCTION

Digestive endoscopy is one of the medical fields that has advanced most over the last few decades in Spain. Due to these technical advances, it has evolved from having an eminently diagnostic role to being increasingly important in the treatment of digestive lesions. This scenario led to an exponential increase in the demand for endoscopic procedures, which resulted in a rapid saturation of the estimates forecast by health systems. Extensive efforts were required from health authorities and medical services in order to counteract this situation by adapting the endoscopy units.

Paradoxically, in Spain, the lack of awareness regarding the physical and functional structure of digestive endoscopy units is far reaching. Surveys are probably the best way to gain an insight into these data. However, there is only one survey on this subject to date that was reported back in 2006 in Andalusia (1). We have performed a new survey in order to gain knowledge of the current status of endoscopy units within the Valencian Community.

MATERIAL AND METHODS

A specific survey was designed to assess the situation of endoscopy units in public and privately managed public hospitals in the Valencian Community. This survey was structured into the sections listed in annex 1. Digestive diseases service and section heads, or endoscopy unit heads when applicable, were personally invited to respond to a telematic survey. They were given two months to respond, from September to October 2017, and the results were analyzed once the deadline had passed.

Statistical analysis

This was an observational, descriptive study. The variables were prospectively collected and expressed as absolute numbers and percentages.

RESULTS

Twenty-four of the 25 public or privately managed public hospitals in the Valencian Community responded to the survey, which represented 96%. Nearly half (13; 54.2%) covered a healthcare area with a population ranging from 100,000 to 200,000 inhabitants. Five hospitals (20.8%) covered an area with a population of over 300,000 people, whereas only two (8.3%) covered an area below 100,000 people.

Architectural structure

The endoscopy unit surface area was smaller than 100 m² in 15 (62.5%) hospitals. The surface area exceeded 500 m² in two hospitals (8.3%) (Fig. 1). Consequently, the number of rooms in the endoscopy units was generally small and 13 (54.2%) units had only one or two rooms. There was a room with radiology equipment in nine (37.5%)

units and a recovery room was available in 17 (70.8%). Sixteen (66.7%) units had double aspiration inlets in most endoscopy rooms and half of units (12; 50%) were fitted with double oxygen outlets. Similarly, 12 (50%) had CO₂ available on some of their towers.

Unit equipment

The number of endoscopy towers is logically related to the number of rooms per unit (Fig. 2). In fact, 15 (62.5%) units had three or fewer towers, whereas two (8.3%) hospitals had more than six towers. More than half of the units (16; 66.7%) had one or two electrocoagulation sources.

Overall, the number of gastroscopes and colonoscopes was related to the number of rooms in a given unit (Table 1). However, only four (16.7%) units had fewer than two gastroscopes and three (12.5%) had less than two colonoscopes per room. In contrast, one hospital had an endoscope/room ratio of 10:2 for gastroscopes and 14:2 for colonoscopes. Two (8.3%) units did not have duodenoscopes and most had one to three (19; 79.2%). Of all 24 hospitals that took part in the survey, 14 (58.3%) had at least one ultrathin endoscope. Nine (37.5%) had endoscopic ultrasound available, both with radial and linear endoscopes. Five (20.8%) had an enteroscope and six (25%) had a choledochoscope. Video capsule endoscopy was available in over half of the units (13; 54.2%). Finally, 15 (62.5%) had three or four washing machines for endoscope processing.

Human resources

The number of physicians in the gastroenterology services or sections that responded to our survey ranged from two to 21. Regarding their participation in endoscopy unit activities, the most common model included two full-time endoscopists, which is defined as four or five days a week (ten hospitals; 41.7%). Three (12.5%) units had four or more full-time doctors whereas five sites (20.8%) had none. Part-time (1-3 days a week) endoscopists were reported as two in seven units (29.2%) and five in seven additional units. Sixteen hospitals (66.7%) did not have a gastroenterology training program (MIR). Fifteen units (62.5%) had two or three full-time endoscopy nurses and

eleven (45.8%) had one to six part-time nurses. With regard to nursing assistants, two was the most common (ten units; 41.7%) with full-time endoscopy commitment and 16 hospitals (66.7%) had only zero to one part-time staff. Half of hospitals had a dedicated office worker for their endoscopy unit and ten (41.7%) had a dedicated porter.

All units had one physician and 22 units (91.7%) also had a nurse in the endoscopy room during the endoscopic procedures. Support staff were distributed as follows: half of the units had at least one, nine (37.5%) units had one shared by several rooms and three (12.5%) had no auxiliary staff.

Endoscopy unit functional structure

Most units have two rooms with endoscopic activity every morning during the week, although the number varies on a day to day basis. Furthermore, 23 of 24 hospitals (95.8%) have endoscopic activity in the evening. Seven (30%) have over five active rooms a week. The scheduled number of procedures (gastroscopies and/or colonoscopies) is highly variable among units and ranges from six to 12 (Fig. 3). Multiple factors play a role in this variability such as emergency procedures, sedation status, exclusive gastroscopy schedules and exclusive colonoscopy schedules.

Sedation

Deep sedation with propofol is performed by the endoscopist in 13 hospitals (54.2%). This modality is more common in hospitals in the Alicante province (90% of respondents) compared to the Valencia and Castellon provinces (58% and 25%, respectively). With regard to sedation controlled by the anesthesiology department, ten hospitals (41.7%) have at least one room with this modality every day during the morning shift and four hospitals have none. Half of hospitals have no rooms with anesthesiologist-controlled sedation during the weekly evening shift.

Endoscopist-controlled sedation with propofol is the most common modality in half of the units for gastroscopies. No sedation is used for over 75% of procedures in four centers (16.7%), whereas an anesthesiologist is standard in other sites. Furthermore, endoscopist-controlled deep sedation with propofol is most common (13 units; 54.2%)

for colonoscopies. Sedation is predominantly performed by an anesthesiologist in six centers (25%) and most colonoscopies are carried out with no sedation at all in one hospital. In all nine hospitals where echoendoscopy is performed, sedation is virtually universal. Sedation or general anesthesia is administered by an anesthesiologist in two thirds of centers and deep sedation is administered by the endoscopist in the other third. This is even more true for endoscopic retrograde cholangiopancreatography (ERCP) procedures; sedation (or general anesthesia) is administered by an anesthetist in 19 (86.4%) of the 22 hospitals where this technique is available, whereas the rest use endoscopist-controlled deep sedation (Fig. 4).

Procedures

Overall, a similar or greater number of colonoscopies *versus* gastroscopies are performed. The opposite was found in only one hospital. Most centers had already performed between 1,000 and 3,000 gastroscopies (75%) and the remaining had performed 3,000, except for one center with fewer than 1,000 gastroscopies. Fourteen units (58.3%) had performed between 2,000 and 3,000 colonoscopies and the remaining had performed over 3,000. With the exception of the previously mentioned center, which had performed fewer than 1,000. With regard to colonoscopies, five smaller hospitals (less than 500 beds) perform over 3,000 colonoscopies annually, whereas two larger institutions (over 500 beds) performed less than 3,000 (Table 2). The mean delay for ordinary colonoscopy is seven months and figure 5 shows the distribution of delay months per hospital. The maximum delay is 15 months and the minimum delay is two months. With regard to pre-procedure colon cleansing within the morning shift, the preparation was administered the previous evening in 13 hospitals (54.2%), whereas the remaining use fractional doses. With regard to colonoscopy, the endoscope insertion tube is most commonly handled by nurses (18 centers; 75%) and forceps are usually handled by nurses or nursing assistants (50% each). Twenty-two (91.7%) of 24 hospitals have already initiated a colon cancer screening program. This program follows a specific schedule and is unrelated to the standard agenda in 19 (86.4%) units. Weekly screenings oscillate between one and five agendas per hospital. Each agenda includes five or six patients in most centers (14;

58.4%).

Two physicians perform the echoendoscopy in seven of the nine hospitals (77.8%) with this technique. Over half of units (55%) carry out 250 to 500 procedures a year. Three hospitals (33.3%) performed more than 200 FNA procedures during the past year and two (22.2%) performed less than 50. ERCP is performed in 22 hospitals (91.7%) and most sites offering ERCP have performed 100 to 250 procedures during the past year (13; 59.1%). Two physicians in the unit usually perform this technique (nine units; 40.9%) and the examination is most commonly performed with the patient in the lateral position (16 units; 72.7%). Pediatric endoscopy for children up to seven years of age is performed at the endoscopy unit in 14 hospitals (58.3%).

Advanced therapeutics

Widespread techniques include the placement of PEG tubes (all hospitals), enteric stents (21 sites) and endoscopic mucosal resection (20 sites). Pseudocyst drainage (ten sites), endoscopic necrosectomy (seven sites), endoscopic management of Zenker's diverticula (seven sites), endosonography-guided cholangiopancreatography (EGCP) (six sites), choledochoduodenostomy/hepaticogastrostomy (five sites), endoscopic transmural resection (five sites), gastrojejunostomy (three sites), cholecystoduodeno/gastrostomies (three sites), and endoscopic submucosal dissection (only one site) are less commonly performed.

Ongoing care

On-duty endoscopy is only available in seven hospitals (29%) in the Valencian Community.

DISCUSSION

This survey was intended to assess the situation of digestive endoscopy units in the Valencian Community in a cross-sectional manner. Thus, questionnaires were sent to public hospitals in the Valencian Community as well as privately managed centers of the Valencian Health Agency. Private centers were excluded in order to obtain a homogeneous sample. Only one similar survey has been reported to date in Andalusia

(1), thus the comparison of the results with those of Spain as a whole or other autonomous communities is not possible. The Andalusian survey was performed more than a decade ago. Thus, extrapolating the physical and functional structures of those endoscopy units to current ones is challenging due to the technical advances developed since then. Twenty-four of 25 hospitals responded to the survey, which is a 96% response rate. This rate confers strength to our study, as it reflects the current status of digestive endoscopy in our community with almost complete reliability.

Over half of the endoscopy units in the Valencian Community have a surface area smaller than 100 m². Thus, most units have one or two rooms for procedures, which is inadequate to meet the current demand. In fact, 12 of the 14 hospitals in the Andalusian survey of 2006 (1) already had three or more endoscopy rooms. Twenty per cent of centers in our community do not have a full-time endoscopist, defined as at least four days a week, and most hospitals have two or three gastroscopes/colonoscopes per room. Thus, the resources devoted to digestive endoscopy are clearly inadequate. For colonoscopy, this translates to a mean delay of seven months, which represents a health risk factor for patients. Notably, 23 of 24 hospitals have both morning and evening shifts in an attempt to counteract this issue, with over five open weekly agendas during the evening. With regard to the number of procedures, most units performed more colonoscopies than gastroscopies in the past year, even though the latter represent easier and shorter procedures. This reflects the increase in colonoscopy demand that we are presently witnessing, due to the growing relevance of colorectal cancer (2) in both symptomatic and asymptomatic patients (due to the implementation of screening programs). Of note, colon cleansing is performed the previous evening for patients that undergo endoscopy during the morning shift, rather than fractionally in over half of centers. This reflects the difficulty of using the recommended fractional approach (3) for outpatient preparation, particularly for individuals who need to travel longer distances to their assigned hospital.

According to the present survey, almost all units have duodenoscopes, 37.5% have echoendoscopes and 20% have enteroscopes. The number of centers with these equipment are similar to that reported by the Andalusian survey results of 2006 (100%,

57% and 35%, respectively) (1), although only 14 hospitals in the large Andalusian community responded to the questionnaire. However, these techniques should be more widely available due to the increased demand for endoscopic treatments.

Sedation is one of the aspects that has stirred up more interest in the past few years and has resulted in the development of multiple clinical guidelines (4-6). In Spain, two surveys on endoscopy-related sedation were reported, one in Catalonia and one in Galicia (7-8). Overall, a notable increase in sedation was seen over the years. In Catalonia (7), in 2004, sedation was administered for only 11% of gastroscopies and 50% of colonoscopies, after excluding private hospitals in order to make the results more homogeneous. In Galicia (8), in 2005, sedation was used for more than half of gastroscopy procedures in 37% of hospitals and over half of colonoscopies in 55% of sites. In Andalusia (1), in 2006, 35% of hospitals used sedation in over 66% of gastroscopies and in 50% of hospitals for over 66% of colonoscopies. In our survey, 78% of units administered sedation in over 75% of gastroscopies and 96% in over 75% of colonoscopies. However, there is room for improvement in many aspects. In 2017 in the Valencian Community, four endoscopy units only administered some type of sedation in less than 25% of gastroscopies and one in less than 75% of colonoscopies.

Over the past few years, deep sedation with propofol has been gradually implemented in multiple endoscopy units. On the one hand, this allows sedation to be administered in a manner convenient to both the patient and the endoscopist, for virtually all procedures. On the other hand, this restricts the presence of an anesthesiologist during procedures with high anesthetic risk patients (4-5). This results in savings that are not reflected when comparing the above surveys (1,7,8). This was the most common sedation approach both for gastroscopies and colonoscopies in our survey. In contrast, propofol was exclusively used by anesthesiologists in the other surveys and the drugs most commonly used for endoscopist-administered sedation included benzodiazepines and opiates.

With regard to precision resources for sedation according to national and international guidelines (4-6), the situation varies across the Spanish territory and there is a general room for improvement. However, advances have been made. There is a recovery room in 37% of hospitals in Catalonia (7), 38.5% of public hospitals in Galicia (8), 64% of sites

in Andalusia (1) and 71% of centers in the Valencian Community. While 14% of Andalusian hospitals (1) recognized the lack of adequate means for recovery, monitoring of patients undergoing sedation was universal in the present survey. In fact, 50% of units are fitted with double oxygen outlets and two thirds have double aspiration inlets.

To conclude, the results of our survey reveal large differences in the infrastructure distribution and in the endoscopy unit organization among public hospitals in the Valencian Community. Organization is highly heterogeneous, regardless of hospital size and human and structural resources, which are usually inadequate to meet the present demand. It seems advisable that properly authorized agencies, such as the Spanish Society of Gastrointestinal Endoscopy (Sociedad Española de Ecografía Digestiva –SEED-) in collaboration with health authorities, establish a minimum set of resources for endoscopy units to care for a given population. While sedation has notably improved among public hospitals in the Valencian community, differences remain that should be corrected.

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Table 1. Distribution of gastroscopes and colonoscopes per endoscopy room in the hospitals included in the survey

<i>No. of rooms</i>	<i>No. of gastroscopes (ratio per room)</i>	<i>No. of colonoscopes (ratio per room)</i>
1	2 (2)	3 (3)
2	3 (1.5)	6 (3)
2	4 (2)	4 (2)
2	4 (2)	5 (2.5)
2	4 (2)	5 (2.5)
2	4 (2)	5 (2.5)
2	4 (2)	5 (2.5)
2	4 (2)	6 (3)
2	4 (2)	6 (3)
2	5 (2.5)	6 (3)
2	6 (3)	5 (2.5)
2	6 (3)	6 (3)
2	10 (5)	14 (7)
3	3 (1)	6 (2)
3	4 (1.3)	4 (1.3)
3	5 (1.7)	5 (1.7)
3	6 (2)	7 (2.3)
3	6 (2)	10 (3.3)
3	9 (3)	12 (4)
4	8 (2)	9 (2.2)
4	13 (3.2)	13 (3.2)
5	9 (1.8)	10 (2)
5	11 (2.2)	8 (1.6)
7	10 (1.4)	10 (1.4)

Table 2. Number of colonoscopies within the past year per hospital size

<i>No. of beds</i>	<i>No. of colonoscopies</i>						
	< 1,000	2,001- 500	2,501- 3,000	3,001- 3,500	3,501- 4,000	4,001- 4,500	> 4,500
100-200	1 (33%)	1 (33%)	1 (33%)	0	0	0	0
201-500	0	5 (33%)	5 (33%)	4 (27%)	1 (7%)	0	0
501-800	0	0	2 (50%)	0	1 (25%)	0	1 (25%)
801-1,000	0	0	0	0	1 (50%)	1 (50%)	0

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Annex 1. Survey contents

1. Hospital data:
 - a. Type: public, privately managed public
 - b. Number of beds
 - c. Province
 - d. Covered area population
2. Endoscopy unit architectural structure:
 - a. Surface area
 - b. Number of rooms
 - c. Own radiology room
 - d. Recovery room
 - e. Double suction inlet in most rooms
 - f. Double oxygen outlet in most rooms
 - g. CO₂ available on endoscopy towers
3. Unit equipment:
 - a. Number of endoscopy towers
 - b. Number of electrocoagulation sources
 - c. Number of gastroscopes
 - d. Number of colonoscopes
 - e. Number of duodenoscopes
 - f. Number of ultrathin endoscopes
 - g. Number of radial and linear echoendoscopes
 - h. Number of enteroscopes
 - i. Choledochoscope available
 - j. Videocapsule endoscopy available
 - k. Number of washing machines for endoscopic procedures
4. Unit human resources:
 - a. Total number of physicians in the gastroenterology service or section
 - b. Total number of physicians devoted full-time to endoscopy (4-5 days/week)

- c. Total number of physicians devoted part-time to endoscopy (1-3 days/week)
 - d. Total number of residents in the gastroenterology service or section annually
 - e. Number of nurses devoted full-time to endoscopy
 - f. Number of nurses devoted part-time to endoscopy
 - g. Number of assistants devoted full-time to endoscopy
 - h. Number of assistants devoted part-time to endoscopy
 - i. Dedicated manager (y/n)
 - j. Dedicated porter (y/n)
 - k. Staff present in each endoscopy room (doctors, nurses, assistants)
5. Unit functional structure:
- a. Number of rooms with endoscopy activity during the morning shift (detail each weekday)
 - b. Number of rooms with endoscopy activity during the evening shift (detail each weekday)
 - c. Number of patients scheduled per endoscopy room (gastrosopies + colonoscopies)
6. Sedation:
- a. Administration of propofol sedation controlled by the endoscopist
 - b. Sedation by an anesthesiologist:
 - i. Number of rooms where sedation is provided by anesthesiology in the morning shift
 - ii. Number of rooms where sedation is provided by anesthesiology in the evening shift
7. Unit-related procedures:
- a. Gastrosopies:
 - i. Number of procedures during the past year
 - ii. Percentage of procedures without sedation
 - iii. Percentage of procedures with conscious sedation

- iv. Percentage of procedures with endoscopist-controlled deep sedation
- v. Percentage of procedures with anesthesiologist-controlled deep sedation
- b. Colonoscopies:
 - i. Number of procedures during the past year
 - ii. Percentage of procedures without sedation
 - iii. Percentage of procedures with conscious sedation
 - iv. Percentage of procedures with endoscopist-controlled deep sedation
 - v. Percentage of procedures with anesthesiologist-controlled deep sedation
 - vi. Standard colonoscopy technique
 - vii. Staff handling the insertion tube
 - viii. Staff handling forceps
 - ix. Colon cancer screening program:
 - 1. Specific screening schedule
 - 2. Number of weekly schedules
 - 3. Number of procedures per schedule
- c. Echoendoscopies:
 - i. Echoendoscopy available at the unit
 - ii. Number of procedures during the past year
 - iii. Number of physicians performing echoendoscopy
 - iv. Number of echo-guided FNAs during the past year
 - v. Percentage of procedures with conscious sedation
 - vi. Percentage of procedures with endoscopist-controlled deep sedation
 - vii. Percentage of procedures with anesthesiologist-controlled deep sedation
- d. ERCP:
 - i. ERCP available at the unit

- ii. Number of procedures during the past year
 - iii. Number of physicians performing ERCP
 - iv. Percentage of procedures with conscious sedation
 - v. Percentage of procedures with endoscopist-controlled deep sedation
 - vi. Percentage of procedures with anesthesiologist-controlled deep sedation
 - vii. Standard ERCP technique
8. Advanced therapeutics:
- a. PEG
 - b. Endoscopic mucosal resection
 - c. Endoscopic submucosal dissection
 - d. Endoscopic pseudocyst drainage
 - e. Endoscopic necrosectomy
 - f. Endoscopic management of Zenker's diverticulum
 - g. EUS-guided biliary access (EUS-CP)
 - h. Endoscopic choledochoduodenostomy or choledochogastrostomy
 - i. Endoscopic gastrojejunostomy
 - j. Endoscopic full-thickness resection
9. Ongoing care
- a. Digestive endoscopy on duty or on call
 - b. Human resources for on-call endoscopy

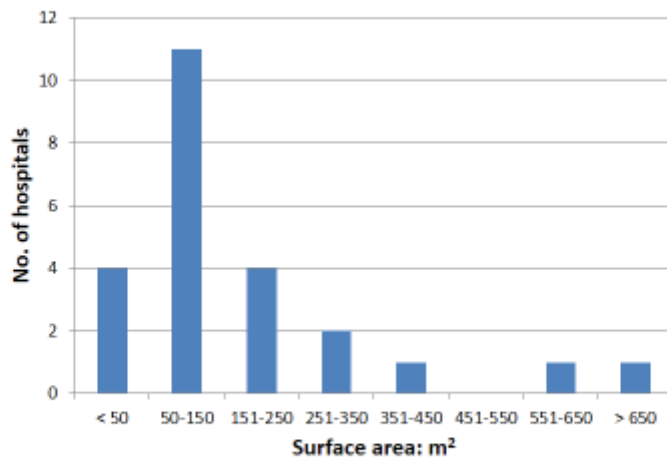


Fig. 1. Distribution of digestive endoscopy units by surface area.

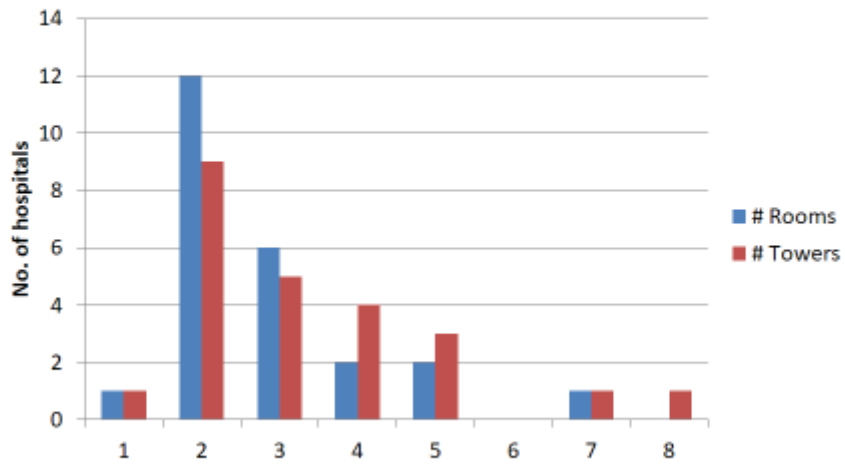


Fig. 2. Number of endoscopy rooms and towers among the units.

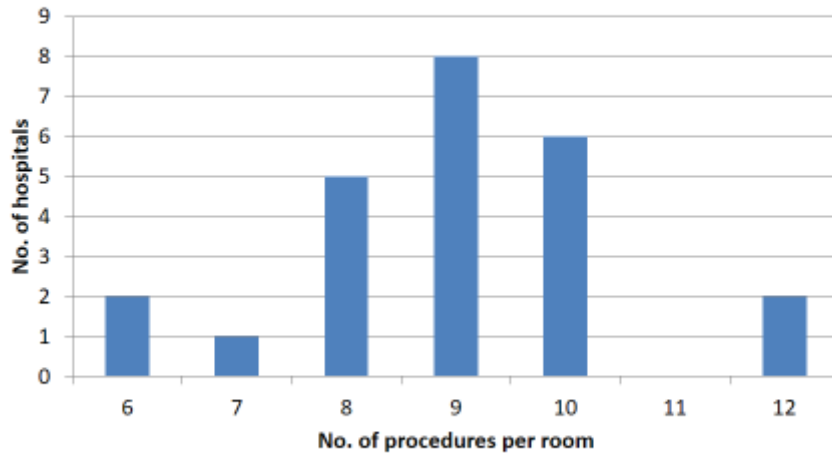


Fig. 3. Number of procedures (gastrosopies and colonoscopies) per room among the units.

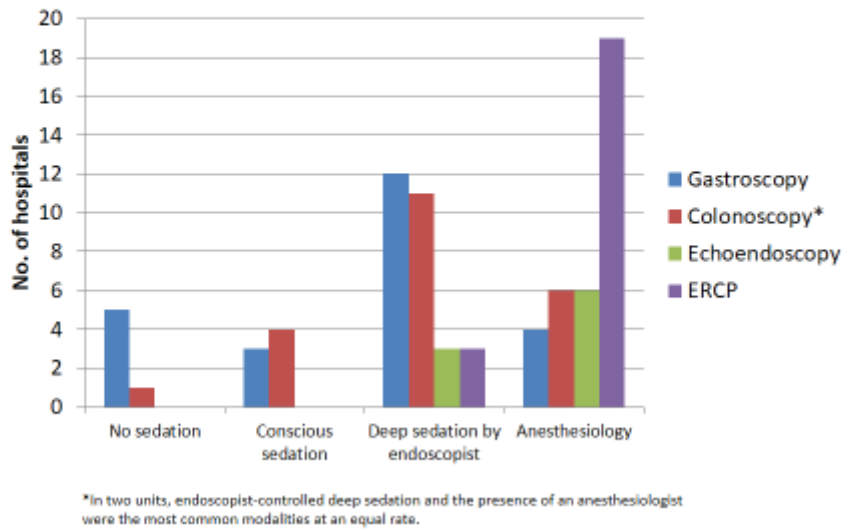


Fig. 4. Most common sedation modality per type of procedure.

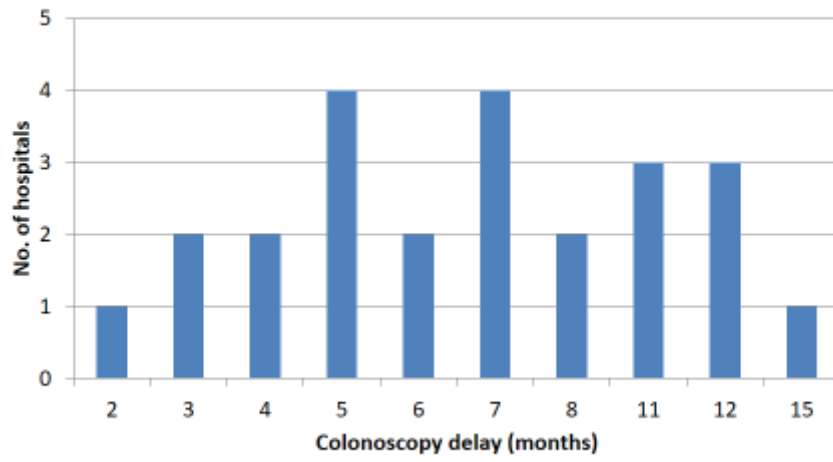


Fig. 5. Months of delay for colonoscopy among the endoscopy units.