AMBULATORY SURGERY

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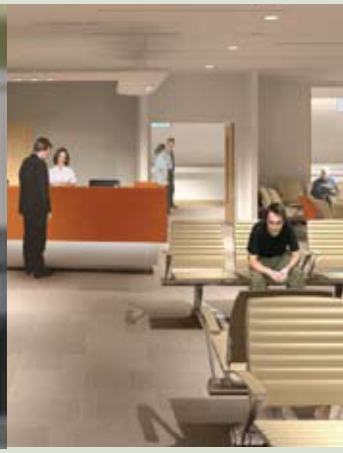

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AMBULATORY SURGERY

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Editorial

Beverly K. Philip

Incentives

The aim of the IAAS is to promote the development and growth of high quality ambulatory surgery worldwide. To this end, it encourages an international exchange of ideas and stimulates programmes of education, research and audit.

In this edition of AMBULATORY SURGERY, Paulo Lemos MD presents an audit of the financial valuation of ambulatory surgery from a truly international viewpoint. Eighteen out of 29 member countries of IAAS answered the questionnaire. Dr. Lemos obtained data on the countries' relative wealth by GDP and their healthcare model, and correlated that with healthcare costs for personnel and drugs, national costs of labour, and the payments for a list of surgical procedures comparing the inpatient and ambulatory settings. Dr. Lemos added a creative comparison of the costs of daily living by comparing the costs of commonly purchased ordinary items, the local newspaper, underground ticket and a burger. These data from four continents showed substantial financial differences and heterogeneity, with some indicators not tracking with others.

These data are interesting and important to be sure. There is however one point that rises above the rest. The countries that provide strong financial incentives achieve a high percentage of ambulatory surgery activity compared to other countries that do not. In these days of tightening budgets, governments should look to ambulatory surgery as a way to provide better care at lower cost, and should incentivize it.

Beverly K. Philip MD
Editor-in-Chief

Financing Day Surgery – An International Perspective

Paulo Lemos

Abstract

Financing day surgery activity is critical for the development of day surgery programmes all over the world. A questionnaire on economical issues was sent to several countries of the world, especially to those countries that are members of the International Association for Ambulatory Surgery (IAAS). The questionnaire asked for general information about financing national health services (NHS), costs of current needs, costs of labour and health staff, and the reimbursement system for a list of common surgical procedures undertaken on a day surgery basis, whatever the surgical regimen used. Eighteen out of 29 countries (62.1%) answered the questionnaire. There was a great heterogeneity in the wealth and the economic potential of the countries involved. However, usually the countries do maintain their relative position for different purposes: those that are wealthier have increased costs, but do reimburse better the surgical activity than those countries that are poorer. More importantly, those countries that have a strong financial incentive (e.g., Denmark, United Kingdom, etc) achieve a high percentage of day surgery activity compared to other countries where there is no financial incentive at all towards this surgical regimen, as in Germany. There are significant potential savings among other advantages when NHS maximize day surgery practice through financial incentives.

Keywords: Ambulatory surgery; Financing health system; Costs; Surgical procedures reimbursement.

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Introduction

Day surgery (DS) has been steadily increased all over the well-developed countries in the last two decades, although at different rates [1]. Economic disincentives can play an important role and create effective barriers to the development of this surgical regimen [2]. In fact, the block funding of hospitals unrelated to the number of patients treated and the number and type of procedures undertaken, which still persists to a greater or lesser extent in some countries today, as well as low reimbursement for procedures undertaken on a day basis when compared to inpatient treatment, which leads to financial loses for the DS setting, both slow the change towards DS [3]. In order to elucidate the way DS is financed all over the world, and how this influence surgical activity, a survey was conducted and sent to many countries with different economical backgrounds.

Methods and Material

A questionnaire regarding different economic data was sent in February 2012 to contact persons in several countries (Fig. 1). The questions consisted of general information about the type of financing the national health service (NHS), the cost of living (most popular daily newspaper, normal ticket for underground and the McDonald's Big Mac® burger), costs related to healthcare (human resources and drugs), costs of labour (minimum national salary), and the reimbursement for a list of common surgical procedures undertaken on a day basis, comparing the payment for inpatient and day surgery settings. For comparison proposes, these 14 surgical procedures were divided in three main groups, namely: i) most frequent day surgery procedures (cataract surgery, tonsillectomy, inguinal hernia repair, varicose vein surgery); ii) most frequent day surgery endoscopic procedures (knee arthroscopy, endoscopic female sterilisation and laparoscopy cholecystectomy), iii) most frequent complex day surgery procedures (thyroid lobectomy, lumbar microdiscectomy, transurethral resection of prostate, laparoscopic assisted vaginal hysterectomy (LAVH)). Several countries had no data for the following three surgical procedures: carpal tunnel release, circumcision and abdominoplasty, and for that reason these procedures were not included in the main groups referred. Since it is difficult to compare different economic situations, even using purchasing power parity, the methodology used compared the relative position between a given item and the wealth (gross domestic product – GDP) per capita for each country. This means that would be normal if a country ranks in the last position for its wealth per capita should repeat this ranking in all other items. In each participating country it was the responsibility of the contact person to find the national data and secure the best possible validity.

Results

Eighteen out of twenty nine countries (62.1%) answered this survey, representing four continents: America (Brazil and Peru), Asia (India), Europe (Belgium, Denmark, Finland, France, Germany, Hungary, Italy, Norway, Portugal, Romania, Spain, Sweden, The Netherlands, and United Kingdom - UK), and Oceania (Australia). However, Australia and Belgium only presented results related to cost of living and healthcare, because the reimbursement rates negotiated between payers and caregivers are not public, and for that reason they were not included in the present paper.

In Table I the sixteen countries enrolled in this study were ranked according to their wealth through GDP per capita, by purchasing power parity, in international dollars (Int$) (US$ equivalents). The European countries occupy the first thirteen positions, followed by the two southern American representatives (Brazil and Peru) and finally the Asian representative, India. In the same Table I, the health expenditure based on the per capita GDP percentage is presented with the relative position for each country. The different financial models used in healthcare systems are presented in Table II. The majority (7 out of 16 countries) still uses the Beveridge model where Governments run national health system financed through general taxation.

Fig. I Questionnaire.

Questionnaire NATIONAL LEVEL

Name of contributor: _____
Country/region: _____
Data source: _____

1. **Financing and Reimbursement**

1.1 How are health services financed ?

- ❑ government run national health system (NHS), financed by general taxation (Beveridge Model)
- ❑ insurance system covering everybody, jointly financed by employers and employees through payroll deduction (Bismark Model)
- ❑ mixed model (Beveridge and Bismark models)
- ❑ private health insurance

1.2 Are Day Surgery procedures reimbursed at the same rate of those carried out in inpatient settings ?
Yes ❑ No ❑

1.3 How much (in Euros or US$) does your health system pay for the following procedures according to the surgical setting (if not applicable please explain in the lines below the table) ?

Surgical Procedure	*ICD9CM*	*DRG*	*Inpatient Reimbursement (€ or US$)*	*Day Surgery Reimbursement (€ or US$)*
Cataract surgery	13.1-13.7	39		
Tonsillectomy	28.2 – 28.3	59		
Inguinal hernia repair	53.0.- 53.1	162		
Varicose veins	38.5	119		
Carpal tunnel release	04.43	6		
Knee arthroscopy	80.26	232		
Circumcision	64.0	342		
Endoscopic female sterilisation	66.2	361		
Laparoscopic cholecystectomy	51.23	494		
Thyroid lobectomy	06.2	290		
Lombar microdiscectomy	80.5	758		
Transuretral ressection of prostata	60.2	337		
Abdominoplasty	86.83	268		
Vaginal hysterectomy (LAVH)	68.51	359		

Comments:

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2. Economic Data of the Country (Human resources & cost of living)

2.1 How much do the following health professionals earn per month (consider public hospitals at the beginning of their professional career, without extra hours or services) ?

Health Professional	*Salary per month (in € or US$)*	*Number of hours per week*
Medical Doctor		
Nurse		

2.2 what is the price of the following drugs over the counter ? (consider purchase at the pharmacy without a doctor prescription)

Name of Drugs	*Unit*	*VAT*	*Price (include VAT) in € or US$*
Paracetamol, 1 g, per os			
Ibuprofen, 400 mg, per os			

2.3 How much is the minimum national salary per month, in your country ?

	Value per month (in € or US$)
Minimum National Salary	

2.4. How much do the following products cost to the common citizen (when possible do consider the cheapest price) ?

Name of Products	*Name / Unit*	*VAT*	*Price (include VAT) in € or US$*
Most popular national daily newspaper			
Normal ticket for underground			
McDonald's Big Mac Burger			

Comments:

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Table I Comparison between health expenditure and gross domestic product (GDP).

Rank	*Countries*	*GDP by PPP**	*Health expenditure***	*Relative position*
1	*Norway*	$53 471	9.6%	8th
2	*The Netherlands*	$42 183	12.0%	1st
3	*Sweden*	$40 394	10.0%	6th
4	*Germany*	$37 897	11.6%	3rd
5	*Denmark*	$37 152	11.5%	4th
6	*Finland*	$36 236	9.2%	11th
7	*UK*	$36 090	9.8%	7th
8	*France*	$35 156	11.8%	2nd
9	*Spain*	$32 360	9.5%	9th
10	*Italy*	$30 464	9.5%	9th
11	*Portugal*	$23 361	10.1%	5th
12	*Hungary*	$19 591	7.4%	13th
13	*Romania*	$12 476	5.4%	14th
14	*Brazil*	$11 769	8.4%	12th
15	*Peru*	$10 062	4.5%	15th
16	*India*	$3 694	4.2%	16th
	Median	*$33 758*	*11.0%*	

* purchasing power parity, per capita (Int$)

** percentage GDP per capita (data from OECD 2009)

Table II Financial Models in Healthcare Systems.

Models	*Countries*	
Beveridge Government run NHS financed by general taxation	Denmark	Spain
	Finland	Sweden
	Italy	United Kindgdom
	Portugal	
Bismark Insurance system covering everybody, jointly financed by employers and employees through payroll deduction	Hungary	Romania
Mixed Beveridge and Bismark models	France	Norway
Private health Insurance with mixed models Miscellaneous system that includes all financial models described	Brazil	Peru
	Germany	The Netherlands
	India	

The expenditure for health staff (doctor and nurse's wages) based on costs at the beginning of their professional career are shown in Table III and Table IV presents the costs for patients with current over-the-counter drugs used in the ambulatory setting: paracetamol, 1g, per os, and ibuprofen, 400 mg, per os.

Cost of living of two current needs, the most popular daily newspaper and the Big Mac® burger of MacDonald's Company, are presented in Table V. Using these indicators, life seems relatively expensive in Norway (ranks first for both expenses) and relatively cheap in India (ranks last in both cases).

Table VI presents costs with labour based on minimum national salary. Curiously, a minimum national salary does not exist in Germany. For the other countries it seems to be a direct correlation between the wealth of each country and costs of labour. Those richer do have higher minimum national salaries.

Reimbursement of the most frequent DS procedures (cataract, tonsillectomy, inguinal hernia repair and varicose vein surgery) performed in the inpatient and on the DS settings are presented in Table VII. UK has the best incentive reimbursement (these procedures are better reimbursed on a day basis – 117.34% - than in comparison with the inpatient setting), followed by Hungary (107.65%). Denmark, France, Spain, Portugal and Brazil pay the same value whatever the surgical regimen used. Curiously, countries like Sweden, Norway and Germany, reimburse DS activity for less than 50% of the value paid for the inpatient setting. The reimbursement of the most frequent DS endoscopic procedures (knee arthroscopy, female sterilisation and laparoscopic cholecystectomy) for both inpatient and DS settings are shown in Table VIII. In relation to reimbursement of DS, Table VIII seems similar to Table VII. Those countries that incentive DS practice do so for all surgical procedures. Again, Sweden, Norway and Germany have a disincentive financial policy towards DS practice. Romania does not reimburse these procedures on a day basis, which creates a great limitation for the development of day surgery programmes in the country. Table IX presents the reimbursement of the most frequent DS complex procedures: thyroid lobectomy, lumbar microdiscectomy, transurethral resection of prostate (TURP), and laparoscopic assisted vaginal hysterectomy, for both inpatient and DS settings. This time a disincentive financial policy regarding DS practice is being done by Norway, The Netherlands and Germany. Romania and Hungary do not reimburse these types of procedures on a day basis.

Finally, Table X presents the reimbursement for thirteen DS procedures based on the tariffs of the NHS of UK. Of notice, the reduction of the payment for the next year (2012-13) for the majority of procedures, and the greater reduction in the inpatient tariff list in comparison with DS list for tonsillectomy.

Table III Expenditure for health staff (values in euros for beginning of professional career).

Countries	*Doctor's wages*	*Relative position*	*Nurse's wages*	*Relative position*
Norway	5 920,00 €	1st	3 625,00 €	1st
The Netherlands	3 053,00 €	7th	2 100,00 €	4th
Sweden	4 090,00 €	2nd	2 500,00 €	3rd
Germany	3 844,25 €	5th	1 884,74 €	8th
Denmark	3 944,00 €	4th	2 800,00 €	2nd
Finland	3 174,89 €	6th	1 907,59 €	6th
UK	2 204,00 €	10th	2 088,00 €	5th
France	4 029,00 €	3rd	1 519,00 €	9th
Spain	1 419,35 €	12th	1 895,57 €	7th
Italy	2 250,00 €	9th	1 450,00 €	10th
Portugal	1 514,33 €	11th	1 020,06 €	12th
Hungary	500,00 €	15th	400,00 €	13th
Romania	310,00 €	16th	220,00 €	16th
Brazil	2 307,70 €	8th	1 153,85 €	11th
Peru	797,69 €	14th	398,46 €	14th
India	1 145,04 €	13th	305,34 €	15th
Median	*2 278,85 €*		*1 701,87 €*	

Table IV Costs for patients with current drugs used in the ambulatory setting (in euros).

Countries	*Paracetamol, 1 g**	*Relative position*	*Ibuprofen, 400 mg**	*Relative position*
Norway	0,13 €	7th	0,25 €	4th
The Netherlands	0,11 €	9th	0,12 €	10th
Sweden	0,07 €	14th	0,48 €	1st
Germany	0,10 €	11th	0,07 €	13th
Denmark	0,13 €	7th	0,17 €	5th
Finland	0,17 €	6th	0,13 €	7th
UK	0,04 €	15th	0,05 €	14th
France	0,23 €	3rd	0,10 €	11th
Spain	0,18 €	5th	0,38 €	2nd
Italy	0,23 €	3rd	0,16 €	6th
Portugal	0,09 €	12th	0,08 €	12th
Hungary	0,11 €	9th	0,13 €	7th
Romania	0,46 €	1st	0,03 €	15th
Brazil	0,08 €	13th	0,13 €	7th
Peru	0,37 €	2nd	0,28 €	3rd
India	0,01 €	16th	0,03 €	15th
Median	*0,12 €*		*0,13 €*	

* per unit, per os

Table V Costs of living with current needs (in euros).

Countries	*Newspaper**	*Relative position*	*Big Mac Burger***	*Relative position*
Norway	3,30 €	1st	7,12 €	1st
The Netherlands	1,50 €	4th	3,15 €	10th
Sweden	1,14 €	8th	2,73 €	14th
Germany	0,60 €	13th	3,79 €	5th
Denmark	3,00 €	2nd	3,70 €	6th
Finland	2,50 €	3rd	3,90 €	3rd
UK	0,35 €	15th	3,52 €	9th
France	1,00 €	9th	3,80 €	4th
Spain	1,30 €	6th	3,55 €	8th
Italy	1,20 €	7th	3,60 €	7th
Portugal	0,90 €	11th	2,95 €	11th
Hungary	0,37 €	14th	2,00 €	15th
Romania	0,90 €	11th	2,90 €	12th
Brazil	1,31 €	5th	4,37 €	2nd
Peru	1,00 €	10th	2,85 €	13th
India	0,08 €	16th	0,92 €	16th
Median	*1,07 €*		*3,54 €*	

* most popular daily newspaper

** MacDonald's®

Table VI Expenditure for health staff (values in euros for beginning of professional career).

Countries	*Minimum national salary*	*Relative position*
Norway	2 900,00 €	1st
The Netherlands	1 446,60 €	5th
Sweden	1 590,90 €	4th
Germany	not applicable	
Denmark	2 112,00 €	2nd
Finland	1 600,00 €	3rd
UK	1 150,00 €	6th
France	1 098,00 €	7th
Spain	641,40 €	9th
Italy	800,00 €	8th
Portugal	485,00 €	10th
Hungary	330,00 €	11th
Romania	165,00 €	14th
Brazil	265,80 €	12th
Peru	192,31 €	13th
India	76,34 €	15th
Median	*800,00 €*	

Table VII Reimbursement of the most frequent DS procedures* in the inpatient (average value, in euros) and on the DS settings (% of the inpatient value).

Countries	*Value for inpatient setting*	*Relative position*	*Day Surgery value (% of inpatient)*
Norway	1 507,75 €	7th	42.02%
The Netherlands	2 926,65 €	2nd	55.26%
Sweden	4 219,92 €	1st	43.89%
Germany	2 004,05 €	3rd	36.95%
Denmark	1 615,50 €	5th	100.00%
Finland	1 875,00 €	4th	66.93%
UK	1 020,75 €	11th	117.34%
France	1 247,75 €	9th	100.00%
Spain	742,63 €	13th	100.00%
Italy	1 431,72 €	8th	86.20%
Portugal	1 603,21 €	6th	100.00%
Hungary	272,50 €	15th	107.65%
Romania	191,00 €	16th	52.09%
Brazil	1 103,85 €	10th	100.00%
Peru	658,97 €	14th	76.73%
India	896,95 €	12th	62.77%
Median	*1 339,74 €*		

* cataract, tonsillectomy, inguinal hernia repair and varicose vein surgery.

Table VIII Reimbursement of the most frequent DS endoscopic procedures* in the inpatient (average value, in euros) and on the DS settings (% of the inpatient value).

Countries	*Value for inpatient setting*	*Relative position*	*Day Surgery value (% of inpatient)*
Norway	2 294,00 €	5th	32.15%
The Netherlands	2 951,06 €	2nd	65.41%
Sweden	5 121,36 €	1st	44.21%
Germany	2 067,59 €	8th	31.44%
Denmark	2 108,33 €	7th	100.00%
Finland	2 595,00 €	3rd	87.41%
UK	1 358,67 €	13th	108.54%
France	1 841,00 €	10th	100.00%
Spain	1 009,50 €	14th	100.00%
Italy	2 412,98 €	4th	100.00%
Portugal	1 741,12 €	11th	100.00%
Hungary	438,33 €	15th	57.03%
Romania	196,00 €	16th	no value for DS
Brazil	2 207,69 €	6th	100.00%
Peru	1 847,69 €	9th	65.01%
India	1 399,49 €	12th	61.82%
Median	*1 957,64 €*		

* knee arthroscopy, female sterilisation and laparoscopic cholecystectomy.

Table IX Reimbursement of the most frequent DS complex procedures* in the inpatient (average value, in euros) and on the DS settings (% of the inpatient value).

Countries	*Value for inpatient setting*	*Relative position*	*Day Surgery value (% of inpatient)*
Norway	2 186,33 €	11th	36.47%
The Netherlands	6 874,02 €	1st	31.31%
Sweden	5 335,36 €	2nd	51.81%
Germany	3 170,90 €	5th	26.09%
Denmark	4 166,25 €	3rd	80.13%
Finland	3 275,00 €	4th	54.27%
UK	2 876,50 €	7th	102.05%
France	2 632,33 €	9th	100.00%
Spain	1 210,21 €	14th	100.00%
Italy	2 726,57 €	8th	97.86%
Portugal	2 441,42 €	10th	88.66%
Hungary	572,50 €	15th	no value for DS
Romania	381,75 €	16th	no value for DS
Brazil	2 942,31 €	6th	100.00%
Peru	1 524,36 €	13th	74.55%
India	2 003,82 €	12th	76.19%
Median	*2 679,45 €*		

* thyroid lobectomy, lombar microdiscectomy, TURP and LAVH.

Table X UK reimbursement based on surgical tariffs for 13 DS procedures performed on inpatient and day basis, on two consecutives years (2011–12 and 2012–13).

				Inpatient Tariff			*Daycase Tariff*		
Surgical Procedure	***ICD9CM***	***DRG***	***HRG4***	***2011-12***	***2012-13***	***%***	***2011-12***	***2012-13***	***%***
Cataract surgery	13.1-13.7	39	BZ03Z	1 091,50 €	1 007,72 €	-7,68%	1 091,50 €	1 007,72 €	-7,68%
Tonsillectomy	28.2 – 28.3	59	CZ05Y (adult)	1 286,20 €	868,48 €	-32,48%	1 286,20 €	1 222,48 €	-4,95%
			CZ05T (<=18)	1 231,92 €	928,66 €	-24,62%	1 231,92 €	1 282,66 €	4,12%
Inguinal hernia repair	53.0.- 53.1	162	FZ18C	972,32 €	986,48 €	1,46%	1 326,32 €	1 340,48 €	1,07%
Varicose veins	38.5	119	QZ05B	1 275,58 €	1 221,30 €	-4,26%	1 275,58 €	1 221,30 €	-4,26%
Carpal tunnel release	4.43	6	HB55C	1 090,32 €	1 118,64 €	2,60%	1 090,32 €	1 118,64 €	2,60%
Knee arthroscopy	80.26	232	HB24C	1 400,66 €	1 367,62 €	-2,36%	1 400,66 €	1 367,62 €	-2,36%
Circumcision	64	342	LB32B (adult)	840,16 €	847,24 €	0,84%	840,16 €	847,24 €	0,84%
			LB32C (<=18)	870,84 €	979,40 €	12,47%	870,84 €	979,40 €	12,47%
Endoscopic female sterilisation	66.2	361	MA10Z	864,94 €	1 095,04 €	26,60%	864,94 €	1 095,04 €	26,60%
Laparoscopic cholecystectomy	51.23	494	GA10D/E	1 616,60 €	1 613,06 €	-0,22%	1 993,02 €	1 961,16 €	-1,60%
Thyroid lobectomy	6.2	290	KA01B/9B	2 801,32 €	2 625,50 €	-6,28%	2 801,32 €	2 625,50 €	-6,28%
Lumbar microdiscectomy	80.5	758	HC04C	3 937,66 €	3 875,12 €	-1,59%	3 937,66 €	3 875,12 €	-1,59%
Transurethral resection of prostate	60.2	337	LB25C	2 021,34 €	1 937,56 €	-4,14%	2 198,34 €	2 173,56 €	-1,13%
Vaginal hysterectomy (LAVH)	68.51	359	MA07B/D	3 168,30 €	3 066,82 €	-3,20%	3 168,30 €	3 066,82 €	-3,20%

Discussion

The majority of countries enrolled in this study (7 out of 16 countries) still use the Beveridge general-taxation model. This system needs more public funds than the Bismark employer-employee-funded or Private Insurance systems. For that reason and due to the European economical crisis we can speculate that in the near future some European economies with financial difficulties will discuss the need to reformulate their financing model. It is important to note that increasing the percentage of surgery done as day case will reduce the costs of operations, or enable scarce healthcare financing to provide more services. Independent of their payment system, almost all western European societies spent between 9 and 12% of their GDP in the health system, making health one of the priorities for its development and the well being of its citizens. Brazil one of the 20 greatest world economies is spending 8.4%, investing a lot in the health system in the last years and achieving important improvements on its health indicators [4]. The two eastern European representatives (Hungary and Romania) spent between 5.0 and 7.5%, not very different from developing countries like Peru and India that spent less than 5.0% of their GDP.

The purpose of this study was to compare costs and reimbursement to the level of wealth of its country. For that reason and due to the results found several remarks for each country should be made:

- **Norway (wealth – rank 1st):** Being the richest country of those countries enrolled in the present study it was not surprising to have a leading position in the majority of costs (with staff, labour, drugs). Nevertheless, in terms of health expenditure it ranks at the middle of the list, and has a tight control in relation to reimburse surgical activity. Surprisingly, although Norway is a country with high level of day surgery (over 60%) [1], policymakers have recently decided to substantially reduce the reimbursement of DS procedures when comparing with the inpatient setting, to between 30 and 45% of the value for the same procedure performed as inpatient. Future will decide if this will have or not a negative impact in a further development of DS in Norway.
- **The Netherlands (wealth – rank 2nd):** Is the country that spends more of its wealth in the health system. In spite of controlling quite well its costs (with staff, labour, current needs or drugs), The Netherlands reimburses surgical activity very well. But like Norway, The Netherlands does not financially incentive DS practice.
- **Sweden (wealth – rank 3rd)**: The wealth and costs results for Sweden are similar to those for The Netherlands, with a similar financially disincentive policy towards DS. DS reimbursement is 30-65% of the value given to the inpatient setting.
- **Germany (wealth – rank 4th)**: After The Netherlands and France, Germany is the third country to spend more of its GDP on health expenditure (11.6%). As others it controls quite well cost especially those related with current needs and drugs. Staff wages are correspondent to its wealth (better doctors than nurses) and surgical activity for the inpatient setting is well reimbursed. Strangely, it's the worst country of the sample to finance DS activity, between 26.09% and 36.95% of the value paid for the same procedure on the inpatient setting. It's curious that the strongest economy of Europe doesn't lead others to incentive cost-effective programmes, such as those performed on a day surgery basis.
- **Denmark (wealth – rank 5th):** Denmark maintains is relative position in all items studied without great variation (of notice, it's the second country to have better wages for nurses and has the second best minimum national salary). Surgery activity is well reimbursed and DS has been incentive financially for a long time, with very positive consequences reflected by the national expression of almost 90% of all non-emergent procedures [1].
- **Finland (wealth – rank 6th):** Even though it is the 6th richest country it only spends 9.2% of its GDP (11th of the rank) on health expenditures. It maintains its relative position for all other items except for current needs such as the most popular daily newspaper or the Big Mac® burger where it ranks 3rd. Finland is the 4th country in terms of surgical reimbursement, but doesn't support much the DS setting where it reimburses between 54.27% and 87.41% (this value for endoscopic DS procedures) of the inpatient value.
- **United Kingdom (wealth – rank 7th):** UK is probably the country that controls best its expenditures. Minimum national salary and nurses' wages rank in the 6th and 5th position, respectively. Otherwise, UK ranks many times in the last positions for costs such as for current drugs (paracetamol in 15th and ibuprofen in 14th) and for the most popular daily newspaper. Moreover, it's one of the countries that spends less money for surgical reimbursement, even less than India for endoscopic procedures! However, in contrast to that, UK is the country that incentives better the DS setting, reimbursing better this surgical regimen than the inpatient setting, making a very rational approach through the tariffs system. Each year there is a reduction for the majority of procedures (most probably reflecting the reduction in costs when transferring patients from the inpatient to the DS setting), and when there is a need for additional incentives for DS practice, there is a lower reduction in this surgical regimen such as happened with tonsillectomy.
- **France (wealth – rank 8th):** France appears to be the country that has the worse control of its expenditures. Being the 8th in richness, it's the 2nd country of the sample that spends more with health (11.8% of its GDP). In addition it has high costs for staff (doctor's wages), current drugs (paracetamol) and current needs (Big Mac® burger). In terms of surgical reimbursement it maintains its relative position, and incentives DS paying the same value independently of the surgical regimen.
- **Spain (wealth – rank 9th):** Spain is a country with costs slightly over its wealth (costs with nurses' wages, current drugs, or even current needs, ranks higher than the 9th position). In contrast, it's the western European country with the lowest surgical reimbursement (ranks in 13th or 14th positions) but creates financial incentives for DS, where these procedures are paid for the same value as for inpatient setting.
- **Italy (wealth – rank 10th):** Italy maintains its relative rank position for the great majority of situations analysed, in relation to costs or surgical reimbursement, with exception to costs with current drugs where ranks 3rd (paracetamol) and 6th (ibuprofen), or reimbursement of endoscopic procedures (ranks 4th). Curiously, the value paid for DS activity is almost the same in comparison with the inpatient setting.
- **Portugal (wealth – rank 11th):** With a wealth that ranks below the average of the countries involved, Portugal is a country that spends a lot with its NHS (the 5th country that spends more with health expenditure, representing 10.1% of its GDP). Knowing that this value was over 10% of the GDP since 2005, where Portugal was the European economy that spent the third most on health, and that the Portuguese GDP has been stable or even slightly reduced for the last couple of years, it seems that the Portuguese governments have been actively controlling health expenditure to avoid significant increases. In terms of

other costs, Portugal maintains its relative position with one exception: reimbursement of the most frequent DS procedures for the inpatient setting where ranks 6th. Similar to many other countries, Portugal is creating financial incentives towards DS, reimbursing the same value whatever the surgical regimen used, explaining the high increase in DS practice in recent years [5].

- **Hungary (wealth – rank 12th):** Hungary and Romania are the two eastern European countries included in the study. Costs of health staff and current needs are very controlled by the government compared to other countries. Strangely, current drugs (paracetamol and ibuprofen) are quite expensive for the Hungarian population especially when compared with countries like UK. Surgical reimbursement for inpatient setting is one of the worst (only better than Romania) of the countries enrolled, but Hungary still incentives day surgery at least for the most frequent DS procedures. Hungary is taking its first steps in the promotion of DS and probably for that reason doesn't allow more complex surgery to be done under this surgical regimen. Hopefully this will be a temporary situation.
- **Romania (wealth – rank 13th):** Romania has a similar scenario to Hungary. Again, like in Hungary current drugs are too expensive in relative terms for the population to support, being paracetamol, 1 g the most expensive of the countries included. This situation can only be explained by the absence of generics of this drug in the Romanian market. In addition, it's the country that pays health staff worst, and has the smallest difference between doctors' and nurses' wages. Moreover, Romania is also the country that reimburses worst surgical activity, worse than India and Peru. Like Hungary, Romania is just starting DS activity, which can explain the limited reimbursement system of procedures performed on a day basis.
- **Brazil (wealth – rank 14th):** Brazil is a county of contrasts. Despite being one of the 20th greatest economies of the World, Brazil has one of the lowest GDP per capita. In recent years, the latest governments are making a great effort to improve Brazil's health indicators and trying to give their citizens better conditions of living. One important fact is the significant investment Brazil is making in the Health Department, spending an amount that is approaching the percentage of well-developed economies [4]. Brazil is spending a lot for its health staff (8th and 11th rank for doctor's and nurses' wages) and has significant costs with current needs like with its most popular daily newspaper (the 5th more expensive) or the Big Mac® burger (the 2nd most expensive). Surgical activity is relatively very well reimbursed (6th position for most frequent endoscopic and complex DS procedures) and DS is being financially incentivized, as its reimbursement is the same as for the inpatient setting.
- **Peru (wealth – rank 15th):** Being one of the poorest countries of those included in this study, Peru has lower investments in health demonstrated by the low percentage spent (4.5% of its GDP). In general and in relative terms the country is having costs slightly over its wealth (the majority of costs have an relative higher position that its wealth). Of notice, Peruvians have to face significant costs to buy current drugs like paracetamol and ibuprofen (the 2nd and 3rd most expensive, respectively), without any obvious explanation. Peru is starting to develop DS programmes all over the country and for this to become a more effective health strategy, financially incentives should be implemented such as offering the same reimbursement whatever the surgical regimen used, as many other countries are following.
- **India (wealth – rank 16th):** India is another example of huge contrasts. Even though it is also one of the 20th greatest World economies, among the surveyed countries it is the one that invests least on Health (only 4.2% of its GDP), explaining the poor health indicators that still exist in India [4]. Except for cost for health staff and surgical reimbursement, India maintains the last position whatever the item analysed. In addition there isn't yet any significant financial incentive measure towards DS. Day surgery is being paid between 61.82% and 76.19% of the inpatient value, making this surgical regimen not very attractive for hospitals to promote.

There is a great heterogeneity in the wealth and the economic potential of the countries involved. However, they mostly maintain their relative position for different measures assessed: those that are richer, have increased costs, but do reimburse surgical activity better than those countries that are poorer. Nevertheless, those countries that achieve a high percentage of DS activity have a strong financial incentive (e.g., Denmark, United Kingdom) than others where there is no financial incentive at all towards this surgical regimen as happens in Germany. Countries like Portugal, France, Spain or Hungary are using this strategy of financial incentives to promote more and more DS. There are significant potential savings when NHS maximize DS practice through financial incentives, especially the opportunity to reduce overall costs with surgical practice when transferring surgery from the inpatient to the DS setting, such as the UK reimbursement policy in recent years.

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Impact of Ambulatory Surgery in the daily life of patients and their caregivers

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Abstract

Aim: To investigate the impact of ambulatory surgery in patients' and caregivers' daily life.

Methods: Telephonic questionnaires, to ambulatory surgery patients and caregivers, performed during the postoperative period.

Results: 220 telephonic questionnaires were done. Patients take, in average, 3days to acquire autonomy and 20days to return to work. Working caregivers (65.2%), miss work a media of 5.1days. Patient and caregiver prefer ambulatory surgery (87.0%;85.5%), but 13% of caregivers didn´t feel up to the role of caregiver.

Conclusion: The preference for day surgery is unanimous, but result, not only in a patient and caregivers important daily life impact, but also a reasonable socio-economic impact.

Keywords: Ambulatory surgery; Outpatient; Caregiver.

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Introduction

Ambulatory surgery is considered advantageous, safe and effective. As a result, in the past years, we have been assisting to a fast expansion, in the number and complexity of procedures done as day surgery. This results in an increase demand on patient self-recovery and availability of an adult caregiver.

Ambulatory surgery involves a transfer of care from the hospital to patients' homes, which implies the existence of a caregiver that interrupts his daily life to take care of the patient subjected to surgery. This support involves pain management, wound care, administration of drugs and the initial management of potential complications.

By accepting this responsibility patients and caregivers assume an extremely important role and their inability to deal with these demands compromises ambulatory surgery itself.

Usually the caregiver is a close relative, without any specific knowledge in health care. This requires that both, patients and caregivers, receive clear instructions for perioperative care.

But what kind of caregivers should we trust? Are they properly informed about what to do? Do they feel able to perform the job? What are the real difficulties they experience?

There is a lack of data regarding the impact of ambulatory surgery in patients' and caregivers' daily life [1,2].

The purpose of this clinical trial is to characterize the caregiver in the ambulatory surgery setting, evaluate the adequacy of information provided by healthcare professionals and identify the difficulties patients and caregivers' have at home during the perioperative period. Our goal is to contribute to the improvement in care of all the subjects involved in the day surgery process.

Methods

This is a prospective, observational, transversal study.

The target population included adult patients, submitted to ambulatory surgery regardless of surgical specialty (General, Plastic, Orthopedic, Gynecologic, Ophthalmic and ENT surgery), during October 2009, in Ambulatory Surgery Unit of Pedro Hispano Hospital.

Patients under 18 years or submitted to surgical procedures without anesthesia were excluded from the study.

An independent telephonic questionnaire was made to recovering patients and their caregivers, during postoperative period.

The questionnaire included questions regarding population characterization (age, ASA Physical Status, type of surgery, occupational activity, previous knowledge about day surgery and relatedness between patient and caregiver), impact on the daily routine (number of days away from home, of labor absenteeism and dependence on the caregiver), follow-up (the need to call for unscheduled professional care, identification of difficulties) and preference between outpatient versus inpatient surgery.

Results

We performed 220 phone calls to 109 patients submitted to day surgery and 111 caregivers, between 7 days and 4 months after the procedure. Finally data from 78 patients and 71 caregivers were included.

The two following diagrams (1 and 2) explain the motives for exclusion and not performed questionnaires.

Sample characterization: Patients average age was 44.4 years, the majority were classified with a physical status ASA I and ASA II (44.9%; 46.4%) and 8.7% were ASA III; 57.9% were female. Most patients were workers (53.6%), followed by retired, domestics, unemployed and students (23.2%; 13.1%; 8.7%; 1.4%).

Caregivers average age was 44.4 years, 65.2% were females and 65.2% were workers followed by retired, unemployed and domestics (18.9%; 10.1%; 5.8%). 52.2% were spouses, 27.5% sons and 20.3% other relatives or friends. In 79.7% of cases they share the same household.

Impact of day surgery in daily life: 8.7% of the patients and 7.2% of caregivers had to move from home in the post-operative period, for an average of 10.8 days and 8.6, respectively (minimum of 1 and

maximum of 30 days).

An average of 3.5 days were necessary for patients to acquire autonomy from caregiver (minimum of 0 and maximum 60 days) and the working patients needed an average of 13.6 of days to return to work (minimum of 0 and maximum 90 days).

Working caregivers had to miss work in average 4.2 days (minimum of 0 and maximum 111 days), most of them in the day of surgery and during the early postoperative period.

Adequacy of information: 47.8% of patients had previous knowledge about day surgery. Most of them were from past experience (63.6%), and the remaining received information from the media, health professionals and family or friends (12.7%; 12.1%; 12.1%).

Both patients and caregivers reported feeling well informed about the postoperative care (97.4%; 85.9%), referring as the main source of information nurses on the day of surgery (67.9%; 63.4%).

Follow-up: 9% of patients needed unplanned professional health care after surgery, mainly due to pain (42.9%). 28.2% of patients had doubts and fears during the postoperative period related, in the majority of cases to pain control (40.9%).

Lack of experience and difficulty in dealing with the dressing were the main reasons why 12,7% of caregivers didn't feel able to perform their role.

Preference of surgical scheme: Both patients and caregivers revealed preference for ambulatory surgery (87.2%; 85.9%), referring as main reasons simplification of the surgical process (41.0%; 36.6%) and patient comfort (42.3%; 33.8%). Patients and caregivers, that preferred inpatient surgery (10.3%; 14.1%), indicated as main reasons fear of complications (50.0%; 30.0%) and preference for professional care in the postoperative period (25.0%; 40.0%).

Discussion

The preference for day surgery is unanimous, considerer by health systems economic advantageous, however the transfer of care to patient´s home, can generate an important public socio-economic impact, resulting in two individuals temporarily non-productive instead of just one, by which can be for long periods of time.

The caregiver, who take responsibility for patients care after ambulatory surgery is in most cases, the spouse that cohabit with patient.

Only a minority of patients and caregivers, have to travel from home to receive or give care after day surgery, but when it happen it was for a long period of time.

Most patients and caregivers are active workers. The worker patient submit to ambulatory surgery take a long time to restart their professional life (median of 13,6 day). The worker caregivers had to miss work (media of 4,2 days) during day surgery and till patient acquire autonomy (media of 3,5 days).

Table 1 Patients: number of days required to achieve autonomy from the caregiver and to return to work.

Time (days)	0	1	2	3–7	8-15	16–30	31–45	≥45
Acquire autonomy (n 78)	10 (13.0%)	13 (18.8%)	15 (20.5%)	16 (18.8%)	15 (18.8%)	7 (8.7%)	2 (1.4%)	
Return to work (n 42)	10 (15%)			5 (12.5%)	8 (17.5%)	11 (20.0%)	6 (15%)	9 (20.0%)

Table 2 Caregivers: number of days absent from work .

Time (days)	0	1	2	3-7	≥8
Miss job (n 47)	23 (48.9%)	9 (19.1%)	6 (12.8%)	3 (6.4%)	6 (12.8%)

Table 3 Patients: average of days to acquire autonomy and to return to work for type of surgery.

Type of surgery	Acquire autonomy (n 78)	Return to work (n 42)
Hernioplasty (n 15)	8.1	20.7
Pilonidal cyst resection (n 10)	13.9	25.1
Cholecystectomy (n 2)	3.5	21.0
Superficial cutaneous lesion resection (n 3)	4.3	11.5
Abdominal liposuction (n 2)	2.5	8.5
Carpal tunnel release/Palmar fasciotomy (n 17)	11.8	45.0
Knee/shoulder arthroscopy (n 3)	4.7	30
Removal of bone implants (n 2)	22.5	45
Hysteroscopy (n 17)	2.1	9.0

Some other wise, consider minor day surgeries, like neurolysis median nerve, palmar fasciotomy, sacrococcygeal cyst resection, osteosynthesis material extraction and hernioplasty, cause patient debilitation and implies patients long periods of recovery (≥ 8 days to acquire autonomy and ≥ 20 days to return to work).

Despite an anesthesia and surgical consultation, that all patients proposed to day surgery are obliged to go, the information provided by nurses at the day of surgery, was identified as the principal information source about care in ambulatory surgery. As consequence we must reflect about the adequacy of medical consultations before day surgery.

Despite the analgesic prescriptions done to all patients before discharge to home, the pain remains a disturbing factor in postoperative period. This results in stress for both patient and their caregiver, and it was identified as the main reason of doubts and fears during postoperative period.

This draws attention to the need of a better pain control in postoperative period and future investigation about possible reasons, like patient therapeutic failure or physician insufficient analgesia.

It was also detected the need to clarify the caregiver preoperatively, about how to deal with the dressing and other possible complications. Perhaps we must consider the possible need of a preoperative nurse consultation.

In future studies it would be interesting to characterize the previous experience of caregivers in taking care of debilitated persons.

In our ambulatory surgery department is protocol a nurse phone call in first day after surgery, for monitoring the evolution of patient submits to surgery. But maybe an involvement of local primary health centers in the postoperative care monitoring would be helpful, for example the possibility of a home nurse visiting in postoperative period could reduced the stress felt be caregivers, clarify any doubts and allow caregivers early return to work.

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Comparison of propofol vs. propofol/ remifentanil anesthesia in upper GI endoscopic ultrasound examination (EUS)

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Abstract

Aim: To examine whether there is any benefit from adding remifentanil to propofol during anesthesia for EUS.

Methods: Anesthesia conditions and the incidence of complications were compared when propofol vs propofol/remifentanil anesthesia were used for EUS.

Results: There was a trend for better anesthesia conditions and lower incidence of complications when propofol was used alone. The difference between the two groups, however, was not statistically significant.

Conclusion: Combining remifentanil with propofol during anesthesia for EUS does not produce better conditions or lower incidence of complications than using propofol alone.

Keywords: Anesthesia; Upper gastrointestinal endoscopy; propofol; remifentanil.

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Introduction

As gastrointestinal (GI) endoscopies increase in both number and complexity, propofol anesthesia for these procedures has gained wide popularity because of its desirable pharmacologic profile as an ultrashort-acting sedative-hypnotic. Propofol is often used as the sole anesthetic for GI endoscopy, but has also been used in combination with opioids during upper GI endoscopy where opioids confer the added advantage of suppressing some of the airway reflexes [2]. The opioid remifentanil is a potent but short-acting synthetic mu-opioid agonist. Similar to that of propofol, the kinetic profile of remifentanil is ideal for procedures such as upper GI endoscopy where the stimulus is intense but brief and intermittent, and where no post-procedural pain is anticipated. Therefore, combining the two drugs could potentially improve patient tolerance of the procedure.

Synergy between remifentanil and propofol in blunting response to noxious stimuli has been demonstrated [3]. However, this synergy also increases the risk of respiratory and cardiovascular depression necessitating the use of a smaller dose of propofol when used in combination with remifentanil compared to when propofol is used alone. The benefits of propofol/remifentanil over propofol alone in upper GI endoscopy have not been demonstrated prospectively. As a result, this randomized, double-blinded study sought to test the working hypothesis that propofol/remifentanil combination provides superior conditions than propofol alone during anesthesia for upper GI endoscopic ultrasound (EUS). In addition, this study aimed to compare the incidence of hypoxia and hypotension between the two techniques.

Methods

One hundred ASA physical status I-III patients age 18 to 65, scheduled for EUS were enrolled in the study. The study was approved by the Institutional Review Board of our hospital. Informed consent was obtained from participating patients. Exclusion criteria included history of allergic reactions to any of the study drugs, chronic opioid use, morbid obesity (BMI > 40), and pregnancy.

Patients were randomly assigned to Group P (propofol) or Group P/R (propofol/remifentanil) using a web-based program (www.randomizer.org). Group P patients received plain propofol 10 mg/ml, and Group P/R patients received propofol diluted with normal saline to a 5 mg/ml concentration + remifentanil 1 mcg/ml. All medications were prepared by the OR pharmacist. Both the endoscopist and the anesthesia provider were blinded to the treatment drug(s) by preparing the syringes such that the appearance of both propofol and propofol/remifentanil was identical. In addition, regardless of group designation, identical drug volumes were delivered using the same drug administration protocol.

After intravenous access was established, the patients received routine supplemental oxygen (3 L/min) by nasal cannula. Vital signs (non-invasive blood pressure, heart rate, respiratory rate, pulse oximetry, and capnography) were monitored before and every 3 minutes until the conclusion of the procedure. All patients were given intravenous glycopyrrolate 0.2 mg before the start of the procedure to decrease salivary secretions. Group P patients received propofol 1.5 mg/kg for induction followed by propofol infusion of 200 mcg/kg/min for maintenance of anesthesia. Group P/R patients received propofol 0.75 mg/kg + remifentanil 0.15 mcg/kg for induction followed by an infusion of propofol 100 mcg/kg/min + remifentanil 0.02 mcg/kg/min for maintenance of anesthesia. Additional boluses of propofol 200 mcg/kg in Group P, or propofol 100 mcg/kg + remifentanil 0.02 mcg/kg in Group P/R were administered at 30-45 second intervals until the patients were unresponsive to stimulation by a Yankauer suction catheter inserted into the oropharynx. The infusion rate and bolus delivery were adjusted based upon the clinical judgment of the anesthesia provider. Conditions during the procedure were deemed appropriate when the patient exhibited minimal movement but was able to maintain spontaneous respirations.

During the procedure, the following data were recorded: total induction time (start of anesthesia to endoscope insertion), total induction drug(s) dose, total procedure time

(endoscope insertion to endoscope removal), and total procedure drug dose. The quality of anesthesia, as determined by patient response, was rated by the blinded endoscopist using a 4-point scale (1 = minimal response, 2 = mild response, 3 = moderate response, 4 = severe response). Episodes of hypoxia (arterial O_2 saturation <85%) or hypotension (systolic blood pressure <90 mmHg) were also noted. Apnea was managed by decreasing or discontinuing the treatment and with positive pressure ventilation, if necessary. Airway obstruction was managed with standard airway maneuvers such as chin lift, jaw thrust, and the use of oral or nasal airways, if necessary. Hypotension was treated with intravenous fluid boluses and/or pharmacologic agents such as phenylephrine or ephedrine, as appropriate. At the conclusion of the procedure, patients were monitored at the post-anesthesia care unit. Patients were discharged when appropriate criteria were met including stable vital signs, lack of post-procedure nausea and vomiting, ability to tolerate oral intake and return of mental status and ambulation to baseline.

The study's primary endpoint was quality of sedation and secondary endpoints were the incidence of hypoxia and hypotension. A sample size of 50 per group was chosen for simple feasibility in the single-site clinical setting of the study. This sample size was sufficient to detect a significant difference for the primary endpoint with 80% power and an overall experiment-wise error rate of alpha = 0.05. The quality of sedation was analyzed using nonparametric Wilcoxon test and the incidence of hypoxia and hypotension were analyzed using Student's t-test.

Results

Ninety-six out of 100 enrolled patients were included in the analysis. One patient underwent the procedure and enrolled in the study twice, receiving different treatment each time. One patient was excluded from the study because of procedure change. One patient assigned to the P/R group was excluded from the study because he required very large induction dose that was not possible to deliver using the study protocol. Two patients were excluded because of incomplete data collection. Patients were similar with respect to demographic data and procedure time except for a higher number of females in the P group and a higher number of males in the P/R group (Table 1). As expected, remifentanil had a dose-sparing effect on propofol (Table 1).

Table 1 Patient Characteristics.

	P	P/R
Total Number	49	47
Sex (M/F)	19/30	29/18
Age	51.0 (2365)	51.6 (27-65)
BMI	26.1 (19.1-37.0)	25.5 (18.2-37.1)
ASA Class (I/II/III)	1/37/11	3/37/7
Total Anesthesia Time (min:sec)	19:52	20:24
Total Dose Propofol (mg/kg)	5.9 ± 2.4	3.6 ± 1.7
Total Dose Remifentanil (mcg/kg)	N/A	0.7 ± 0.3

P = propofol group, P/R = propofol/remifentanil group

Overall, the quality of sedation as rated by the endoscopist was similar in both groups. The number of patients with anesthesia score of 1, 2, 3 and 4 was 35, 11, 2, 1 in the P group and 27, 16, 4, 0 in the P/R group, respectively (Table 2). The average anesthesia score was 1.37 and 1.51 for P and P/R, respectively (p-value = 0.15) (Table 2). Hypoxia occurred in 4/49 (8%) and 6/47 (13%) of patients in the P and P/R groups, respectively (Table 2). Most of the hypoxia was caused by airway obstruction and responded to standard maneuvers such as chin lift and jaw thrust. One patient in the P group developed apnea that required management by mask-bag ventilation. Hypotension occurred in 2/49 (4%) and 6/47 (13%) of patients in the P and P/R groups, respectively (Table 2). All episodes of hypotension resolved after administration of IV fluid bolus and/or phenylephrine or ephedrine. Although there was a trend for better anesthesia scores and lower incidence of hypoxia and hypotension in the P group, the difference between the two groups was not statistically significant (Table 2).

Table 2 Patient Outcomes.

	P	P/R	*p*-value
Quality of Anesthesia	1.37	1.51	0.15
Hypoxia	4/49 (8%)	6/47 (13%)	0.46
Hypotension	2/49 (4%)	6/47 (13%)	0.12

P = propofol group, P/R = propofol/remifentanil group

Discussion

Propofol has gained wide acceptance for anesthesia in upper GI endoscopy because of its rapid onset and short duration of action. However, propofol has a narrow therapeutic index and lacks intrinsic analgesic properties. Therefore, when propofol is used alone, relatively large doses are needed to provide optimal conditions for insertion of the upper endoscope, increasing the possibility of adverse events [5]. Indeed, this level of sedation can rapidly reach the depth of general anesthesia, and can result in dose-dependent hypotension, respiratory depression, and airway obstruction [4]. Remifentanil, unlike other mu-opioid receptor agonists, is metabolized by nonspecific plasma esterases through enzymatic hydrolysis, resulting in an extremely rapid clearance that is independent of excretory organ function [6]. Numerous studies have evaluated the use of remifentanil to supplement propofol during colonoscopy with mixed results [7,8].

However, findings from these studies may not be extrapolated for GI endoscopy because of the difference in the intensity and pattern of stimulation between the two procedures. As a result, our study compared propofol/remifentanil and propofol in upper GI endoscopy, a procedure considered more stimulating than colonoscopy. Because of the similar pharmacokinetics of both drugs and the known synergy between propofol and remifentanil, we hypothesized that the combination of propofol/remifentanil will provide better anesthesia compared to propofol alone. Our findings suggest that the combination of propofol/remifentanil does not improve the quality of sedation and confers no benefit compared with the use of propofol alone.

In the current study, the dose of remifentanil used was comparable to the dose recommended for spontaneously breathing patients [9]. In addition, the dose of propofol used was within the range used to produce general anesthesia. All routine requirements for care of patients undergoing general anesthesia were applied to the study

patients. Anesthesia was induced slowly and the drugs were given enough time to reach peak plasma levels before the start of the procedure. In addition, adequate depth of anesthesia was confirmed before insertion of the endoscope. Consequently, we postulate that these steps were helpful in achieving generally favorable sedation conditions and low incidence of complications in most of the study patients regardless of treatment regimen.

As expected, patients in the P/R group required a smaller dose of propofol during the procedure than patients in the P group. Unfortunately, the trend for better conditions and lower incidence of hypoxia and hypotension when propofol was used alone did not reach statistical significance because the study was powered to detect relatively large, clinically meaningful differences. However, our results suggest that using propofol alone during anesthesia for EUS may be preferable to using a smaller dose of propofol combined with remifentanil.

A major limitation of our study is that post-procedure data about recovery and discharge times as well as the incidence of complications such as nausea and vomiting were not collected. Propofol is known to have antiemetic properties while remifentanil has the potential for causing nausea and vomiting.

In conclusion, when anesthesia induction and maintenance during EUS is carried out slowly according to the described protocol, there is a trend for better anesthesia conditions and lower incidence of hypoxia and hypotension when propofol is used alone compared to when a smaller dose of propofol is used combined with remifentanil. However, the difference between the two groups was not statistically significant.

Additional studies using a larger group of patients are warranted to detect the small but potentially clinically-significant differences between the two groups.

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